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HYDROLOGICAL MODEL OF THE TOPLICA WATERSHED IN ADDRESSING NEW CHALN LENGES IN FLOOD RISK ASSESSMENT

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ABSTRACT

Torrential floods are hydrological natural hazards by nature of their occurrence, but with a high scale of severe damages to the facilities and infrastructure and a high number of casualties in human populated environment, they can become a natural disaster. In addition, they cause more or less significant environmental changes, such as geomorphological damages to river banks and river channels. In enhancing the existing capabilities of flash flood risk management for meso- and small-scale basins, building a hydrological model for a specific watershed is of great significance. In this paper, a hydrological model is created using the Shetran hydrological software for the upper part of the Toplica River basin located on the eastern slopes of Mount Kopaonik in Southern Serbia. The watershed model is based on extreme rainfall events and involves a large dataset of natural characteristics (relief, geological terrain, soil, vegetation and microclimate) and land use factor in the calculation of torrential flood occurrence. Shetran is used to enable the transformation of rainfall in the runoff with the aim of getting simulated flood hydrographs that correspond with the registered hydrographs as much as possible. Model-sensitive parameters are determined and subsequently calibrated and validated. The average coefficient of determination for the watershed model of the Toplica River/ profile Magovo when registered and modelled hourly discharges are compared reaches 0.87, showing a good precision so that it can be useful in torrential flood forecasting.

Keywords: Runoff modelling, Maximal discharges, Torrential floods, Toplica River

INTRODUCTION

The initiation of torrential processes is related to a wide range of watershed conditions [1], [2], [3], [4]. Watershed hydrology research is supposed to include all spatially variable natural characteristics (microclimate, topography, geology, soil, vegetation) and anthropogenic factors (for example, land use) [5], [6]. In urbanized landscapes, surface runoff is dominant due to a decrease of permeable surfaces and low infiltration rate. In rural regions, forest covered areas have a positive role, but agriculture is an influential modifier of soil and vegetation characteristics creating erosion- and runoff-friendly conditions in watersheds.

Engineering risk assessment relies on the risk modelling approach with the aim of reaching the best risk assessment and optimal decision-making support [7]. In torrent hydrology, it is essential to understand the philosophy of relationships and interactions between watershed characteristics and watershed processes. Mathematical modelling of

watersheds provides a simulation of hydrological processes and their relations, taking into account the physical-geographical specificity of watershed characteristics, finally enabling runoff prediction. Hydrological simulations are a valuable instrument for determining the threshold of torrential flood occurrence and the rate of watershed reaction to an extreme rainfall event. The aim of this paper is to create a hydrological model of a watershed located in a mountainous region of Serbia in order to provide hydrological simulations of extreme maximal discharges, i.e. torrential flood waves. The main focus is on the transformation of rainfall in the runoff to get simulated flood hydrographs that correspond to the registered hydrographs to the greatest possible extent.

CHARACTERISTICS OF THE MODELLED WATERSHED

The Toplica River is a left tributary of the Južna Morava River and its river basin covers an area of 2,180 km2. Given that hydrological modelling of small areas is more accurate and relevant than in the case of larger areas, the study area covers the upper part of the Toplica River basin up to the Magovo profile (hereinafter also: watershed Toplica/Magovo) (A=173.46 km2). The watershed Toplica/Magovo spreads in the west/southwest direction to the east and is located in a rural region on the eastern slopes of the Kopaonik Mountain in Southern Serbia. The upper part of the study area (sub-watersheds of Duboka and Zaplanjska reka) belongs to the National Park of Kopaonik, so this territory is under a strict protection regime.

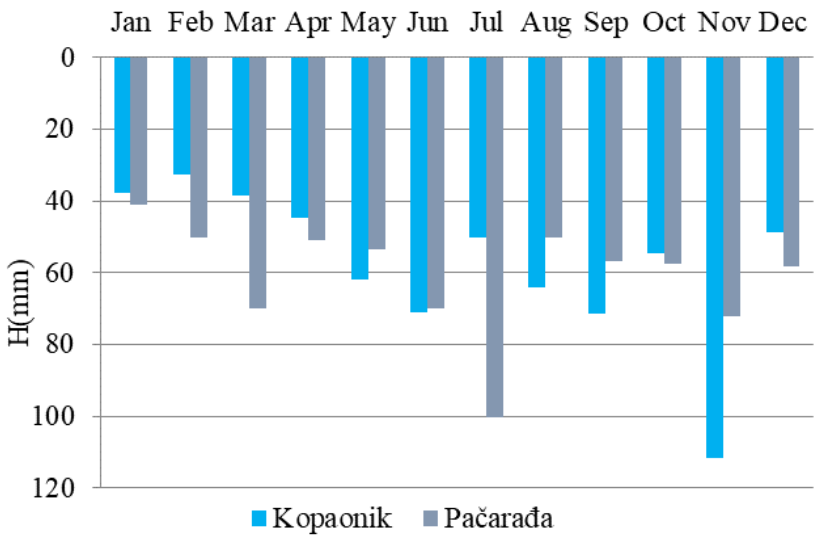

Figure 1. Absolute maximal daily precipitation per month for the 1968-2012 period on main meteorological gauge Kopaonik and period the 1976-2012 period with interruptions in measurement on gauge Pačarađa (Source: Republic Hydrometeorological Service of Serbia)

Precipitation and discharge extremes are always at issue when talking about torrential floods. The most-rainy months in the upper part of the Toplica River basin are June, May and July according to the recorded data on the main meteorological gauge Kopaonik and precipitation gauge Pačarađa, while the absolute maximal daily precipitations are recorded in July, then November, June and March on gauge Pačarađa and in November, September and June on gauge Kopaonik (Figure. 1). Since the theoretical trigger rainfall quantity for the occurrence of a torrential flood event is more than 30mm/day, all of these recorded absolute maximal daily precipitations could have resulted in a genesis of a torrential flood wave in the watershed. As an example, absolute maximal daily

precipitation on the gauge Pačarađa was recorded in July (H=100.2 mm) after an extreme rainfall event which caused the occurrence of a flood with an absolute maximal discharge (Qmax = 192 m3s-1) on 17th July 1986. In addition to torrential flood events in warmer part of the year as a consequence of spring/summer extreme rainfall events, the precipitation during colder periods of the year is mostly in the form of snow since the study area is situated in a mountainous region (the highest point of the watershed is at an altitude of 2017 m a.s.l – Pančić's peak) and they can trigger a torrential flood event when melting, especially when coinciding with a rainfall episode.

Hydrological analysis of the watershed in terms of the time of concentration, lag time and time of regression is given in Table 1. The value of concentration time on the profile Magovo in the Toplica watershed, using equations after Ristić [8], is calculated in the range from 6.3h to 6.8h and the average Tc is 6.46h. The average lag time calculated according to the equations [9] in Table 1 is 4.56 h, while the average time of regression is 11.3 h.

Table 1. Time of concentration, lag time and time of regression for the watershed Toplica/Magovo

Time of concentration - T_c	h	Lag time–T_l	h
$0{,}502 \cdot A^{0{,}506}$	6.8	$0.751\ (\frac{L \cdot Lc}{\sqrt{Smr}})^{0.336}$	4.7
$0{,}316 \cdot L^{0{,}933}$	6.6	$1.399\ (\frac{L \cdot Lc}{\sqrt{Smr \cdot Smt}})^{0.315}$	4.5
$0.819\ (\frac{L \cdot Lc}{\sqrt{Iu}})^{0.376}$	6.3	$0{,}693 \cdot Tc$	4.5
$0{,}47 \cdot L^{0{,}826} \cdot S_{mr}^{-0{,}127}$	6.3	Time of regression - T_r	h
$0{,}609 \cdot L^{0{,}898} \cdot S_{mr}^{-0{,}17}$	6.4	$1.145 \cdot A^{0{,}446}$	11.4
$0{,}56 \cdot L^{0{,}846} \cdot S_{mr}^{-0{,}084} \cdot S_{mt}^{-0{,}08}$	6.4	$L^{0{,}743}$	11.2

(A– Watershed area in km2; L- watershed length along the main channel, from the point on a watershed boundary to the profile/outlet, Lc– distance from the profile, measured along the main channel to the point in the river bed closest to the centroid of watershed, Smr– mean slope of the riverbed; Smt - mean slope of terrain)

Average maximal annual discharge of the Toplica River on the profile Magovo is 29.3 m3s-1, while average minimal annual discharge is 0.28 m3s-1 (average annual discharge is 1.61 m3s-1). The ratio between the absolute maximal discharge which occurred in 1986 and the absolute minimal discharge which occurred in 2012 is 1:1.714, indicating the torrential hydrological regime of the Toplica River/Magovo. From the maximal discharge data series, four events (Table 2) were suitable - due to data requirements, to be taken into the modelling process.

The BFI program was used to analyze these torrential flood waves in order to split the base flow and direct runoff. As in Table 1, the share of the base flow is the lowest in the total runoff volume of the greatest flood wave in July 1986, so BFI is the lowest and specific maximal discharge is the highest. The intensity of rainfall precipitation was the highest in the downpour episode in July 1986, while the duration of all four rainfall events was almost equal (6-8 hours). The peak surface flow was reached at midnight on 16/17th July, 1986, 2 hours after the direct flow started.

Table 2. Some characteristics of the distinguished flood waves of theToplica River/Magovo profile

Flood event	T_r(h)	I_r	W_d ($10^6 m^3$)	Q_{dmax} ($m^3 \cdot s^{-1}$)	W_b ($10^6 m^3$)	Q_{bmax} ($m^3 \cdot s^{-1}$)	W_t ($10^6 m^3$)	BFI (Wb/Wt)	Q_{max} ($m^3 \cdot s^{-1}$)	q_{maxsp} ($m^3 s^{-1} km^{-2}$)
13.-14.08.1983	8	1.19	1.98	3.908	6.67	1.300	8.65	0.771	4.90	0.028
17.-20.06.1986	5+2	2.23	6.91	12.079	15.25	3.800	22.16	0.688	13.9	0.079
16.-18.07.1986	7	13.96	89.03	187.182	59.52	17.760	148.55	0.401	192.00	1.106
03.-06.08.2010	6	4.03	9.10	14.513	13.29	3.590	22.39	0.594	16.1	0.093

In the watershed of the upper Toplica River up to the profile Magovo, the greatest area is under flysch sediments according to the digitalized geological map of Kuršumlija and Novi Pazar whose scale is 1:100000 issued by the Geological Service of Serbia. With regard to the soil cover (Figure. 2), dominant soils are Eutric Leptosol and Dystrict Lepotosol (87.3%) and Cambisol (10.2%), according to the digital soil map from 1979 (source: Institute of Soil Science, Belgrade). Land use is defined by CORINE Land Cover 2006 (Fig. 3) and it is presented by deciduous forest (60.2%), arable land (19.9%) and shrub (12%) (in interpretation of the CLC database for the Shetran modeling purposes). Due to socio-economic trends in the upper part of the Toplica River basin, such as depopulation and migrations, the local forest areas have increased after 2000 [10]. According to the geomorphological map of Kuršumlija and Novi Pazar [11], there are thirteen fans in the watershed of Toplica/Magovo, as evidence of historical torrential floods with the transport of a huge amount of sediment and accumulation of it at the mouth of the tributaries. According to the Inventory of torrential floods in Serbia [12], there are 19 recorded torrential flood events in the Toplica River basin at the time lapse of 99 years. It is supposed that this number is much higher, but not recorded due to a lack of data.

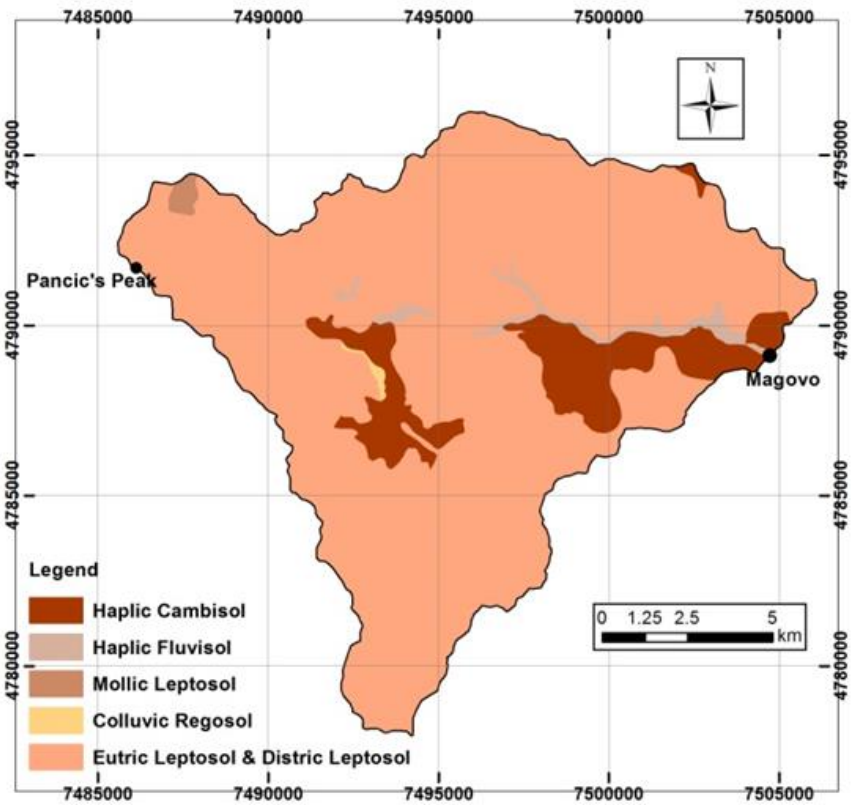

Figure 2. Soil map of study area

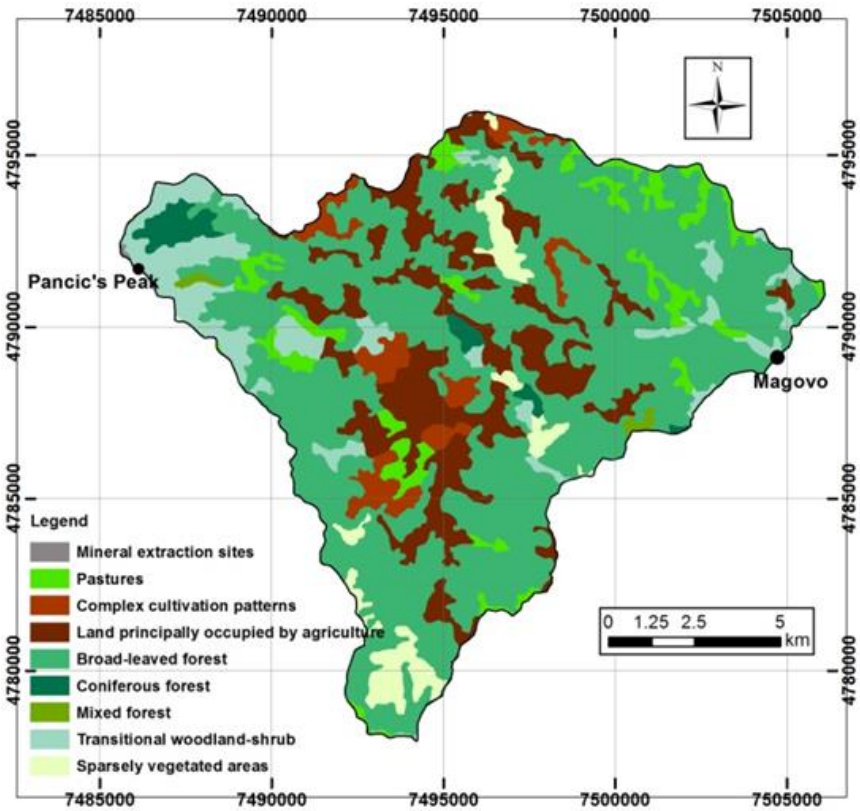

Figure 3. Land cover of study area

SHETRAN AS A SOFTWARE FOR HYDROLOGICAL MODELLING

SHETRAN (written in Fortran) is designed as a modelling system for watersheds using the physics-based governing partial differential equations (such as Rutter storage model, Penman–Monteith equation, Richards equation, Boussinesq equation, Saint Venant equations) working on a three-dimensional grid level. It is a rainfall-runoff model on a slope-channel scale, calculating processes of infiltration, evapotranspiration, overland flow, basic flow and flow through the river network. Input data are rainfall data altogether with the watershed data and output data are modelled discharges.

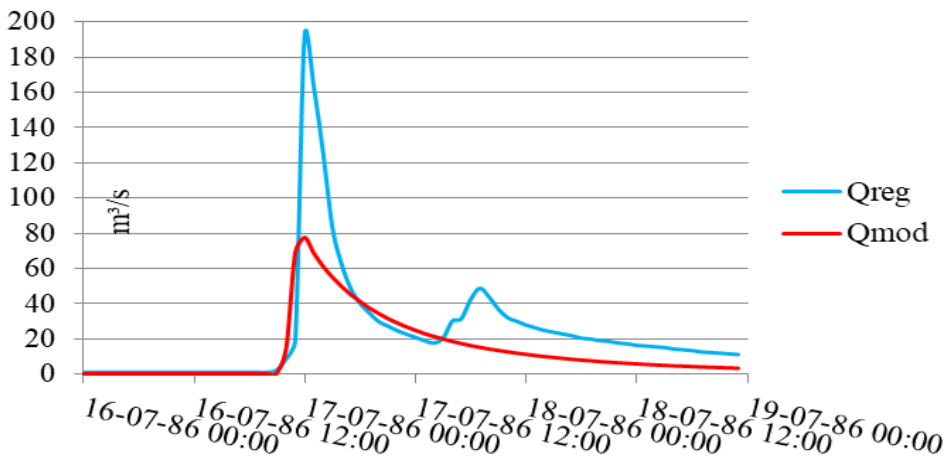

Figure 4. Initial modelled hydrograph for the flood event in July 1986 created by running the Shetran GUI aplication

In terms of the spatial discretization of watershed, there are three types of elements – grid, channel and bank, which are linked so that computations at the watershed level at defined time step and through the whole simulation period are enabled. For each simulation and calculation, the three flow modules are mutually inter-dependent and automatically included by Shetran: variably saturated zone (VSS), evapotranspiration/interception (ET), overland/channel (OC).

After processing and preparing the data on topography (using SRTM 90m digital elevation model), geology, soil, vegetation and land use for the watershed of the Toplica River/Magovo in ArcGIS, the starting point of using this software for hydrological modelling is to run Shetran graphical user interface - GUI application on the base of the digital elevation model and watershed mask, with dominant land use, i.e. vegetation type, dominant soil type, hydrological and meteorological hourly data for the flood wave event. Typical heavy downpour event (H∑4h=76.5mm) and related absolute maximal discharge in July 1986 (Qmax=192 m3s-1) is taken for sensitivity analysis and calibration, and maximal discharge events (which belong to the medium discharges) in June 1986, August 1983 and August 2010 are used for the validation of the watershed model. The result of this initial simulation is a primary modelled hydrograph with the shape non-fitting to the registered hydrograph and the maximal ordinate which was much lower than recorded one (Figure. 4). In this first step, two main outputs for the development of the watershed model were derived: the river network which is integrated in the watershed grid matrix and the input files, to feed them in the phase of calibration. The size of grid cells is 500x500m and the dominant geological, soil, vegetation and land use property of one grid is attributed to the whole grid. The grid matrix (Figure. 5) includes 698 grid cells, while the number of rows and columns for computations are 40 and 43.

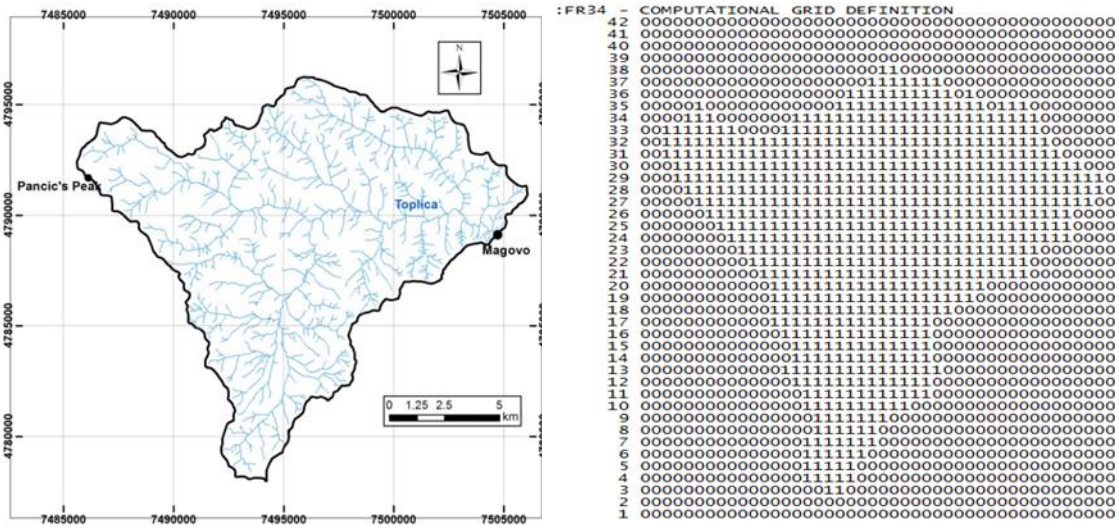

Figure 5. Study area and its grid definition

ESTABLISHMENT OF THE TOPLICA/MAGOVO WATERSHED MODEL

For further development of the watershed Toplica/Magovo model, the input files were supposed to be fed with the specific parameters listed in Table 3 and their field research and literature values (according to Rawls 1982; Breuer et al. 2003; Dunn and Mackay 1995; Shuttleworth 1993; Gregory 1988).

Table 3. Needed data for watershed model

River network	Strickler roughness coefficient for river network
Geology	Rock depth, saturated water content, residual water content, saturated conductivity, specific storage, van-Genuchten n and a parameters for each rock type
Soil	Soil depth, saturated water content, residual water content, saturated conductivity, specific storage, van-Genuchten n and a parameters, for each soil type and textural classes
Vegetation	Canopy storage capacity, plant area index, canopy leaf area index, root depth, root density function, drainage k and b parameters, evapotranspiration parameters for each vegetation type
Land use	Strickler roughness coefficient for each type of land use

From the listed parameters, there are parameters which greatly influence the runoff output, so these are taken for the model sensitivity and calibration. According to the previous research [6], [13], [14], the characteristics of runoff hydrographs, i.e. slope of growth and recession branches and peak of hydrograph are very sensitive to the values of the vertical saturated hydraulic conductivity of the subsurface soil (Ks), horizontal saturated hydraulic conductivity in the saturated zone (Kr), the Strickler's coefficients for overland flow for different types of land use (inverse of Manning's roughness coefficient) (So) and the Strickler's coefficients for river network (Sr).

The influence of each parameter on simulated discharge will be well perceived when changing the values of only one parameter. Model sensitivity for the watershed Toplica/Magovo is examined with the upper and lower values of highly influential parameters (Table 4) and their impact on maximal ordinate, as given in Table 5 which shows that the greatest variation of simulated maximal discharges is caused by the input of the upper and the lower values of hydraulic conductivity for soils, then hydraulic conductivity for rocks, while upper and lower values of the Strickler's coefficients for overland flow and river network cause a lower variation of simulated maximal discharge. By using the upper value of the Strickler's coefficients for overland flow Somax, simulation gives the peak discharge closest to the registered one, it is decreased by only 0.57%. With examining the impact of Ksmax, the simulated peak discharge shows the least match, it is reduced by 26.84% in comparison with the recorded peak discharge. Model calibration is the next phase, in which the point is optimisation of the model parameter values, by performing a large number of simulations with different combinations of parameter values in defined intervals, in order to get a set of model parameters which will be used further in the validation process. In the calibration process, the main focus is on getting the simulated flood hydrographs corresponding to the registered hydrographs as much as possible.

Table 4. Intervals of parameter values for sensitivity analysis

Parameter	min	max	Unit
K_r	0.0126	5	md^{-1}
K_s	$2.74*10^{-6}$	10	md^{-1}
S_o	4	60	$m^{1/3}s^{-1}$
S_r	20	40	$m^{1/3}s^{-1}$

Table 5. Impact of parameters' values on maximal discharge on 17th July 1986(Qmax=192 m3s-1)

Parameter	min	max	ΔQ
Q_{Ks}	219.55	140.48	79.07
Q_{Kr}	231.95	183.83	48.12
Q_{So}	170.84	190.91	20.07
Q_{Sr}	178.65	196.72	18.07

The calibrated values of parameters for the watershed of Toplica River up the profile Magovo are as follows: Hydraulic conductivity coefficient for different soils are 0.051 md-1 for clay loam, 0.159 for loam, 0.0153 for clay, 0.099 for sandy clay loam, 0.0327 for silt loam, while hydraulic conductivity coefficient for rocks is calibrated to 0.74 md-1; Strickler roughness coefficient for the river network is 35 m1/3s-1, while Strickler roughness coefficient for overland flow is in the range of 4 m1/3s-1 for forests, 9 for arable land, 10 for grassland, 12 for schrub to 50 m1/3s-1 for bare lands.

RESULTS

When performing the simulation with calibrated parameters for the watershed model (Figure. 6), the coefficient of determination (R2) of the recorded and simulated hourly discharges for the extreme and historical flood event of the Toplica River/Magovo in July 1986 is 0.85 and multiple R is 0.92. Modelled peak discharge is slightly higher than recorded, Qmaxmod=192.32 m3s-1. When applying the calibrated watershed model on three other runoff events in the validation phase (Figure 7-9), also a high determination coefficient of the modelled and recorded discharges appears: R2=0.92 and correlation coefficient, multiple R=0.96 in the case of validation event in August 1983; R2=0.89 and correlation coefficient, multiple R=0.94 in the case of validation event in June 1986; R2=0.83 and correlation coefficient, multiple R=0.91 in the case of validation event in August 2010

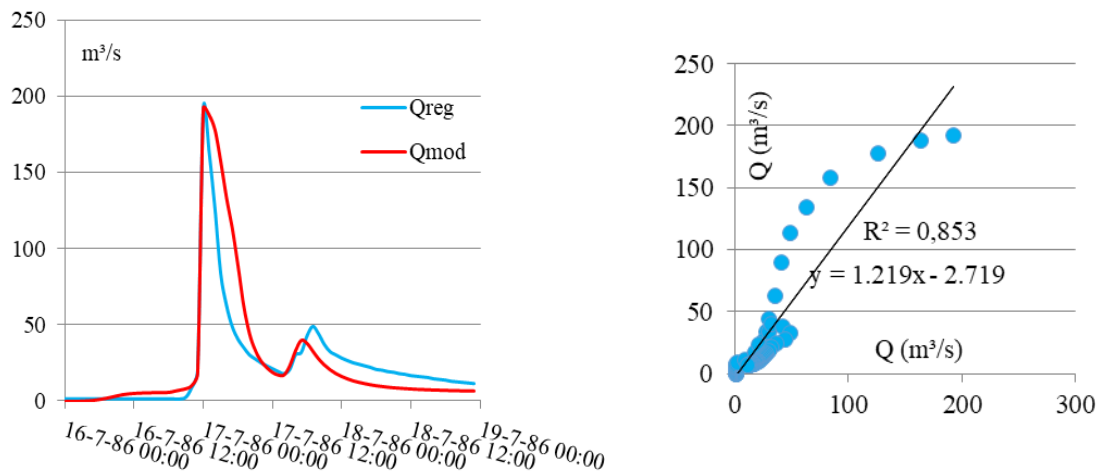

Figure 6. Simulated and recorded hydrograph for maximal discharge in July 1986 (a) and its coefficient of determination (b)

In all four simulation events, the probability of error according to the F test is lower than 0.05. When observing visually the simulated and modelled hydrograph of all four events, the best matching is in the case of the hydrographs in August 1983 and June 1986. In the case of maximal discharge in July 1986, there is a visible mismatch between the modelled and recorded regression branch of the hydrograph as well as at the secondary peak. As presented in the Figures 8 and 9, the modelled growth branches start earlier than recorded ones.

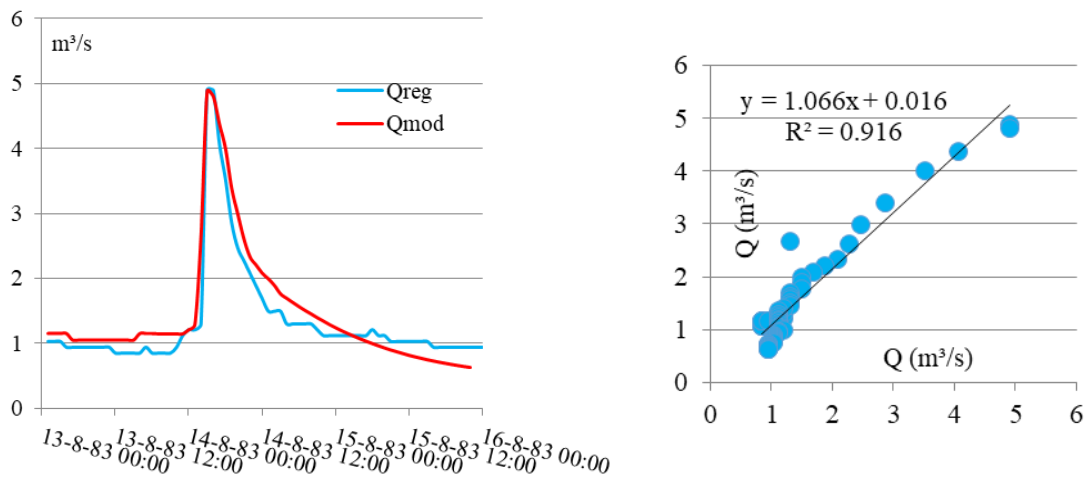

Figure 7. Simulated and recorded hydrograph for maximal discharge in August 1983 (a) and its coefficient of determination (b)

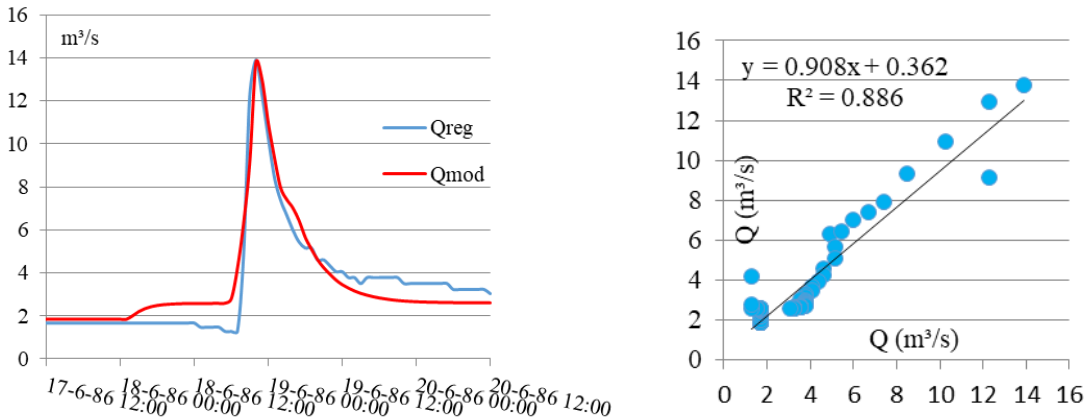

Figure 8. Simulated and recorded hydrograph for maximal discharge in June 1986 (a) and its coefficient of determination (b)

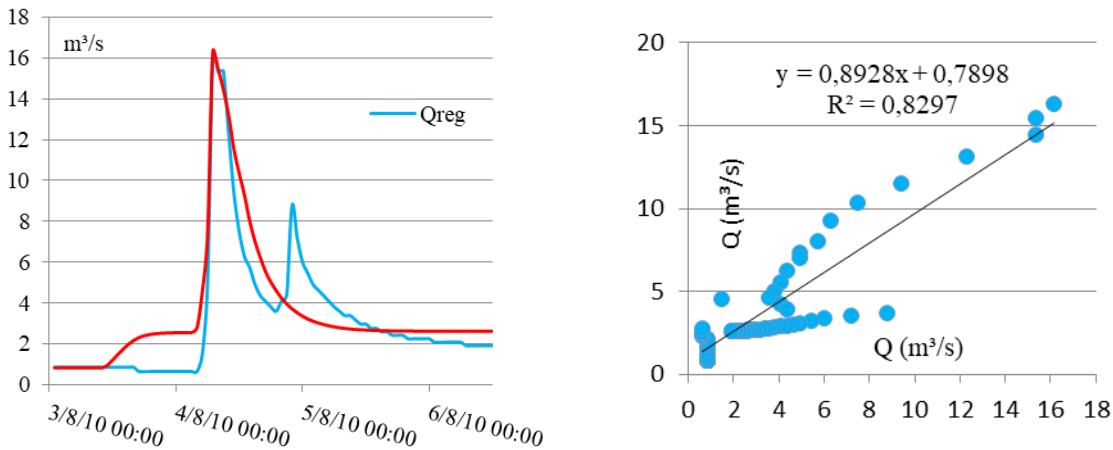

Figure 9. Simulated and recorded hydrograph for maximal discharge in August 2010 (a) and its coefficient of determination (b)

Finally, the average coefficient of determination for the watershed model of the Toplica/Magovo is 0.87, which is satisfactory in practice of hydrological simulations. By

way of comparison, the model developed for the Topčiderska River basin [6], which is hydrologically better studied and gauged and it is situated in peri-urban area (macro region of Serbian capital, Belgrade), the average coefficient of determination for simulated flood events is 0.9. Also, in other studies [13], [15], a high agreement between the modelled and the recorded hydrographs in hydrological simulations is reached.

CONCLUSION

The hydrological modelling system Shetran is used in this paper to develop the watershed model of the Toplica River on the Magovo profile by calibration in the case of the historical torrential flood event in July 1986 and verification in the case of three other torrential flood events in August 1983, June 1986 and August 2010, but starting with the model sensitivity in which the impact of influential parameters on modelled discharge is analyzed. Although the setting up a model for new watershed is difficult and time consuming, once developed hydrological model with comprehensive dataset of characteristics for one watershed can be helpful in the forecast of torrential flood events contributing to the natural hazard warning (when forecasted extreme rainfall data are available).

However, it is not possible to define risk zones in the riverine area using modelling system Shetran. The advantage of this software in terms of reliability of output data is the possibility to compare modelled with registered discharges. This research is focused on torrential flood events in hydrological terms and further research could get even more significance if this model is developed for sediment transport withal, so that it will be able to predict both torrential processes – fluvial and erosion processes. Moreover, there are studies of the effects of land use changes and climate change [16], as well as of pollutant transport [17], [18] using the modelling system Shetran, so these results should be a reminder in decision making.

There are many approaches in dealing with the flood risk phenomenon as the most frequent natural hazard whose severity and harmfulness increases from decade to decade [19]. Integrated flood risk management should inevitably comprise hydrological modelling as a valuable tool in flood risk assessment [20] [21] [22], which can finally also contribute to soil and water resources management. According to the Law on disaster risk reduction and emergency situations management of the Republic of Serbia (2018), it is compulsory for local authorities to create natural hazards risk assessment and plan of natural hazard risk reduction. In this progress towards risk reduction, local communities should collaborate since collaboration on the watershed/river basin level is necessary.

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THE IMPACT OF WATERSHED MORPHOMETRY ON OCCURRENCE OF TORRENTIAL FLOODS: CASE STUDY OF SERBIA AND BULGARIA

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ABSTRACT

In the present study, 43 watersheds in Serbia and Bulgaria are taken for the morphometric analysis using digital elevation model in the environment of geographical information system. Statistical analysis, including correlation, regression and factor analysis is conducted with the following results and conclusions: (1) as evidenced in the correlation matrix, there is a high correlation between maximal discharges and watershed area, primarily and watershed length, secondarily; (2) the high correlation is found between independent variables watershed area and watershed length, as well as Melton index and relief ratio; (3) the multiple linear regression model encompassing all seven independent variables is obtaind with R squared of 70,99, indicating that the model as fitted to that extent explains the variability in maximal discharge, and adjusted R squared of 0,65. An additional multiple regression analysis is done excluding the watershed area, due to a high starting impact on the dependent variable. In this case, a multiple regression linear model is obtained with R squared=60,116 and adjusted R squared=0,53468, leading to the conclusion that the excluded parameter has a high influence which is also confirmed by the results in correlation matrix; (4) according to the rotated component matrix in principal component analysis, first component is mostly influenced by the relief ratio, Melton index and watershed length, while the second component is determined by parameters of relief characteristics, slope >25° and watershed relief. Having regard to the results of correlation and factor analyses the watersheds are prioritized on the basis of the morphometric parameters with a purpose to indicate the watersheds with the high priority for implementation of measures reducing the flood risks. Though morphometric study itself is not sufficient to explain extensively the occurrence of maximal discharges in the events of demolishing torrential floods, morphometric analysis may meaningfully contribute to the flood risk assessment.

Keywords: morphometry, watershed, Bulgaria, Serbia

INTRODUCTION

Watershed is a basic unit for the flood hazard evaluation. Initial watershed observation comprizes the calculation of its parameters and indices and their interpretation to explain to which rate is watershed prone to flooding. Morphometrical analysis is a starting point in each hydrological study of watershed and has a wide use in specific studies such as

flood hazard assessment. From the definition of torrential watersheds – an area with steep slopes in hilly-mountainous regions with high erosion intensity and high risk of torrential floods in the case of intensive rainfall events [1], [2] - it can be concluded how important is the morphometric analysis of these watersheds.

Watershed characteristics have a strong impact on the dependence of the runoff on rainfall in the watershed. Morphometric parameters quantitatively express geomorphology of a watershed which controls hydrological response of a watershed in the case of extreme rainfall episode. In the case of the large river basins (such as the Danube river basin) it is generally known that floods in higher parts occurr abruptly on the one hand and much slower in lower parts of the basin on the other hand. Also, the round shaped watersheds experience the floods with higher peaks of maximal discharges and shorter duration in comparisson with the elongated watersheds. Watershed management professionals especially rely on the morphometry in the case of the ungauged watersheds. Morphometric analysis defining the parameters and indices can be of high importance in an explanation of a specific torrential flood event in ungauged watersheds.

There have been many studies across the globe focusing on morphometric parameters of watersheds as static factors of torrential flood occurrence [3], [4], [5], [6], [7]. Melton [8], [9] found significant correlations by exploring the relations among morphometric properties of the relief in the analysis of watersheds in Arizona, Utah, Colorado and New Mexico. In this research, it was found that maximum valley-side slopes are correlated positively with relative relief and ruggedness number; slopes are negatively correlated with channel frequency and drainage density.

Benson (1964) [10] found in the investigation of factors of the flood occurrence in the western Gulf of Mexico basin within the United States, that watershed area and main channel length are the most important variable according to the correlation matrix of the mean annual discharge (2,33-year peak) and the independent variables. Patton and Baker (1976) [11] found in their research of watersheds in different climate and hydrological conditions of the USA–Central Texas, North Central Utah, Southern California, Indiana and Appalachian Plateau, that watershed relief and drainage density are two distinguishing factors of flash flood occurrence among morphometric parameters (when excluding the watershed area and length). Therefore, the authors suggested that extremely dissected high relief drainage basins have high flood potentials even in the case of relatively low rainfall episode. Taha et al. (2017) [12] determined the flash flood hazard for Wadi Qena (Eastern Egypt) using remote sensing and GIS techniques for calculation of the geo-morphometric indices.

Khurana et al. (2020) [13] discussed the hydrologic response of a Himalayan watershed and its sub-watersheds using various morphological parameters extracted on the base of digital elevation model employing GIS techniques, and accordingly, conducted the sub-watershed prioritization. Loczy et al. (2009) [14] assessed the local flood hazard as moderate to high on the base of the analysis of channel morphometry and its evolution along the studied section of the Tisza River.

The main objective of this research is to analyse the morphometric conditions of the watersheds as a prerequisite for torrential floods occurrence and to find a relation between morphometry and maximal discharges in the events of torrential floods.

STUDIED WATERSHEDS

Study area encompasses 43 watersheds in total: 28 watersheds in Serbia, south of the Danube and the Sava River (belonging to the Drina, Kolubara, Velika Morava and

Danube River Basins) and 15 watersheds in Bulgaria (belonging to Arda, Iskar, Vit and Yantra River Basins, while several rivers flow directly into the Black Sea), Figure 1. These watersheds are selected also in accordance with availability of data and they are all situated in hilly-mountainous and mainly rural regions. The climate of Central Serbia (south of the Danube and the Sava River) and in some of the investigated watersheds in Bulgaria is moderate-continental, while the watersheds in the southern part of Bulgaria and along the Black Sea have transitional Mediterranean climate. The average annual precipitations ranging from 650 to 1000 mm in higher regions.

An extreme torrential flood event is related to each studied watershed. Most of the presented torrential flood events happened in May and June which is a peak of their occurrence in Serbia and in the northern part of Bulgaria. For instance, Asparuhovo–West and Asparuhovo–East (Bulgaria) are gullies, but the sites where severe torrential flood happened on the 19-20th June 2014 taking 13 human lives. After rainy April and first half of May 2014, a tree-day rainfall episode (May 14, 15 and 16) with 428 mm or ca. half of total annual precipitation caused an extreme event of torrential floods of three local torrents (Čađavica, Kržava and Brštica in Serbia) which attacked municipality of Krupanj and surrounding settlements, causing the death of 2 people and material damage estimated to more than 30 million €.

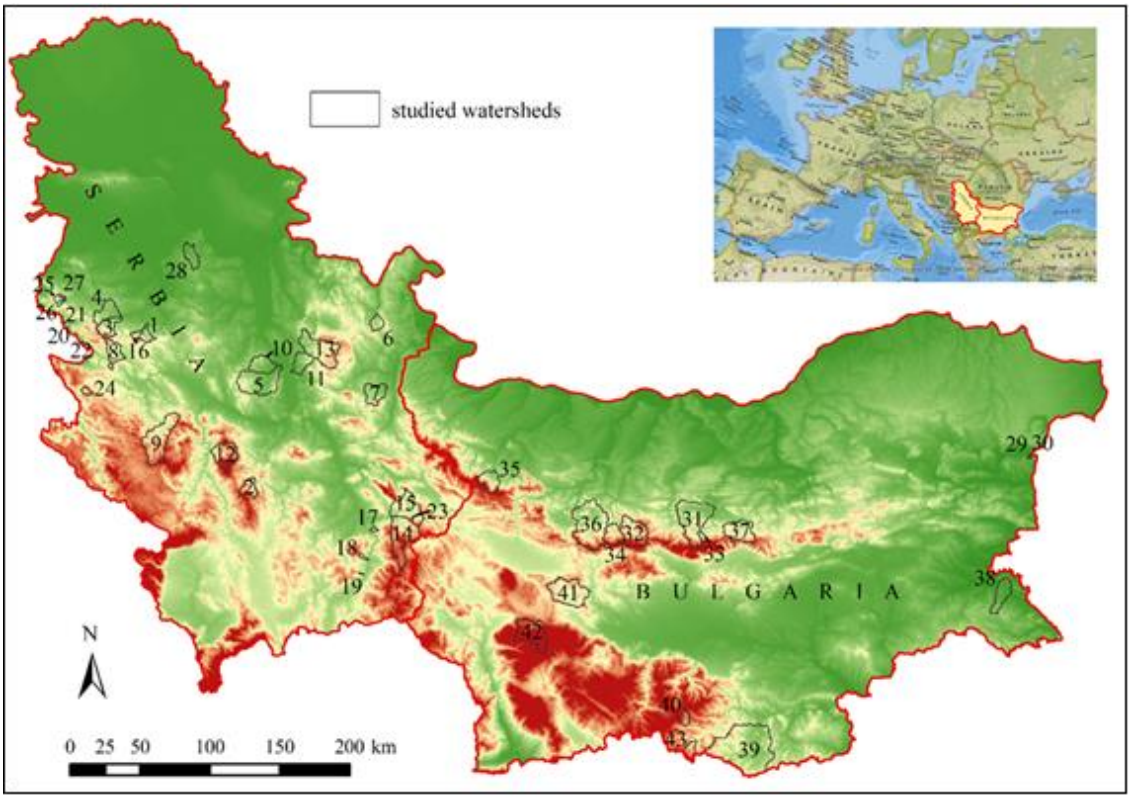

Figure 1. Map of watersheds in Serbia and Bulgaria
(the numbers of the watersheds correspond to those in Table 2)

METHODS AND DATA

Data for this work are analyzed in GIS environment on the base of 30m Shuttle Radar Topography Mission Digital Elevation Model (SRTM DEM), NASA JPL [15]. Georeferenced topographic maps with a scale of 1:25000 (10 meter contour interval) are also used since the stream map derived from the DEM had to be checked and improved.

These data are processed in ArcGIS and QGIS. The ArcGIS and QGIS tools are used to determine the watersheds and to delineate stream lines. The slope surfaces are generated and classified. Basic morphometric parameters are calculated in ArcGIS: watershed area, watershed length, total stream length, maximal and minimal elevation points (H and h), and area with slope >25°. Morphometric indices are computed based on the literature definitions and formulas (Table 1).

Watershed area is the first mophometric parameter which is analyzed. The size of watershed area causes the variability of the hydro-climatic and geomorphic conditions, particularly affecting a total amount of the surface runoff on slopes and consequently the maximal discharges of the streams. Watershed length is measured along the long axis of the watershed from the mouth/profile of the river to the watershed boundary.

Watershed relief is the vertical elevation distance between the highest point in the watershed and the mouth of the river or profile indicating the geodynamics of the area and development of the erosion processes [8]. Relief ratio is a measure of the general steepness of the watershed which is calculated by dividing the watershed relief with the watershed length [16], [17].

Table 1. Quantitative morphometric parameters.

Morphometric parameter	Description Formula	Units	Reference
Watershed Area	A	km^2	
Watershed Length	L	km	
Watershed Relief	$R = H - h$	km	Melton 1957
Relief Ratio	$Rr = \frac{R}{L}$	km	Schumm 1956; Strahler 1958
Melton Index	$M = \frac{R}{\sqrt{A}}$		Melton 1957; Melton 1958
Drainage Density	$D = \frac{L_t}{A}$	$km \cdot km^{-2}$	
$A_{S>25^o}$	$S>25^o$	%	

Melton index as an indicator for the ruggedness, is calculated by dividing the watershed relief by the square root of the watershed area, which is widely used in the Asian and USA literature as an indicator for erosion and debris floods, and for the identification of watersheds prone to flooding. Drainage density is the total length of streams of all orders in the watershed divided by the watershed area. This is also an indicator of the development of erosional processes, which can lead to changes in the sediment transport and to increase the solid discharge, and thus increase the disposition for floods. Watershed area with a slope >25° (AS>25°) is a topographic surface sloped >25° expressed in % of the total area of the watershed. These are the areas with higher energy of mass movement and they affect the velocity of water flow and the development of erosion processes.

The data for maximal discharges are obtained from the Hydrological yearbooks of Republic Hydrometeorological Service of Serbia and National Institute of Meteorology and Hydrology of the Bulgarian Academy of Sciences as well as from Preliminary Assessment of Flood Risk (Danube River Basin Directorate and East Aegean River Basin Directorate, Bulgaria).

In analysis of derived data on watersheds we conducted statistical analyses by using the statistical software programs - Statgraphics and SPSS version 19. For determination of the correlation between two or more variables, simple and multiple regression analyses are employed. Simple regression indicates the strength of linear regression including two

variables (Y=a+b·X). Multiple regression analysis, as an extension of simple regression, explores the relationship between dependent variable and two and more independent variables.

Factor analysis is a multi-variance technique with an aim to determine the extent to which shared variance exists between variables [18]. This technique has been used in two contexts in data analytics: as confirmatory, designed to confirm or negate the hypothesized structure, or exploratory, to discover a structure [19]. In factor analysis, extraction method used is principal component analysis and rotation method is varimax with Kaiser normalization. Varimax rotation includes a mathematical algorithm maximizing the high and low value factor loadings and minimizing mid value factor loadings [20]. As defined in Tabachnick and Fidell [21], principal components analysis explores the correlations among the variables to develop a few set of components summarizing empirically the correlations among the variables.

Having regard to the results of correlation and factor analyses the watersheds are prioritized in terms of torrential flood risks. The prioritization in this research is done on the basis of the morphometric parameters, following the common methodology of ranking the watersheds and expert knowledge presented in many publications [22], [23], [24].

The aim of the prioritization is to indicate the watersheds with the high priority for implementation of measures reducing the flood risks. For this purpose, each morphometric parameter is ranked taking into account its relation to the maximal discharge. In case of positive correlation, the highest rank is assigned to the watershed with the highest value of the considered morphometric parameter, and if the correlation is negative, the watershed with the lowest value of the given morphometric parameter is evaluated with the highest rank.

The compound priority number of each watershed is calculated as an average of the priority numbers of the morphometric parameters. On the basis of the compound priority the watersheds are divided into three groups - high, moderate and low priority. As limit values we accepted 25% deviation from the average value of the compound priority numbers.

RESULTS

Output of morphometric analysis for studied watersheds is given in Table 2. Watershed areas ranges from 0,5 km2 to 1155 km2. Watershed lengths varies from 1,4 km to 85 km and watershed relief from 0,2 to 2,2 km. Relief ratio is in the range from 0,014 to 0,185 and values of Melton index from 0,03 to 0,45.

Table 2 Studied watersheds with morphometric data

	Watershed	Profile	Date	Q_{max} (m^3s^{-1})	A (km^2)	W. length (km)	W. relief (km)	R. Ratio (km)	Melton I	Density ($km \cdot km^2$)	$A_{S>25°}$ (%)
1	Ribnica	Pastrić	13.6.1996	418,08	99,865	21,054	0,908	0,043	0,091	2,970	12,887
2	Lukovska reka	Merćez	18.6.1986	69,2	113,382	20,747	1,19	0,057	0,112	2,334	33,793
3	Jablanica	Sedlare	14.5.2014	138	143,422	22,796	1,075	0,047	0,090	1,629	16,731
4	Obnica	Belo Polje	22.05.1967	140	185,364	26,870	0,808	0,030	0,059	1,919	3,228
5	Lugomir	Jagodina	26.4.1964	78,8	435,732	47,095	0,784	0,017	0,038	1,867	5,601
6	Crnajka	Crnajka	16.8.2005	66,7	77,518	15,368	0,979	0,064	0,111	2,281	9,278
7	Grliška	Grlište	19.4.2014	68,9	181,628	25,323	1,002	0,040	0,074	1,435	5,023
8	Skrapež	Kosjerić	13.6.1986	75,5	159,073	24,135	0,944	0,039	0,075	1,921	11,802
9	Moravica	Ivanjica	13.5.1965	362	478,478	35,089	1,382	0,039	0,063	2,306	22,347
10	Belica	Jagodina	15.7.1999	87	195,777	25,567	0,59	0,023	0,042	1,557	2,172
11	Ravanica	Ćuprija	17.6.1969	171	150,071	22,356	0,678	0,030	0,055	1,133	3,731
12	Jošanica	Biljanovac	13.5.1965	118	253,476	32,253	1,572	0,049	0,099	2,058	20,915
13	Resava	Man. Manasija	8.6.1969	278	385,069	36,203	1,145	0,032	0,058	1,248	13,972
14	Vlasina	Svođe	26.6.1988	488	443,480	46,366	1,415	0,031	0,067	1,948	20,885
15	Lužnica	Svođe	26.6.1988	413	323,037	34,440	1,097	0,032	0,061	1,611	10,677
16	Manastirica	Brežđe	13.6.1996	154,9	30,038	10,268	0,811	0,079	0,148	2,786	17,357
17	Sejanička d.	Grdelica	2.7.1983	62,75	12,544	7,077	0,638	0,090	0,180	2,663	7,426
18	Kalimanska r.	Vladičin Han	1929	149	15,857	9,763	0,953	0,098	0,239	2,361	17,552
19	Lještarska d.	Priboj Vranjski	25.7.1982	16,16	2,759	4,438	0,587	0,132	0,353	1,976	6,017
20	Đurđevački p.	Ljubovija	1982	0,98	0,537	1,468	0,239	0,163	0,326	4,274	6,296
21	Lonjinski p.	Lonjin	1987	0,43	0,936	1,748	0,323	0,185	0,334	2,260	22,797
22	Dubošnički p.	Bačevci	1987	1,05	1,353	3,072	0,523	0,170	0,450	2,839	30,189
23	Ravna reka	Strelac	26.6.1988	59,75	5,593	4,804	0,722	0,150	0,305	2,179	17,922
24	Kamišna	Glibetići	26.5.2007	76,3	27,856	10,900	0,715	0,066	0,135	3,298	26,779
25	Čađavica	Krupanj	15.5.2014	141,45	24,036	8,248	0,586	0,071	0,120	4,649	11,270
26	Kržava	Krupanj	15.5.2014	61,32	12,478	7,485	0,658	0,088	0,186	2,633	16,087
27	Brštica	Krupanj	15.5.2014	29,2	9,515	7,226	0,478	0,066	0,155	2,849	10,838
28	Topčiderska r.	Rakovica	10.7.1999	91,35	126,87	28,140	0,418	0,015	0,037	1,564	0,618

	Watershed	Profile	Date	Q_{max} (m^3s^{-1})	A (km^2)	W. length (km)	W. relief (km)	R. Ratio (km)	Melton I	Density ($km \cdot km^2$)	$A_{S>25°}$ (%)
29	Asparuhovo	Western gully	20.6.2014	99,143	3,613	4,548	0,201	0,044	0,106	1,226	0,189
30	Asparuhovo	Eastern gully	20.6.2014	95,389	4,807	4,099	0,215	0,052	0,098	1,351	0,101
31	Vidima	Sevlievo	28.6.1939	690	560,198	66,396	2,176	0,033	0,092	2,132	13,889
32	Beli Vit	Teteven	22.10.2007	322	306,219	30,214	1,748	0,058	0,100	1,844	45,840
33	Ostretska	Apriltsi	13.6.1953	60,8	26,877	10,768	1,314	0,122	0,253	2,158	26,825
34	Cherni Vit	Cherni Vit	3.7.2005	84,9	161,099	23,506	1,637	0,070	0,129	1,956	32,898
35	Barziya	Balabanitsa	15.4.2003	94,54	172,117	19,233	1,728	0,090	0,132	2,195	23,848
36	Malak Iskar	Svode	29.6.2018	420	653,938	63,444	2	0,032	0,078	0,987	18,472
37	Yantra	Gabrovo	6.7.1991	695	270,435	25,524	1,128	0,044	0,053	1,868	19,057
38	Ropotamo	Veselie	6.9.2014	170	189,81	23,862	0,439	0,018	0,032	0,957	0,442
39	Varbitsa	Dzhebel	12.12.1990	1450	1155	85	1,216	0,014	0,036	0,983	12,812
40	Byala	Smolyan	28.6.2018	37,56	63,45	13,12	1,114	0,084	0,140	0,922	28,638
41	Mati Vir	Sersemskale	5.9.1957	210	389,1	56,8366	0,877	0,015	0,043	0,750	3,742
42	Beli Iskar	Beli Iskar	22.5.2007	73,5	330,32	31,325	1,9	0,061	0,105	2,107	32,128
43	Elhovska	Rudozem	28.6.2018	138,239	84,588	16,5	1,121	0,068	0,122	0,956	31,842

Most of the watersheds have a value of Melton ruggedness number lower than 0,3, indicating higher susceptibility to torrential floods with low amount of the sediment transport, while watersheds with higher Melton index than 0,3 are prone to debris flow processes [25]. Drainage density varies from 0,75 to 4,6 km/km2. Areas with slope>25° in watersheds varies from 0,1 to 45,8%. Watersheds with an area less than 100 km2 have the lower watershed relief and watershed length and the higher relief ratio, Melton index and stream density, in comparison with larger watersheds. Measured maximal discharges varies from 0,4 km3s-1 to 1450 m3s-1.

Before taking into account all envisaged parameters for the multiple regression analysis, the correlation between dependent variable - maximal discharges and the first independent parameter - watershed areas is explored. The output shows fitting a linear model to describe the relationship between variables. Since the P-value in the ANOVA table is less than 0,01, there is a statistically significant relationship between variables at the 99% confidence level. The determination coefficient indicates that the model as fitted explains 68,257% of the variability in dependent variable. The Pearson correlation coefficient equals 0,83 and nonparametric Spearman Rho is 0,72, indicating a moderately strong relationship between the variables. This is a reasonable finding since the quantity of water discharged to the stream is mainly proportional to the watershed area.

By adding another parameter from the list–watershed length, a turn to a multiple linear regression model is required. In this step, the determination coefficient is slightly higher, indicating that the model as fitted with two independent variables explains 69,87% of the variability in dependent variable and the adjusted R squared is 0,684% (Table 3). Including the watershed relief as the third dependent variable, multiple regression analysis gives the determination coefficient of 70,306, while adjusted R squared is getting slightly lower and this trend of decrease continues by adding all other variables

Table 3. Outputs of multiple regression analysis.

Q	R^2	R^2 (adjusted for d.f.)	Standard error
A, L	69,873	68,367	0,562
A, L, R	70,306	68,022	0,565
A, L, R, Rr	70,317	67,193	0,572
A, L, R, Rr, M	70,325	66,315	0,580
A, L, R, Rr, M, D	70,931	66,087	0,582
A, L, R, Rr, M, D, S	70,987	65,184	0,590

Next multiple regression models include relief ratio as the fourth independent variable - and then Melton index as the fifth variable, indicating there is almost no changes of the determination coefficient value. When multiple linear regression model encompassed the sixth constant–drainage density, it resulted in slightly higher determination coefficient that increased at first decimal–70,931. By adding the last morphometric parameters, area with slope>25°, the final multiple linear regression model is obtained with R squared=70,99, indicating that the model as fitted to that extent explains the variability in maximal discharge and adjusted R squared=0,65184, which points out that graduated adding of parameters did not have a greater impact on the variability of the dependent variable. The equation of the fitted model is as follows:

$$\mathrm{Qmax} = 1{,}279\mathrm{E} - 10 + 1{,}221 \cdot \mathrm{A} - 0{,}344 \cdot \mathrm{L} - 0{,}113 \cdot \mathrm{R} - 0{,}103 \cdot \mathrm{Rr} + 0{,}046 \cdot \mathrm{M} + 0{,}093 \cdot \mathrm{D} + 0{,}04 \cdot A_{S>25°}$$

An additional multiple regression analysis is done excluding the watershed area, given that there was a high starting impact on the dependent variable. In this case, a multiple regression linear model is obtained with R squared=60,116 and adjusted R squared=0,53468, leading to the conclusion that the excluded parameter has a high influence which is also confirmed by the results in correlation matrix. Including the watershed area as the independent variable reduces the standard error-from 0,682 to 0,582. There is a statistically significant relationships between the variables at the 99% confidence level in all steps of the multiple regression analyses, since the P-value in the analysis of variance (ANOVA) is less than 0,01.
In the matrix of correlations (Table 4) between all observed variables, there is a high correlation between maximal discharges and watershed area, primarily and watershed length, secondarily. The high positive correlation is also found between independent variables watershed area and watershed length, as well as Melton index and relief ratio. There is also a negative correlation >-0.6 between watershed length and relief ratio and Melton index, respectively.

Table 4. Correlation matrix.\

	A	L	R	Rr	M	D	$A_{S>25^o}$	Q_{max}
A	1							
L	0,9538	1						
R	0,5611	0,5992	1					
Rr	-0,5628	-0,6665	-0,2697	1				
M	-0,5226	-0,6097	-0,2959	0,9623	1			
D	-0,4165	-0,4638	-0,2052	0,4953	0,4617	1		
$A_{S>25^o}$	0,0236	-0,0301	0,5806	0,3167	0,2469	0,1250	1	
Q_{max}	0,8262	0,7498	0,3839	-0,4286	-0,3962	-0,2585	0,0026	1

After simple and multiple regression analysis, the factor analysis using the prinicipal component method (PCA) was performed. Feasibility of factor analysis is defined by two tests - Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy [26] (Kaiser 1974) and Bartlett's Test of Sphericity [27] (Bartlett 1954). According to the KMO test (Table 5), there is a sense to conduct factor analysis with this dataset, since the value of 0,636 exceeds the recommended value acceptable for a good factor analysis (0,6 and 0,5 according to different authors). Bartlett's test with value of $p<0,05$ justifies the application of the factor analysis and indicates the factorability of the correlation matrix.

Table 5. KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0,636
Bartlett's Test of Sphericity	Approx. Chi-Square	299,839
	df	21
	Sig.	0,000

Factor analysis (method: Principal components) extracted two components with the characteristic value of ≥1 according to the Kaiser criterion. Also, the screeplot reveals the existence of a clear breaking point behind the second point (Figure 2). The contribution of the first component is 53,844, while the contribution of the second component is 24,335, so that both have cumulative % of 78,179, which means that these two components together explain over 78% variance.

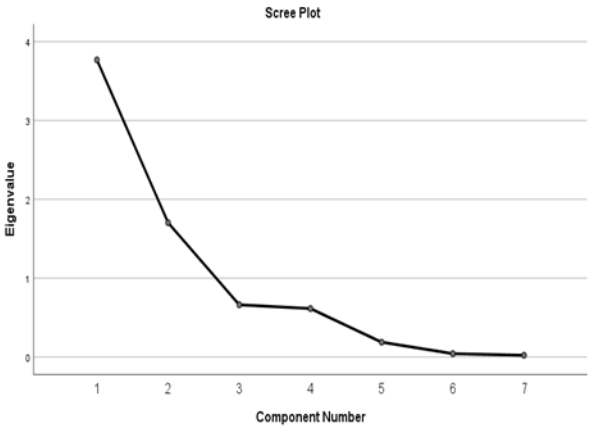

Figure 2. Scree plot from factor analysis

Table 6. Rotated Component Matrix

	Component	
	1	2
A	-,780	,423
L	-,851	,384
R	-,372	,860
Rr	,927	,128
M	,891	,093
D	,648	,010
$A_{S>25^o}$	,310	,862

After rotation converged in 3 iterations, a rotated component matrix is derived. According to the values of loadings (Table 6), first component is mostly influenced by the relief ratio and Melton index with positive loadings and watershed length and watershed area with negative loadings, while the second component is determined by slope >25° and watershed relief, both with positive loadings. Here are two logical findings: (1)
According to the first component, the smaller watershed area and length, the higher relief ratio and Melton index. However, relief ratio is a morphometric index calculated using the parameter of watershed length and Melton index is calculated using the parameter of watershed area in the equations. (2) As defined in the second component, the higher the relief ratio, the higher area under slope >25°. Watershed area and watershed length belong to the watershed geometry, while drainage density is a parameter of the drainage characteristics and watershed relief, relief ratio, Melton index and slope >25° belong to the relief characteristics.
On the basis of the analyses of the morphometric parameters and their relation to the maximal discharge the prioritization of the watersheds in terms of flood risk is conducted (Table 7). We excluded the parameter of slope (area with slope >25°) due to a low correlation with the maximal discharge as in correlation matrix. Watersheds with a compound priority value deviated by more than 25% from the average value of the compound priority series are evaluated as watersheds with high priority, where the flood risk measures need to be taken first. Watersheds where the value of the compound priority deviates less than 25% of the average value are included in the group of low priority and the others are sorted in the group of moderate priority.
The watersheds with high priority have mostly an area larger than 150 km2 and length from 22,36 to 85 km (only one of the watersheds in this group have an area less than 150 km2 - Topčiderska river). In the group of moderate priority dominate watersheds with the area less than 150 km2 and the watersheds length varying between 13,12 and 24,14 km. Three of the watersheds with moderate priority have an area between 159 and 172 km2. Their presence in this group could be explained with the relatively high values of the relief ratio (0,07 – 0,09) and the drainage density (1,92 – 2,19). The third group of priority (low priority) includes the watersheds with an area between 0,54 and 30,04 km2 and the length less than 11 km.
However, from the flood susceptibility point of view, watersheds from the third group of priority could be the highest priority watersheds, especially when considering the extreme maximal discharges and watershed area. Although torrential floods are complex phenomena, this morphometric prioritization could support the planning process and

mitigating the flood risk, and can be considered as a first stage of more complex prioritization by adding other parameters, such as hydro-climatic and infrastructural.

Table 7. Watershed prioritization

Watershed	Profil	Watersheds priority numbers according to:						Comp. number	Priority
		Area	Length	Relief	Relief ratio	Melton index	Drainage density		
Varbitsa	Dzhebel	43	43	33	30	42	39	38,33	
Malak Iskar	Svode	42	41	42	28	28	38	36,50	
Mati Vir	Sersemskale	37	40	20	34	38	43	35,33	
Resava	M, Manasija	36	37	31	28	35	35	33,67	
Vidima	Sevlievo	41	42	43	27	25	18	32,67	
Vlasina	Svođe	39	38	36	29	31	23	32,67	
Lugomir	Jagodina	38	39	17	33	40	27	32,33	
Lužnica	Svođe	34	35	27	28	33	30	31,17	
Moravica	Ivanjica	40	36	35	26	32	12	30,17	
Yantra	Gabrovo	32	28	30	23	37	26	29,33	
Ropotamo	Veselie	29	25	6	32	43	40	29,17	
Beli Vit	Teteven	33	32	40	18	22	28	28,83	
Belica	Jagodina	30	29	11	31	39	32	28,67	
Grliška	Grlište	27	27	25	25	30	33	27,83	
Beli Iskar	Beli Iskar	35	33	41	17	21	19	27,67	
Jošanica	Biljanovac	31	34	37	21	23	20	27,67	
Obnica	Belo Polje	28	30	18	30	34	25	27,50	
Topčiderska r.	Rakovica	21	31	5	34	41	31	27,17	High
Ravanica	Ćuprija	23	22	14	30	36	37	27,00	
Skrapež	Kosjerić	24	26	22	26	29	24	25,17	
Jablanica	Sedlare	22	23	26	22	27	29	24,83	
Cherni Vit	Cherni Vit	25	24	38	13	15	22	22,83	
Elhovska	Rudozem	18	18	29	14	16	41	22,67	
Byala	Smolyan	16	16	28	10	12	42	20,67	
Barziya	Balabanitsa	26	19	39	8	14	15	20,17	
Lukovska r.	Merćez	20	20	32	19	18	11	20,00	Moderate
Ribnica	Pastrić	19	21	21	24	26	4	19,17	
Crnajka	Crnajka	17	17	24	16	19	13	17,67	
Asparuhovo	Western g.	5	6	1	23	20	36	15,17	
Asparuhovo	Eastern g.	6	4	2	20	24	34	15,00	
Ostretska	Apriltsi	13	14	34	6	6	17	15,00	
Manastirica	Brežđe	15	13	19	11	11	7	12,67	
Kamišna	Glibetići	14	15	15	15	13	3	12,50	
Kalimanska r.	Vladičin H.	11	12	23	7	7	10	11,67	
Čađavica	Krupanj	12	11	9	12	17	1	10,33	
Kržava	Krupanj	9	10	13	9	8	9	9,67	
Sejanička d.	Grdelica	10	8	12	8	9	8	9,17	
Ravna reka	Strelac	7	7	16	4	5	16	9,17	
Brštica	Krupanj	8	9	7	15	10	5	9,00	
Lještarska d.	Priboj V.	4	5	10	5	2	21	7,83	
Lonjinski p.	Lonjin	2	2	4	1	3	14	4,33	
Dubošnički p.	Bačevci	3	3	8	2	1	6	3,83	Low
Đurđevački p.	Ljubovija	1	1	3	3	4	2	2,33	

CONCLUSION

In this paper, morphometric analysis for 43 watersheds in Serbia and Bulgaria with related maximal discharges in the events of torrential floods is conducted followed by the statistical analyses which gave satisfactory results. The high correlation between maximal

discharges and watershed area is found. A multiple linear regression model including all seven independent variables is obtained with R squared=70,99, indicating that the model as fitted to that extent explains the variability in maximal discharge and adjusted R squared is 0,65184. Factor analysis (method: Principal components) extracts two components in rotated correlation matrix with the characteristic value of ≥1 according to the Kaiser criterion, that together explain over 78% variance. The first component is mainly composed by the relief ratio, Melton index and watershed length, while the second component is determined by parameters of relief characteristics, area with slope >25° and watershed relief.

Though morphometric study itself is not sufficient to explain extensively the occurrence of maximal discharges in the events of destructive torrential floods, morphometric analysis can meaningfully contribute to the explanation of torrential flood events.

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A METHOD OF CORRELATING GROUNDWATER LEVELS WITH PERCIPITATION

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UDC: 556.313:551.577]:551.501(498)

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ABSTRACT

The current climatic context characterized by increasingly extended periods in which the rainfall deficit and high temperatures lead to the need to make forecasts that can identify the increase in the groundwater level from the amount of rainfall. In order to establish forecasts of the groundwater regime, it is necessary to know the complexity and capacity of action of internal and external factors as well as the particularities of the regime. Identifying the correlations that are established between variations in the groundwater level and precipitation, especially where the predominant factor of variation is represented by precipitation, can be a useful tool in establishing forecasts. The possibility of correlations was analyzed at 5 hydrogeological wells located in the northeastern part of Romania for the period 1983-2017, taking into account the monthly data of precipitation and groundwater level variation only for the period of rising levels, that is November - April, May.

Keywords: forecast, correlation, groundwater level, hydrogeological wells

INTRODUCTION

Groundwater is the main reservoir of fresh water and therefore requires special attention when it comes to managing these resources. The most important changes that take place in the variation of the groundwater level are due to the relationship that is established between it and the atmospheric precipitations [1]. Groundwater level studies indicate that precipitation is favorable for underground recharging [2, 3, 1, 4, 5] unknown in this relationship being given by the connecting element between surface and underground, the permeability of rocks. The lack of a complex groundwater monitoring system [6, 7] as well as the fact that only about 10% of the rural population is connected to a centralized water supply system [8] leads to critical situations among the water supply of the population especially in years of severe drought [9, 10].

Population growth and the anthropogenic impact it brings by intensifying agriculture, industrialization and pollution increase concern about groundwater resources [11]. Climate scenarios highlight the increasingly variable nature of the groundwater level as well as their long-term impact by increasingly limiting groundwater resources [12, 13, 14]. Starting from the importance of groundwater and the increasingly unpredictable nature of the variation of precipitation in terms of quantity and uneven spatial distribution, it is necessary to make a correlation between atmospheric precipitation and the amplitude of the variation of the groundwater level to predict and have an overview of groundwater resources

DATASETS AND METHODOLOGY

Datasets

The analyzed wells are located in the north-eastern part of Romania, in the territorial administrative unit of Botoșani county (Figure 1). The frequency of the hydrological, pedological and atmospheric drought phenomena that characterize this area leads to a major interest regarding the correlations that are established between the oscillation of groundwater level and the atmospheric precipitation in the area. In the analysis were used the variations of the groundwater level, monthly data, over a period of 34 years (from 1983-2017). In order to be able to perform the forecast analysis and to observe the connection between the precipitations and the groundwater level, the monthly precipitations were also taken into account, for the same period, from the Botoșani meteorological station.

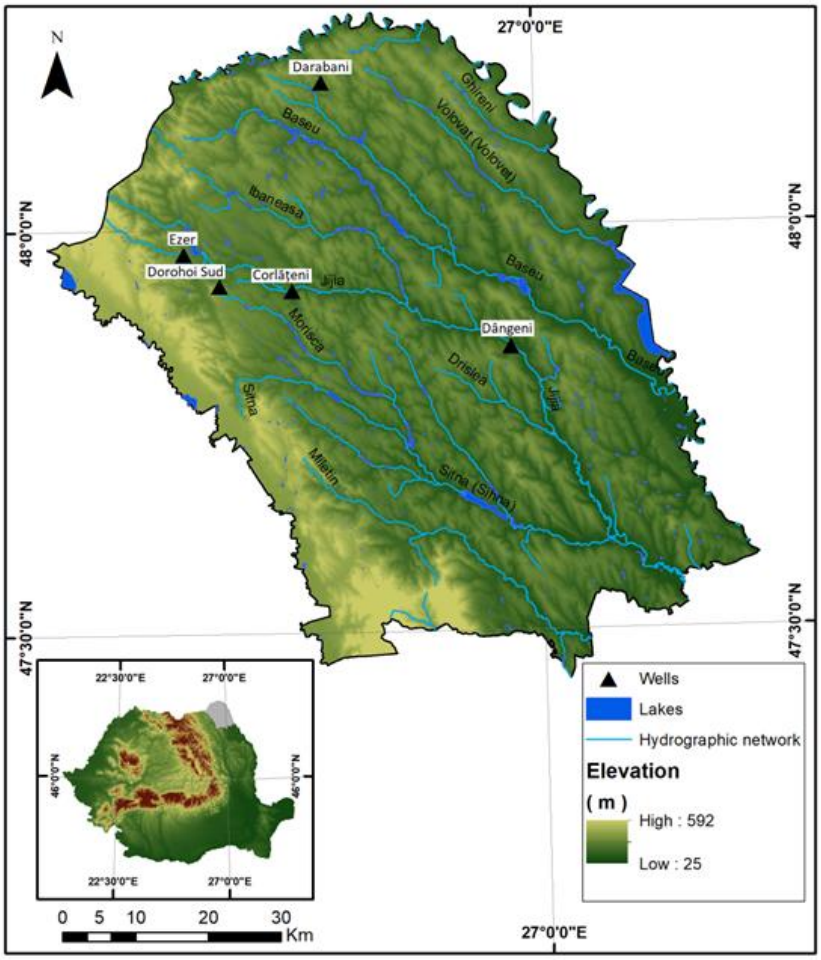

Figure 1. Hydrogeological wells analyzed from study area.

Methodology

The methodology approached for identifying the correlations that are established between the variation of groundwater levels and precipitation was developed and used by Eleonora Tabacaru Roșescu in 1974 [15]. This methodology is an enriched version of the previous one.

The methodology uses data on the amount of precipitation (monthly) that overlaps over the period of increase in groundwater levels as well as the amplitude of the variation of

the level in that period. For the analyzed study area, this growth period is from November to April or May. Starting from these data we will obtain a correlation line expressed by a first order equation of type y = a + bx. Determining the estimated values of a and b generates a series of characteristics of the correlation line.

$$a = y - bx \qquad (1)$$

$$b = \frac{n * \sum xy - \sum x * \sum y}{n * \sum x^2 - (\sum x)^2} \qquad (2)$$

Where:

- = Δh (mm) - (for the period November - April, May); y = sum of precipitation (Σp) in mm, for the same period; n = number of years taken into account;
- In the correlation between level and precipitation it should be mentioned that:
- a = lost precipitation (Pp) - that part of precipitation that does not participate in raising groundwater levels, that is that part of the precipitation that is consumed in the processes of saturation of the aeration area and / or by total evaporation;
- b = represents the effective porosity (me) or the rock yield coefficient (μ (%)). Knowing the value of "b" calculated using expression (2) and the replacement of its unknown in expression (1) we can determine the value of "a" that is the value of lost precipitation (Pp).

From the sum of the fallen precipitations (Σp) we subtract the value corresponding to the lost precipitations (a = Pp) we obtain the effective precipitations (Pe) that contribute to the raising of the phreatic level. In other words, it represents the contribution of precipitation in the aquifer (3).

$$Pe = P - Pp \qquad (3)$$

Having the data referring to the lost precipitation and the yield coefficient, we can move on to the calculation of the spring level (forecasted level). Thus, it is necessary to know the amount of precipitation that fell in order to forecast (Δh) and increase the respective levels (4).

$$\Delta h\ (mm) = \frac{P(mm) - Pp(mm)}{\mu} = \frac{Pe}{\mu} \qquad (4)$$

The correlation between the real groundwater level (α) of formula 6 and precipitation was made after the omega (Ω) of formula 5 was calculated

$$.\ \Omega = (\bar{x} - Pp)/\mu \qquad (5)$$

$$\alpha = \Delta h + (\pm \Delta h * \Omega) / 100 \qquad (6)$$

RESULTS

The analysis of the correlation between the variation of the groundwater level and the atmospheric precipitations raises a whole series of unknowns that act on the process of underground water storage. In most of the cases of analysis of these two parameters it was found that a statistically or graphically valid correlation cannot be established [16]. The location of the study area in the area where groundwater is exploited uncontrollably by about 70% of the rural population is another impasse that adds to the set of unknowns in the study of this field. In an attempt to have a clearer picture, it is necessary to make spring forecasts [17].

Table 1. Centralizer with the data necessary for the correlation graph

Period	Δh (mm)	Precipitation (mm)	x^2	y^2	Xy	μ (%)	Pp (mm)	Pe (P-Pp)	Δh forecast (cm)	±Δh (cm)	Δh (cm)	α (cm)
1983-1984	430	326.8	184900	106798.2	140524	0.25	147.1	179.8	70.9	27.9	43	61.4
1984-1985	320	230.1	102400	52946.01	73632	25.35		83.1	32.8	0.8	32	32.5
1985-1986	380	159.8	144400	25536.04	60724			12.8	5.1	-32.9	38	16.3
1986-1987	230	167	52900	27889	38410			20.0	7.9	-15.1	23	13.0
1987-1988	780	367.8	608400	135276.8	286884			220.8	87.1	9.1	78	84.0
1988-1989	120	176.3	14400	31081.69	21156			29.3	11.6	-0.4	12	11.7
1989-1990	190	148.1	36100	21933.61	28139			1.1	0.4	-18.6	19	6.7
1990-1991	500	309.1	250000	95542.81	154550			162.1	64.0	14.0	50	59.2
1991-1992	220	165.4	48400	27357.16	36388			18.4	7.3	-14.7	22	12.3
1992-1993	580	284.8	336400	81111.04	165184			137.8	54.4	-3.6	58	55.6
1993-1994	190	210.9	36100	44478.81	40071			63.9	25.2	6.2	19	23.1
1994-1995	620	256.2	384400	65638.44	158844			109.2	43.1	-18.9	62	49.5
1995-1996	740	243.9	547600	59487.21	180486			96.9	38.2	-35.8	74	50.4
1996-1997	500	279.6	250000	78176.16	139800			132.6	52.3	2.3	50	51.5
1997-1998	350	330.2	122500	109032	115570			183.2	72.3	37.3	35	59.6
1998-1999	260	229.4	67600	52624.36	59644			82.4	32.5	6.5	26	30.3
1999-2000	330	185.9	108900	34558.81	61347			38.9	15.4	-17.6	33	21.4
2000-2001	260	212.6	67600	45198.76	55276			65.6	25.9	-0.1	26	25.9
2001-2002	160	193.4	25600	37403.56	30944			46.4	18.3	2.3	16	17.5
2002-2003	150	188.5	22500	35532.25	28275			41.5	16.4	1.4	15	15.9
2003-2004	260	137.8	67600	18988.84	35828			-9.2	-3.6	-29.6	26	6.4
2004-2005	840	376.7	705600	141902.9	316428			229.7	90.6	6.6	84	88.4
2005-2006	290	295.1	84100	87084.01	85579			148.1	58.4	29.4	29	48.4
2006-2007	120	168.8	14400	28493.44	20256			21.8	8.6	-3.4	12	9.8
2007-2008	550	356.5	302500	127092.3	196075			209.5	82.7	27.7	55	73.3
2008-2009	300	196.9	90000	38769.61	59070			49.9	19.7	-10.3	30	23.2
2009-2010	410	352.3	168100	124115.3	144443			205.3	81.0	40.0	41	67.4
2010-2011	450	176	202500	30976	79200			29.0	11.4	-33.6	45	22.9
2011-2012	440	229.9	193600	52854.01	101156			82.9	32.7	-11.3	44	36.5
2012-2013	640	341.1	409600	116349.2	218304			194.1	76.6	12.6	64	72.3
2013-2014	270	341.3	72900	116485.7	92151			194.3	76.7	49.7	27	59.8
2014-2015	380	179.9	144400	32364.01	68362			32.9	13.0	-25.0	38	21.5
2015-2016	370	246.1	136900	60565.21	91057			99.1	39.1	2.1	37	38.4
2016-2017	460	251.2	211600	63101.44	115552			104.2	41.1	-4.9	46	42.8
Σ=34	13090	8315.4	6214900	2206745	3499309							
Average=	x= 385	y= 244.5										
Ω =	66											

Following the application of the methodology and the analysis of the obtained results, it was found that there are major differences between Δh obtained from the measurements made by the state institutions and Δh obtained by forecast (mathematically calculated). (Table 1).

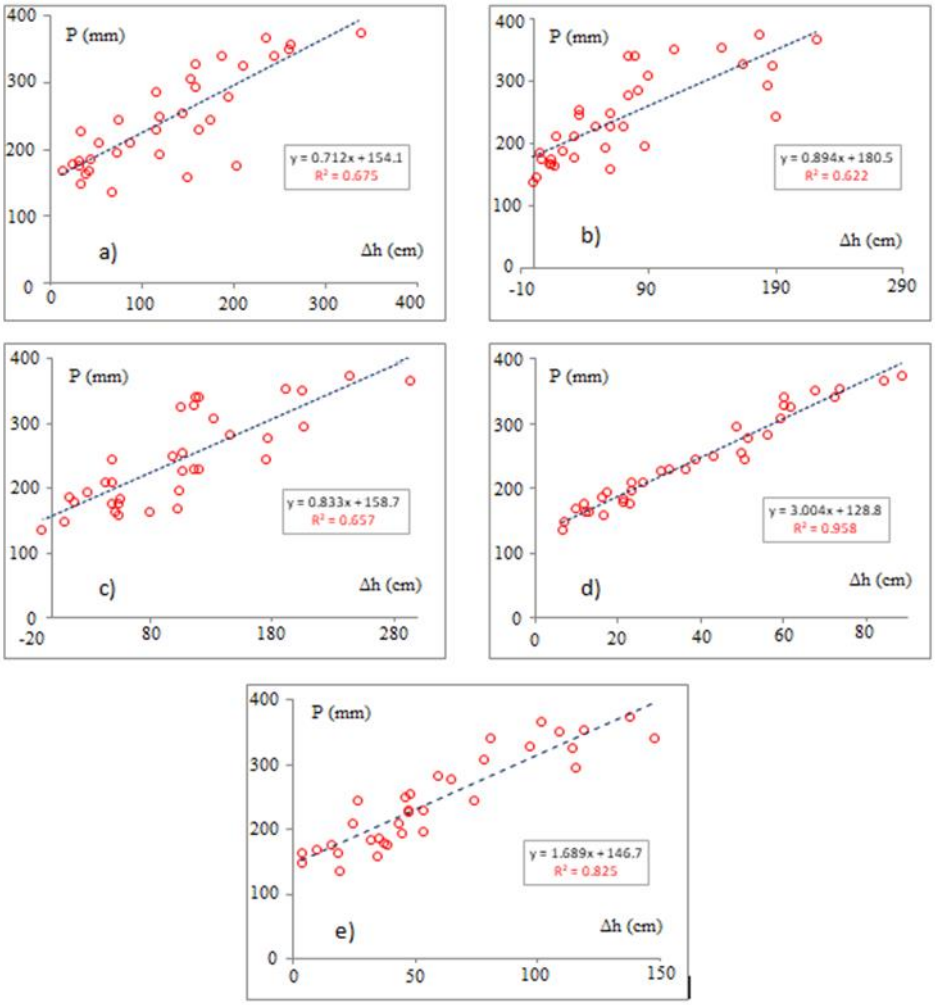

Figure 2. Correlation between precipitation and amplitude of the groundwater level (November 1983 – May 2017) at wells: a) Darabani; b) Dorohoi Sud; c) Ezer; d) Corlățeni; e) Dângeni.

Starting from the fact that the variations of the groundwater level are mainly influenced by the variation of the atmospheric precipitations and the permeability of the rocks, a new index was calculated starting from the difference between the variation of the measured and the calculated groundwater level (± Δh).

The analysis of the correlation graphs (Figure 2) that were made following the application of the new methodology highlights graphical and statistical correlations that are between the threshold of 0.6 and higher than 0.9 [18, 19]. The weakest value of the correlation can be observed in the Dorohoi ud dwell (Figure 2, b), well that is located in an area where variations of the groundwater level are identified that cause an anthropogenic footprint, being an area with a high anthropogenic level, value of 0.622.

Table 2. Calculated parameters for wells.

Well	Period	Medium groundwater level (m)	μ (%)	Pp	α (%)	Correlation
Darabani	1983-2017	3m - 4m	4.1	192.3	27	0.675
Dorohoi Sud	1983-2017	3m - 4m	6.4	199.1	23	0.622
Ezer	1983-2017	6m - 7m	4.9	193.6	26	0.657
Corlățeni	1983-2017	1m - 2m	25.35	147.1	66	0.958
Dângeni	1983-2017	2m - 3m	12.3	173.4	41	0.825

The application of the methodology to the rest of the wells observed highlighted the fact that the strongest correlations are characteristic of those wells whose groundwater level is located closer to the topographic surface and the permeability has higher values. The Corlățeni well with a permeability of 25.35% and an average value of the groundwater level of 1-2m is noticed, followed by the Dângeni well with a permeability of 12.3% and an average value of the groundwater level of 2-3m (Table 2).

CONCLUSIONS

The analysis of the correlations that are established between precipitation and the amplitude of the variation of the groundwater level resulting from the determination of spring forecasts can be useful in making plans to reduce negative effects in the underground given that the degree of mutual influence in calculation. The approached methodology is characterized by the simplicity of performing hydrogeological calculations and ease in interpreting the obtained data. It is especially useful in terms of the fact that it can be used in a large data set, it excludes a series of hydrogeological calculations that characterize the filtering properties of rocks (whose determination over time is expensive) generating these data only based on the amplitude of levels and rainfall.

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CARTOGRAPHIC IMAGE OF LAND USE CHANGES IN THE BIAŁA NIDA CATCHMENT SINCE THE BEGINNING OF THE 19TH CENTURY

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ABSTRACT

The last centuries have been characterized by rapid civilization progress and intensified social and economic changes. Anthropogenic activities (e.g. agriculture, industry, urbanization) and physical-geographic processes contribute to changes in land use. Proper land use from the human needs point of view, combined with the environmental potential and the protection of resources, is a fundamental problem of geographical and social sciences. The aim of this study is to identify changes in land use and land cover occurring in the catchment area of the Biała Nida river since the beginning of the 19th century, as well as an attempt to determine the causes of these changes. The essence of research is also to determine how these changes may take place in the near future. The scope of study included analysis of data obtained as a result of objects vectorization, located on raster, historical cartographic materials, subjected to calibration process. Spatial analysis methods, being a part of GIS technology, were used in the research. The conclusions drawn from the analyses of land-use changes in the Biała Nida catchment municipality are based on qualitative and quantitative evaluation. Results of the spatial analysis indicate that in the southern part of catchment area the agricultural method of land use dominates (along with fishing), while in the northern part the industry is more important (formerly metallurgy in the Old Polish Industrial District, now limestone mining and cement industry).

Keywords: land use changes, Biała Nida catchment, cartographic materials, spatial analysis, GIS

STUDY AREA

The Biała Nida catchment (Świętokrzyskie and Silesian Voivodships), with an area of over 1020 km2, is located in Palaeozoic structures of the Kielce Uplands, Mesozoic structures of the Przedbórz Uplands and Cretaceous structures of the Nida Basin [1]. In the catchment area it is possible to find rocks from different epochs, from Cambrian to Holocene. Deposits of limestone, marl, dolomite, sand, peat, calcite, clay, gravel, loess and barite were documented in the studied area [2]. From the 12th/13th century, the catchment area was exploited for its raw materials, i.e. silver, copper and lead. Iron production was possible thanks to the occurrence of bog iron ore, among others, in the Łososina valley [3].

The area is characterized by the alternation of concave and convex forms as well as elevations with different relative heights [2]. Altitudes in the catchment range from 188 to 447 m. (Fig. 1). The Biała Nida catchment area is closed with watershed of the 2nd and

3rd order, and the main tributaries of the river are Łososina, Lipnica, Jedlinica, Kwilinka and Hutka. The northern part of the studied area is dominated by soils with low fertility and humus content, while the southern part is dominated by rendzinas [2]. There are two landscape parks in the analysed area, seven nature reserves, Natura 2000 and Protected Landscape Areas [4].

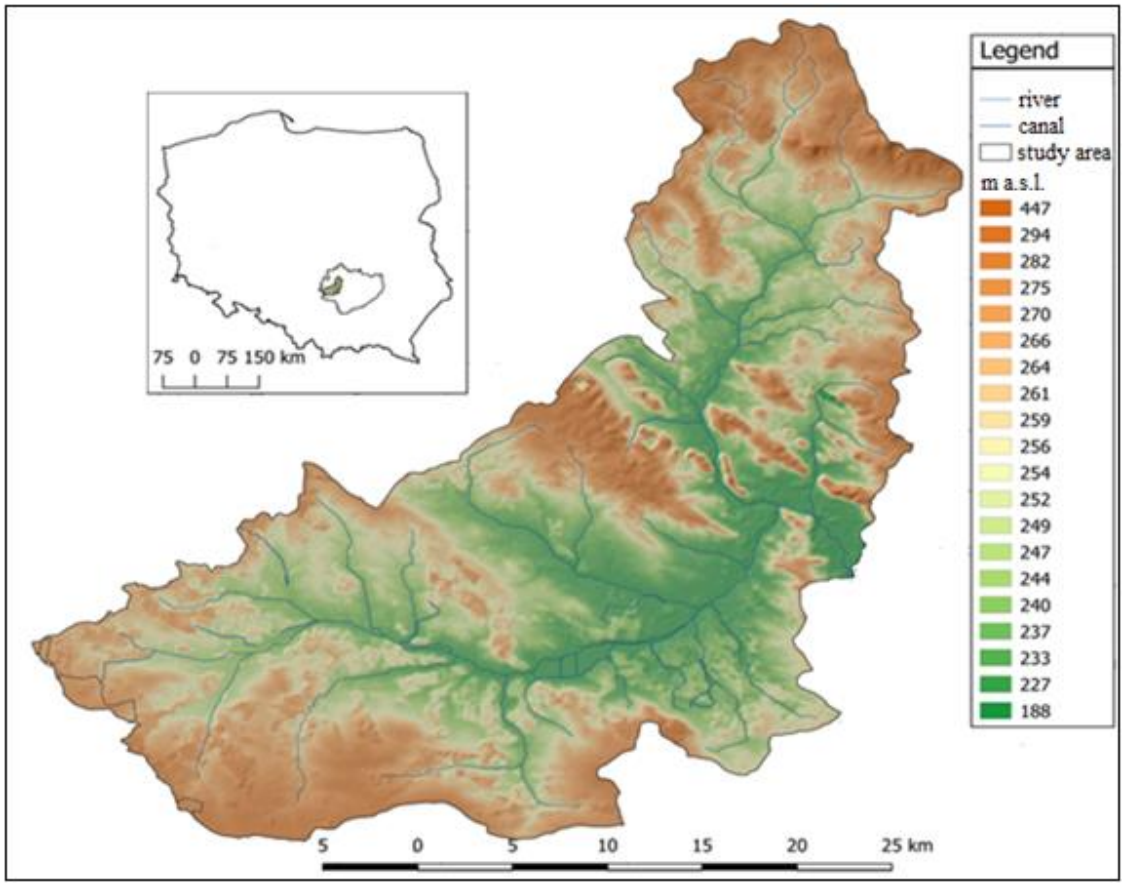

Figure 1. Digital terrain model of the Biała Nida river catchment.

AIM OF THE STUDY AND METHODS

The aim of this study was to identify changes in land use and land cover occurring in the catchment area of the Biała Nida since the beginning of the 19th century, as well as an attempt to determine the causes of these changes. The analyzed changes were related to such land use forms as forest areas, water reservoirs, marshlands, areas covered with grass vegetation, arable lands, built-up areas, watercourses, roads and railroads.

The essence of research was also to determine how these changes may take place in the near future [4]. The scope of study included analysis of data obtained as a result of objects vectorization, located on historical cartographic materials (Table 1; Fig. 2). The work uses the geographical information system tool - QGIS 3.10.4.

The usefulness of archival maps depends on the quality of their processing from analogue to digital format [5]. Research of land use changes began with the calibration of the four oldest topographic maps. Transformation of coordinates from the pixel system to the "1992" geodetic coordinate system was carried out using characteristic reference points, e.g. road crossings, bridges, churches, and mills. The older ones, created before the 19th

century and some from the first half of the 19th century, were not prepared on the basis of the surveying grid, which makes them unreliable [4], [5], [6].

Table 1. Cartographic materials used in the stud.

Time cutting	Date of issue	Type of data	Scale	Map
the beginning of the 19th c.	1808	raster	1:288 000	Carte von West-Gallizien
half of the 19th c.	1843	raster	1:126 000	Mapa Kwatermistrzostwa
the beginning of the 20th c.	1915	raster	1:100 000	Karte des Westlichen Russlands
first half of the 20th c.	1934 - 1939	raster	1:100 000	Mapa Taktyczna Polski
second half of the 20th c.	1966 - 1975	raster WMS	1:50 000	Mapa Topograficzna
the end of the 20th c.	1991 -1998	raster WMS	1: 50 000	Mapa Topograficzna
the beginning of the 21st c.	2019	vector	-	BDOT10k

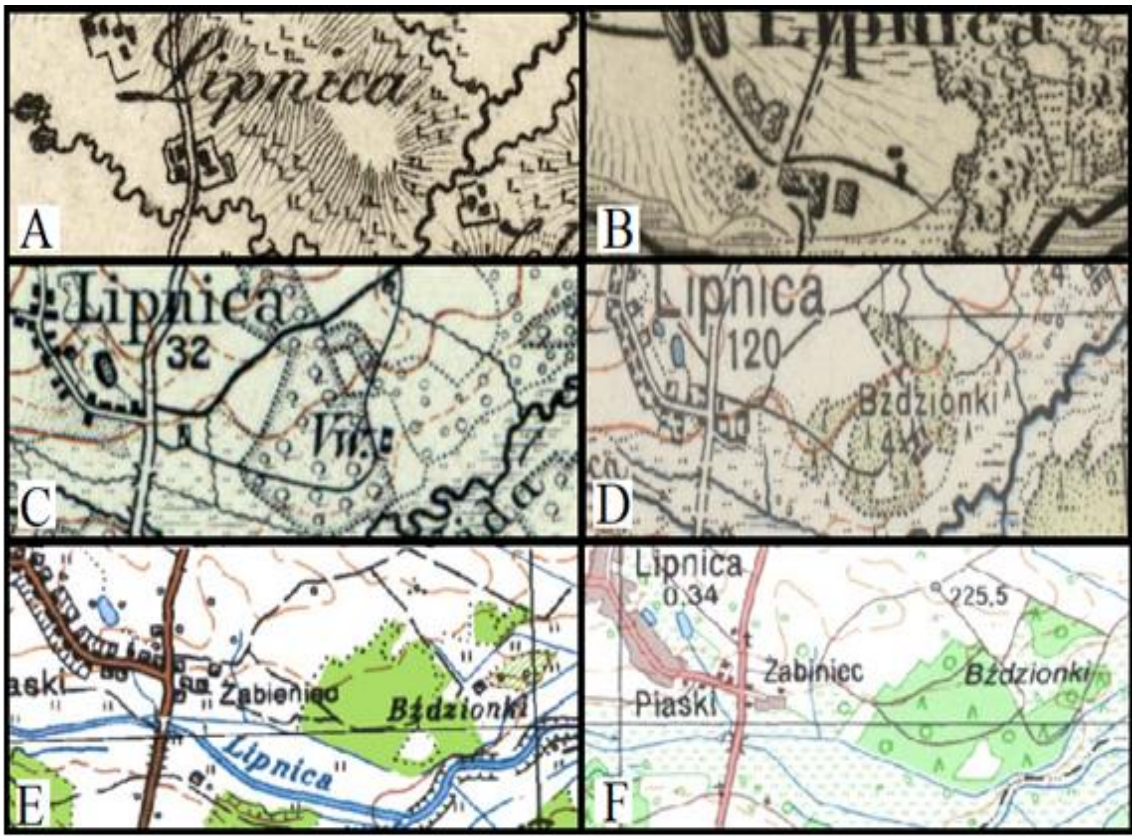

Figure 2. Cartographic materials used in the study: A – Carte von West-Gallizien, B – Mapa Kwatermistrzostwa, C – Karte des Westlichen Russlands, D – Mapa Taktyczna Polski [http://igrek.amzp.pl] , E – Mapa Topograficzna, F – Mapa Topograficzna [https://mapy.geoportal.gov.pl]

They can be a source of information about the existence of certain environment elements, e.g. forests, but they should be viewed with some distance as they are not fully cartometric [5]. In case of maps that do not follow the cartometric rules, a transformation called spline function (TPS) was applied, in which the image was distorted, but the control points coincided very well with the reference layer. The calibration of the 20th century maps was performed using a second-order polynomial transformation [5], [7]. The next stage of work was data analysis. After the map digitization was completed, the area of polygon features and the length of line features were calculated [4], [5].

RESULTS

The result of spatial analysis indicates that in 1808 non-forested areas (arable land, meadows, pastures, wooded areas, shrubs or wastelands) constituted about 58% of the Biała Nida catchment area (Table 2). Forests then occupied 41.5% [4]. Areas located in the northern part were ore-bearing. Documents and names of some villages such as Ruda Zajączkowska, Hucisko, Kuźniaki prove the existence of industrial settlements in this area. The wood obtained from vast stretches of forest was used to produce charcoal, which was used to fuel steel furnaces [3], [4]. While in the southern part of catchment area there were favorable conditions for agricultural development.

Built-up areas and water reservoirs at that time constituted a minor share in the land use structure. The length of watercourses in 1808 was over 382 km. Only the main roads were marked on the topographic map from the beginning of the 19th century. The vast majority of these roads were located in the southern part of catchment area and ran through the only town in studied area – Małogoszcz [4]. The town used to be an important trade center where the main transport routes crossed [4], [8].

Table 2. Structure of land use in the Biała Nida catchment in 1808-2019.

Type of land use	1808	1843	1915	1934-1939	1966-1975	1991-1998	2019
forests [km^2]	423.98	399.68	322.83	255.01	275.42	323.31	375.56
arable land [km^2]	-	486.91	503.34	600.28	597.67	504.76	378.24
meadows and pastures [km^2]	-	124.37	175.11	138.47	121.94	164.81	216.42
water reservoirs [km^2]	1.90	2.04	4.14	8.74	6.69	7.38	9.26
wetlands [km^2]	-	82.15	56.63	23.90	20.57	19.44	11.94
built-up areas [km^2]	4.52	7.88	15.46	18.38	19.16	20.62	41.40
watercourses [km]	382.05	410.14	577.25	576.16	1052.85	1243.84	1565.08
roads [km]	149.56	2017.13	2090.72	2249.32	3196.96	4026.78	4743.88
railway lines [km]	-	-	28.60	28.60	31.44	31.44	31.44

The state policy at that time was to transform forests into arable land and to dispose of state property. The abolition of serfdom in 1864 after the January Uprising in the lands of Russian partition was an important factor in changes in land use. Forests were sold and cut down, wood was used to rebuild houses and farm buildings burned during the uprising [14], and land was used for agricultural production [15]. In 1915, farmland accounted for about 49%. At the beginning of the 20th century, the share of built-up areas in the land use structure in the Biała Nida catchment area increased to 1.5%.

The nature of built-up areas changed to a more compact one. In addition, two railroad lines were built in the catchment area. The decrease of swamps, bogs and marshes to approximately 57 km2 was mainly the result of drainage and increasing arable land area. The length of watercourses at the beginning of the 20th century increased to just over 577 km. Numerous water reservoirs were created during this period, most of which were intended to serve as fish ponds. Forested areas between 1934 and 1939 occupied only 25% of studied area (Fig. 4). Deforestation may have been caused by the further conversion of forests into arable land and the use of wood for industry and construction, growing branches of the economy in the reborn People Republic of Poland

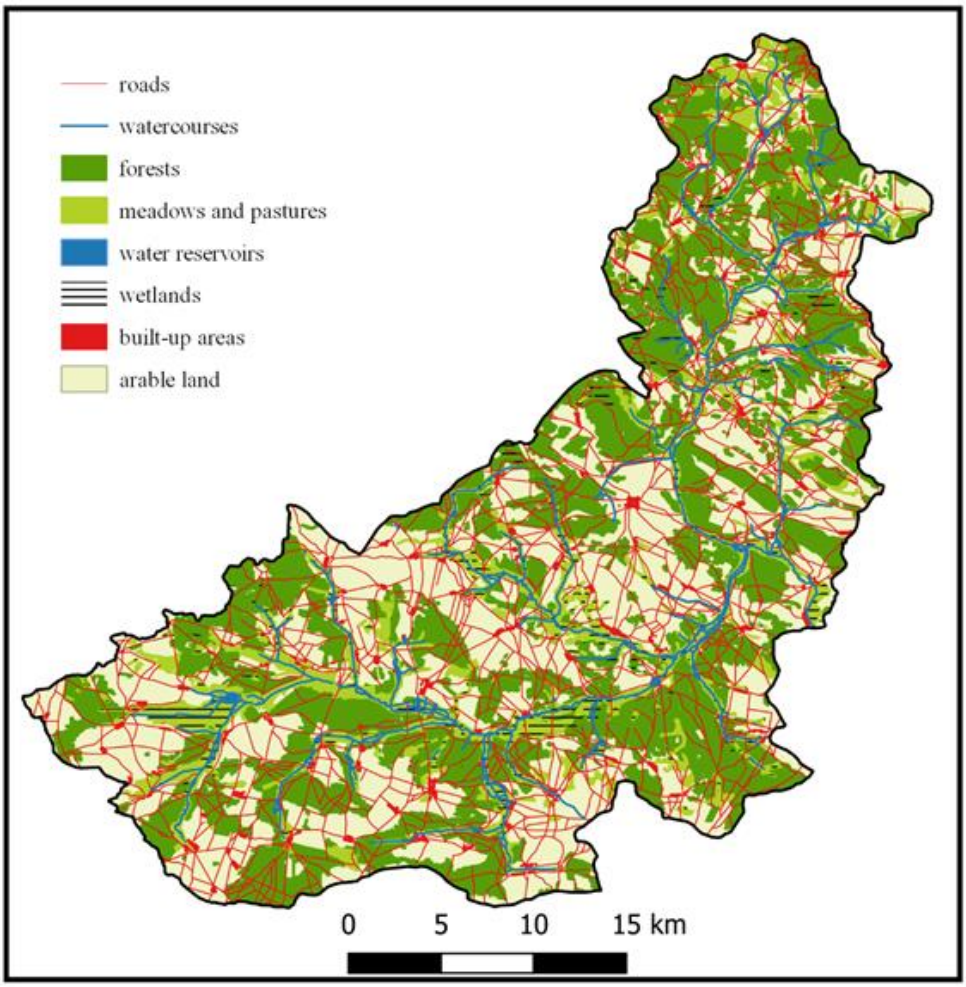

Figure 3. Land use of the Biała Nida catchement in 1843.

During this period, the highest share of arable land in the land use structure (about 59%) was recorded. Meadows and pastures constituted about 14% of the studied area. At the end of the first half of the 20th century, not only forests, but also meadows and pastures were converted into arable land. Small areas of land designated for pastures and large numbers of livestock meant that livestock often had to graze on grassy baulks or in ditches. Many villages, especially in the northern and eastern part of the studied area, acquired a character of stretching compact buildings on both sides of the road. The analysis of cartographic reports from 1934-1939 indicates a 1.8% share of developed areas in the land use structure. The vehicular road network was slightly expanded compared to the 1915 status. In 1934-1939, wetlands covered only less than 24 km2. The share of water reservoirs in the land use structure increased considerably and the length of water courses decreased [4].

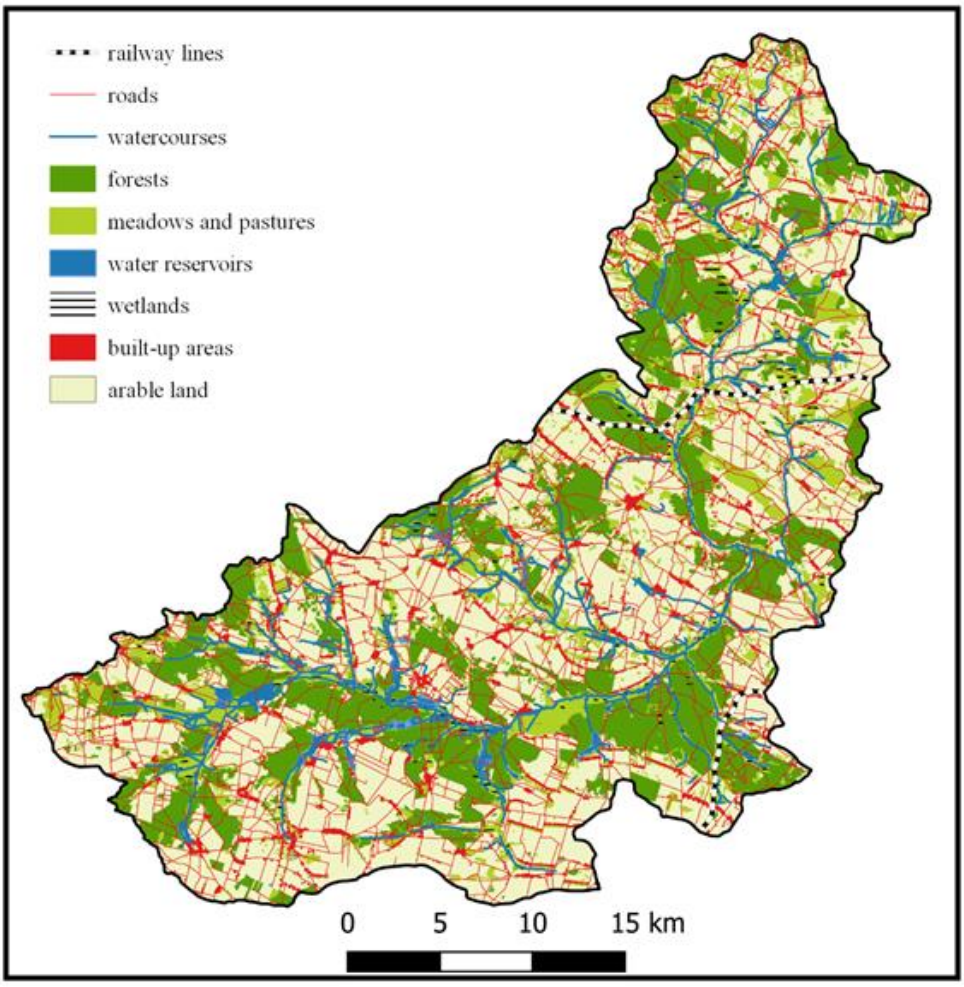

Figure 4. Land use of the Biała Nida catchement in the years 1934-1939

In the second half of the 20th century, forest coverage in the Biała Nida catchment area began to gradually increase. In a study from 1966-1975, forested areas accounted for 27%. During the Second World War, forest areas were devastated. In post-war Poland, forest policy led to an increase in forest cover [4], [15]. In the second half of the 20th century the amount of arable land in the Biała Nida catchment area began to decrease. According to the topographic map prepared in 1966-1975, arable land constituted 58.5%. In the central part of catchment, three large industrial plants were established, in which work became for people an alternative to work in agriculture.

In the second half of the 20th century, the area of built-up land in the Biała Nida catchment area increased to 1.9%. A high concentration of buildings is characterized by the northern part of studied area, where mining industry plants were established. In this period a railroad connection with the cement plant at Małogoszcz was also built. After the Second World War, the road network became very dense (3197 km). The river network along with drainage ditches was almost 1053 km long. The construction of many ditches and drainage channels (melioration) may have been the reason for significant difference in the length of watercourses, which occurred in only about thirty years. Wetlands were drained on a massive scale and then used as arable land or for buildings. The share of forests in the land use structure in the following years increased to 31.7% (Fig. 5). New forest areas appeared mainly in the eastern part of the Biała Nida catchment where weak or incipient soils dominate.

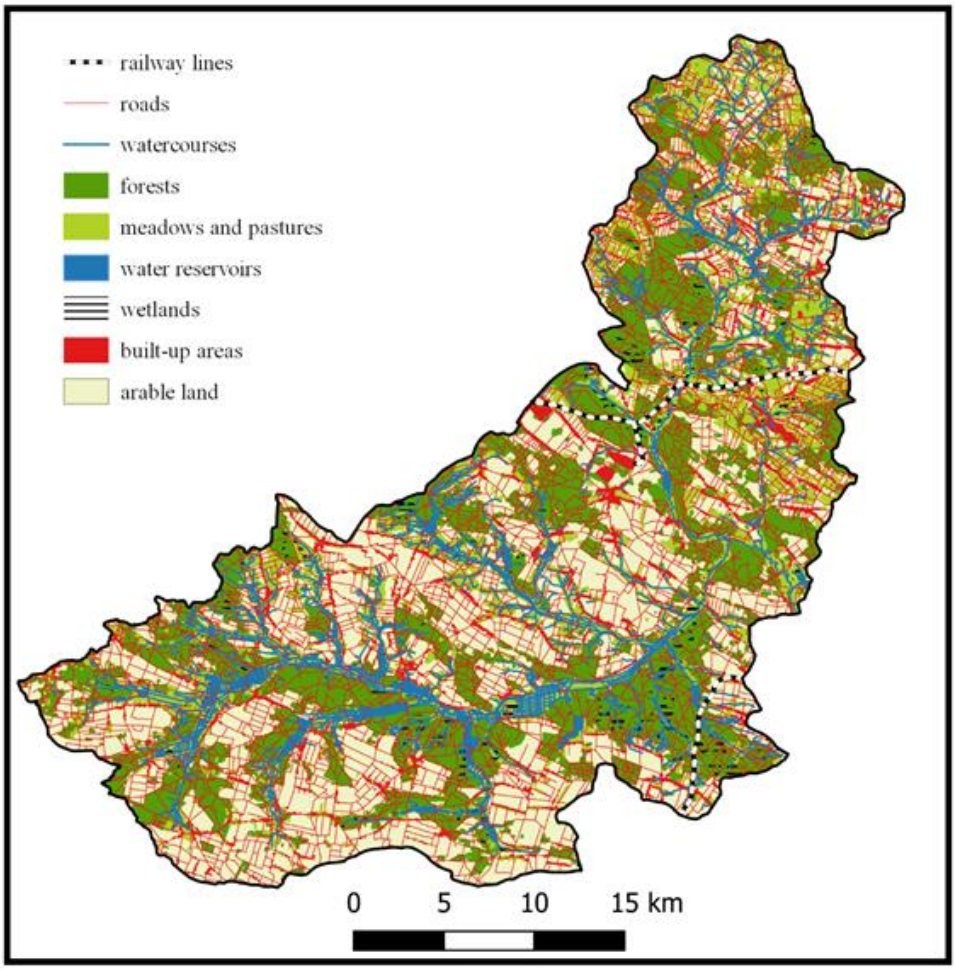

Figure 5. Land use of the Biała Nida catchement in the years 1991-1998.

The establishment of large industrial plants, e.g. the limestone mine in Miedzianka, contributed to the drainage of analyzed land. There is a clear division between the agricultural southern part of catchment and the non-agricultural northern part. The share of meadows and pastures in the land use structure increased to just over 16%. It can be assumed that areas, which were previously arable land, became wasteland. At the end of the 20th century, built-up areas still occupied a small area (about 2%). The following years brought a deepening of the expansion of drainage ditches and channels network. The length of watercourses increased to over 1244 km. The area of water reservoirs, which were created mainly in places of mine excavations, also increased. At the beginning of the 21st century, forest cover in the Biała Nida catchment area increased to almost 37% (Fig. 6).

Arable land accounted for about 37% in 2019. Whereas the area covered by grassland vegetation increased significantly [4], mainly due to fallow areas [5]. The area of built-up land (about 4%) and the length of roads (4744 km) also increased. Spatial analysis of watercourses and water reservoirs shows that the system of drainage ditches has been expanded and new water reservoirs have been created (mainly for retention as well as for tourist and recreational purposes) [4].

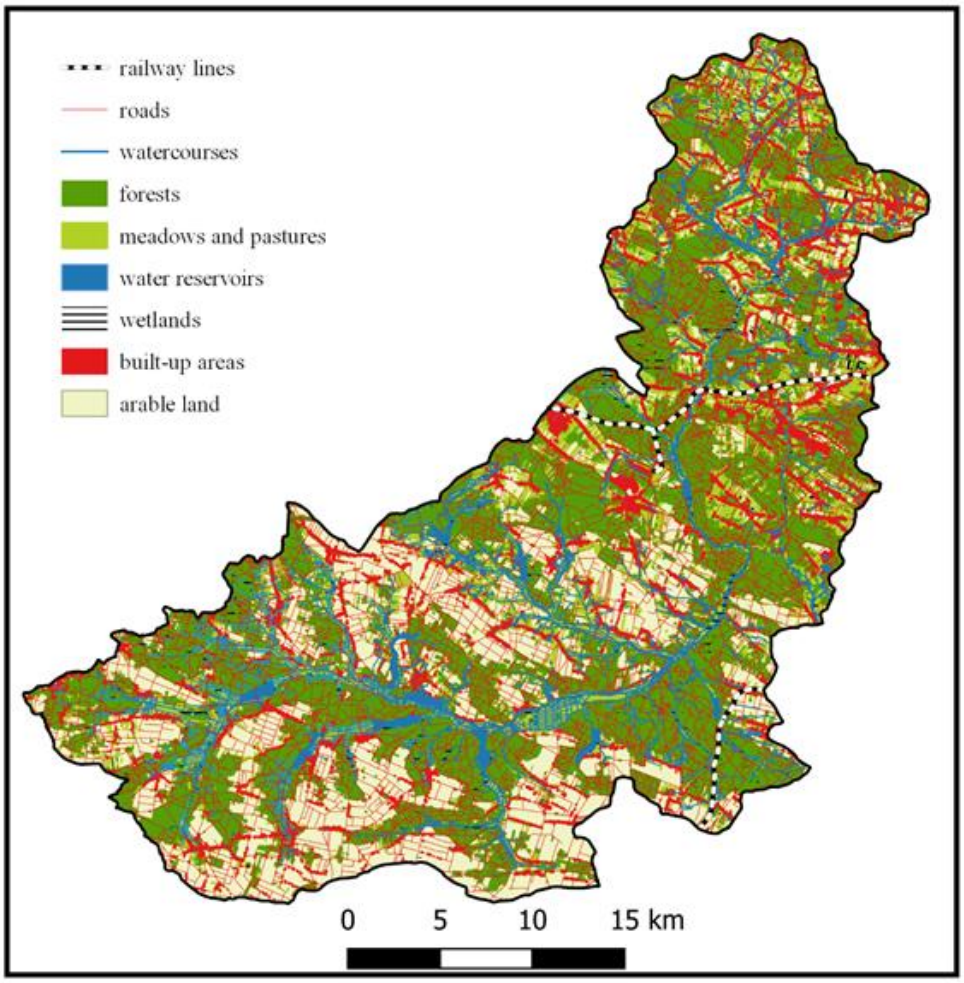

Figure 6. Land use of the Biała Nida catchement in 2019.

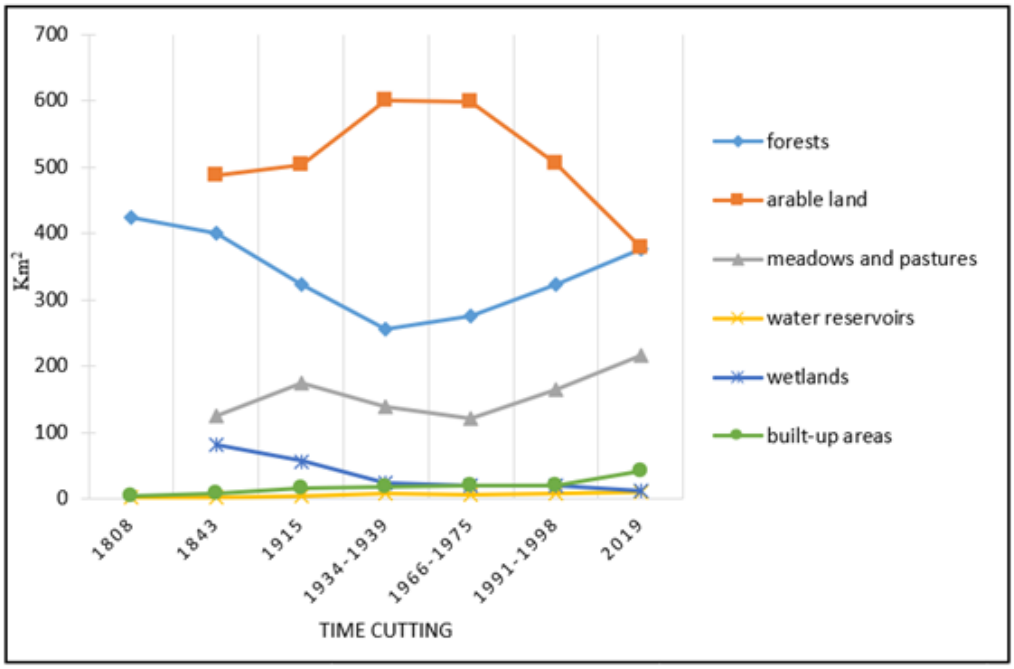

Figure 7. Changes in the structure of land use in the Biała Nida catchment

CONCLUSIONS

Archival topographic maps can be used in studies on land use changes, but not without criticism. The result of spatial analyses depends largely on accuracy, legibility, scale and generalization degree of the cartographic material used, as well as on the quality of calibration and vectorization performed. These factors can completely distort the perception of changes occurring in the landscape as they affect the geometry of topographic signs used and their position [4], [16].

Changes in land use during the time periods studied were influenced primarily by political and socio-economic transformations. More intensive transformations in land use structure took place in the northern part of the Biała Nida catchment. The greatest changes occurred in the proportion of arable land and forests. After the Second World War, there was a reversal of the trend to increase the arable land area at the expense of forests. It can be predicted that in the future forest areas will not be transformed into arable land. In addition, in recent years there has been a tendency to convert poor quality agricultural land, areas located on steep slopes and degraded land into forested areas and it is expected that this tendency will continue in the coming years. Due to drainage works in the catchment area, the length of watercourses has definitely increased, while the area of wetlands has decreased [4].

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ENVIRONMENTAL CONTEXT OF THE EARLY MEDIAEVAL SETTLEMENTS COMPLEX NEAR GRODZISK (NE POLAND) IN THE VIEW OF INTERDISCIPLINARY RESEARCH

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ABSTRACT

The aim of the study is to identify the environmental context of the archaeological settlement complex located near Grodzisk. The research area is located in the north-eastern part of Poland, in the Podlaskie province, in Sokólski district near Suchowola.
To determine the conditions of the environment in which the society of this Early Medieval settlement complex functioned, interdisciplinary research was applied. These were invasive and non-invasive methods (geological boreholes, archaeological excavations, electrofusion, magnetometr, and GPR prospecting). The analyes were supplemented with geomorphological and geological mapping of Quaternary sediments. Environmental analyes were used to construct detailed geological cross-sections, update the geomorphological map, verify the existing maps, and identify the environmental context of archaeological site. Geophysical analyes revealed the occurrence of anomalies that could be connected with the settlement from the Early and the Late Medieval. The area between the two large rivers of the region (Biebrza and Supraśl) has not been subject to wider archaeological discussion the arly , especially in aspect of interdisciplinary research
Thanks to the obtained results, both sites in Grodzisk (site 1 - hillfort, site 2 - settlement) were verified in detail. Non-invasive recognition of their construction and the acquisition of dating material will consequently lead to more complete conservation protection.

Keywords: Biebrza Basin, Early , geophysical methods.

INTRODUCTION

The remains of defensive (fortified) settlements have been an important element of the cultural landscape of the Podlasie region for a long time. Th type of objects is most often connected with . There are over a dozen Early Medieval hillforts in the Biebrza and Supraśl inter-rivers region. These small elevations are ring-shaped with an area of about 0.2 ha to 1 ha. They stand out in arrangement, number of embankments, and location. Not all of them have been identified by excavation or non-invasive methods. The only

settlement where this type of research was conducted i the settlement in Trzcianka, Janów district (site 14).
The first information about the hillfort in Grodzisk can be found in the literature from the 19th c [1, 2]. The first surface studies were carried out in 1922 [3], subsequent archaeological works took place after WW II, in 1955 [4]. Surface studies were repeated several times in 1957, 1959, 1966, and 1967. As part of the (AZP), research in the settlement complex w carried out in 1989 [5]. Subsequent verification work was undertaken after nearly thirty years in 2017.

AIM OF STUDY AND METHODS

The aim of the study is to identify the environmental context of archaeological settlement complex located near Grodzisk and to present the results of the research carried out in 2020 on the eponymous sites. Most of the analyses were carried out under the project entitled „Weryfikacja terenowa kompleksu osadniczego w Grodzisku, gm. Suchowola (stan. 1 i 2)". The project was co-financed by the Ministry of Culture and National Heritage of the Republic of Poland.
Several invasive and non-invasive methods were used in the work (geological boreholes, archaeological excavations, resistivity surveys, magnetometric and GPR prospecting). The analyses were supplemented with geomorphological mapping and geological mapping of Quaternary sediments. The applied research methods, mostly non-invasive, facilitate the settlement and hillfort structures.

GEOLOGICAL AND GEOMORFOLOGICAL BACKGROUND

The Biebrza valley is surrounded on the east, south, and west by morainic plateaux of the last but one glaciation (Saalien). In the north, it contacts the Elk Lake District in the northwest and the Augustw Outwash Plain in the northeast (Fig. 1) [6]. Within the valley, the following lower-order morphological units can be distinguished: the Upper, the Middle, and the Lower Basin (Fig. 1).
The hillfort in Grodzisk is located in the Pleistocene valley (Fig. 2A, B) in the close vicinity of fluvioglacial sands with gravels and moraine (Fig. 2D, C) from Warta Stage (border between moraine upland and fluvioglacial plain - Fig. 2B). Most likely, the same form of this kind of dry valleys can be associated with the outflow of subglacial/fluvioglacial water during the Middle Polish (Saalian) Glaciation - Warta Stage [7]).
With no doubtrelief of this region was formed during the Middle Polish (Saalian) Glaciation – Warta Stage. During the next ice-sheet advance until the Pomeranian phase of last glaciation [8] 15,5-15,0 ka BP, [9] 16.2 ka BP outflow from Naroch-Wilia and Skidel dam lakes and river waters of the upper Neman river followed Łososna river valley, it's tributary Tatarka river breakthrough Pripilin-Nurki gap section to Biebrza and Narew river valleys [8], [10], [11]. Therefore the Biebrza is underfit river with vast peat-bogs on its valley floor. During the whole Pleistocene, the successive ice-sheet advances and retreats were associated with repeated erosive and accumulative processes. As a result, highly diversified surfaces of individual beds and great lithologic variability are present in the Pleistocene formations [12].
The system of ice-marginal valleys in the study area has evolved significantly since the LGM. It probably experienced catastrophic glacial-outburst megafloods [13], the later

retreat of the Fennoscandian Ice Sheet and a subsequent postglacial rebound: a glacial isostatic adjustment (GIA) [14, 15, 16].

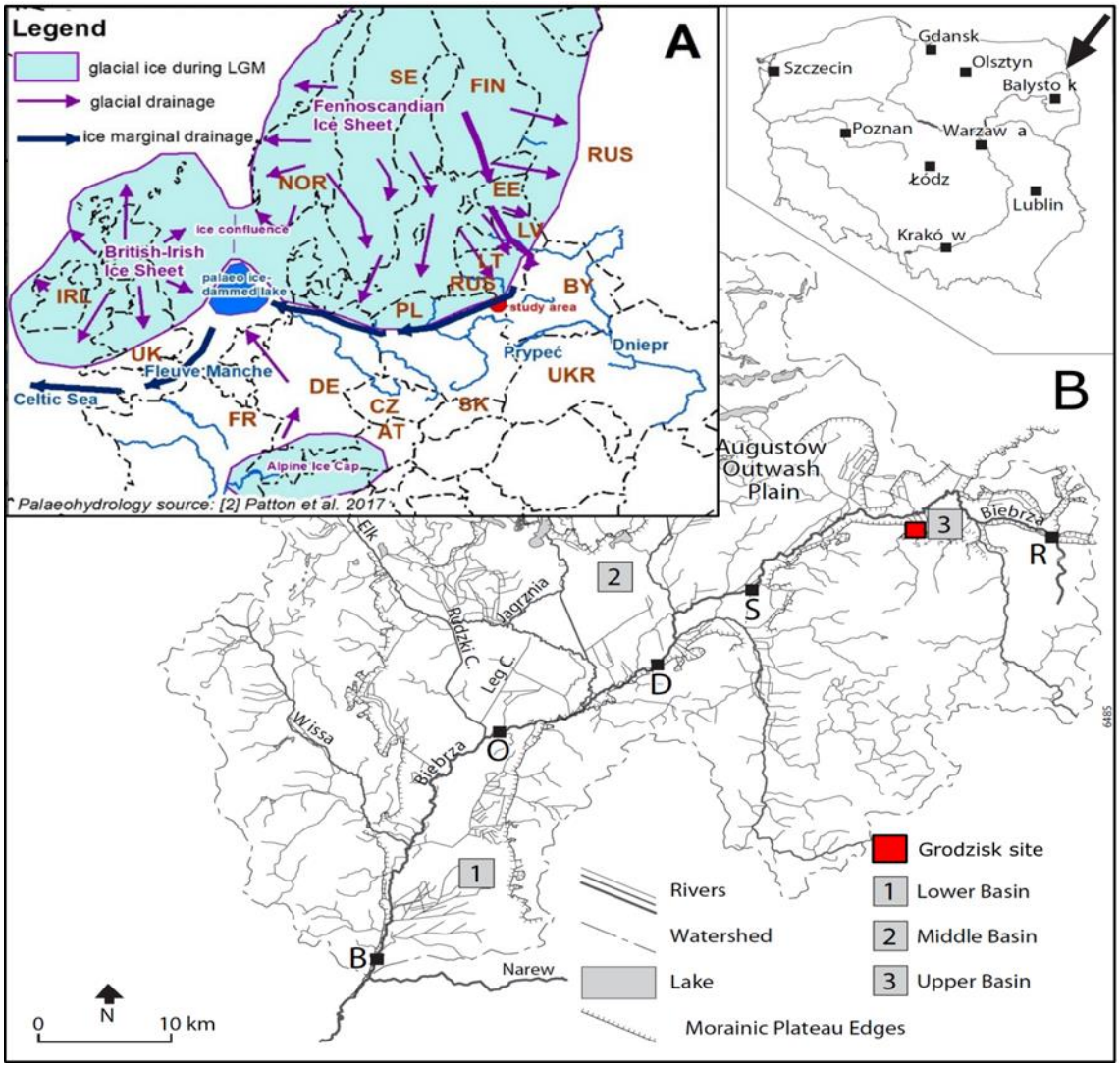

Figure 1. A - Location on political map of Europe with paleohydrological setting during LGM [14], B - The Biebrza catchment, location in Poland, and general topographic features [6]

The last stage of its evolution occurred in the Holocene. This is when the high saturation of the superficial layers of valley sediments coupled with the favorable climate allowed for the development of mires [17].

Unique hydrogeological features and suspected hydrogeological windows are responsible for supplying the Upper Basin of the Biebrza Valley with mineral rich groundwater [18, 124, 19]. However, due to the architectural complexity of fluvioglacial sediments, these hydrogeological windows that supply distantly recharged groundwater to topographic depressions are seldom documented [17]. In this period controlling factors of the evolution were climate and vegetation changes [15, 17].

The valley is completely peat-covered, with peat deposits of 3–7 m thickness partly underlain by calcareous gyttja [6].

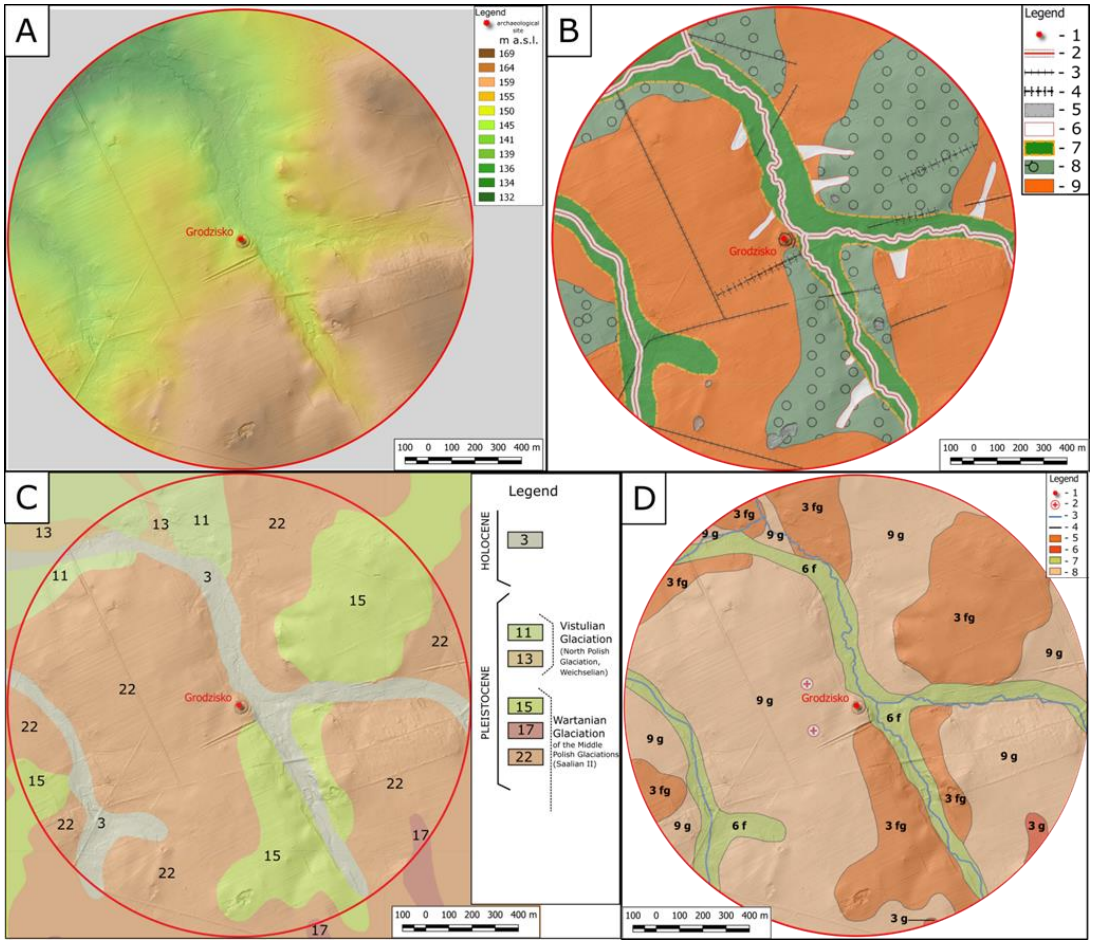

Figure 2. A) The relief of the research area based on the DTM with a marked settlement with 1 km circle buffer zone;
B) Geomorphological map of the studied area: 1 - study area, 2 - Holocene rivers, 3 - anthropogenic embankment, 4 - anthropogenic trench, 5 - sand pits and gravel pits, 6 - Holocene valleys, 7 - Pleistocene valleys, 8 - fluvioglacial plain, 9 - moraine upland [after 20 - changed];
C) Fragment of the geological map in 1:50 000 scale, Suchowola sheet (227-N-34-95-A): 3 - peaty muds, 11 - glacial sands and gravels (Vistulian Glaciation), 13 - tills (Vistulian Glaciation), 15 - glacial sands and gravels (Wartanian Glaciation), 17 - sands and gravels of crevasse accumulation (Wartanian Glaciation), 22 - tills (Wartanian Glaciation);
D) Fragment of a lithogenetic map in the scale of 1:50 000 of the Suchowola sheet (224-N-34-95-A) [after 21 - changed]: 1 - study area, 2 - pebbles, 3 - rivers, 4 - lithological boundaries, 5 - gravelly sands - fluvioglacial (3fg), 6 - gravelly sands - glacial (3g), 7 - peaty sands - fluvial (6f), 8 - diamicton - glacial (9g)

RESULTS

To determine the organization and the construction of the hillfort as well as to verification the potential settlement in its surrounding area geophysical surveys have been carried out (resistivity surveys and GPR). Resistivity survey was carried out on an area of 1.53 ha using a measuring system, so-called "Two-electrode", with electrode spacing: A1M = 1m and BN = 10m, A2M = 0.5m and BN = 10m. Two GPR research sections G_1, G_2 were selected based on the data from resistivity surveys (Fig. 3). On the G_1 (10x10 m) and G_2 (20x40 m) research polygon, GPR profiles were run every 0.3 m. Additionally, a 124 m long cross-sectional profile (blue line on Fig. 3) was made through the form of a hillfort. To verify the archaeological site in the research area 5 archaeological excavations were made (Fig. 3). Archaeological trench 1/20, with an area of 16 m² and dimensions of 8 by

2 m, was located to the south-east of the settlement on the earth embankment interpreted as an external one (outer). Trenches 2/20-5/20, with a total area of 34 m², were located about 40 to 100 m from the hillfort to the west (Fig. 3).

To recognize the environmental context of the archaeological sites, geomorphological and geological mapping of Quaternary sediments were made. The closest vicinity of the archaeological site was selected for a detailed analysis where 30 geological boreholes were made (Fig. 3), 10 of them were subjected to detailed sedimentological analysis. The results of particle size distribution analyses were presented using particle size profiles with graphs of mechanical particle size distribution indexes according to Folk, Ward [22].

Magnetometry prospection took place on an area of 3ha, spanning the direct western proximity of the site and its southern and northern margins as they were free from dense vegetation. Due to the steep slopes of the anthropogenic mound, no measurements were taken there, except one prospection grid in the center of the hillfort (Fig. 4). In result of magnetometry survey, 10 types of anomalies were distinguished comprising those of polygonal (pI – pV) and linear (lI – lV). The division between particular types was based on the nT values, orientation of magnetic field, their arrangement, sizes, and eventual patterns.

Figure 3. Location of geological borehole (1), profile lines (2), archaeological trenches (3), resistivity survey prospection results: low resistance zones (4), high resistance zones (5), area for verification (6), and GPR polygons and profiles.

Figure 4. Magnetometry prospection results from Grodzisk. The aerial orthophotography after geoportal.gov.pl

Many anomalies were registered in the profile crossing the hillfort (E-F cross-section Fig. 5). In the first interpretation, we can group them into two categories - anthropogenic related to the functioning of the site (anomalies 1-4) and natural processes (anomaly 5) (Fig. 7C).

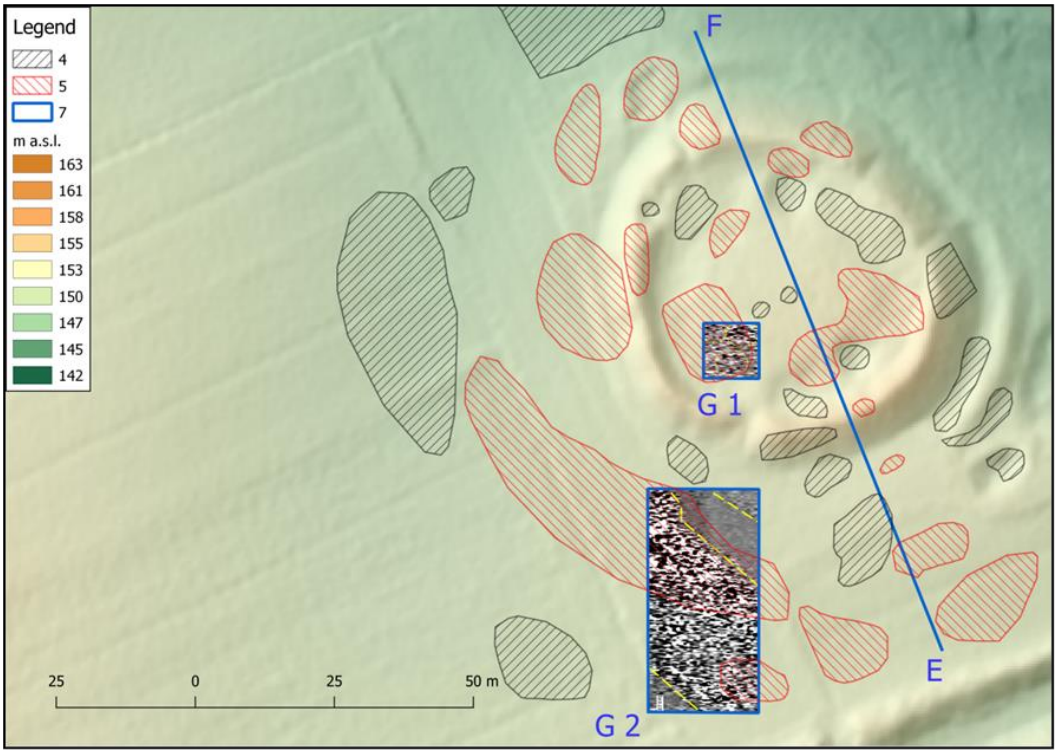

Figure 5. Location of GPR results on resistivity surveys prospection (explanation Fig. 3)

The polygonal anomalies (pI – pV) were widely spread across the study area and in some cases corresponded with a presence of metal waste recorded (pI – pII) during the prospection or erratic rocks (pebbles) abundant in magnetic minerals (pII – pIII). Anomalies (pIV – pV) should be treated as manifestations of single objects, but also some small lithological differences. The first linear type of anomaly (lI) is represented by a critical line anomaly which is directly corresponding with the course of the metal fence (Fig. 6). The lII type was of similar properties to the first one, however the anomalies position do not reflect any visible objects in the field (only on 3D DTM models in high resolution). The third type (lIII) consists of linear arrangements of polygonal anomalies of type pV and therefore might resemble alignments of archaeological objects (Fig. 6). Another explanation of this area is that th positive band is the concentration of minerals that are the diluvial/colluvial material of the former barrow. The lIV type was registered as a positive band at the foothill of a slope of settlement. Such anomaly might reflect the diluvial/colluvial material eroded from the slopes of the hillfort (Fig. 6). The last linear type of anomalies (type lV) was recorded at the western front of the settlement. It is a discernible linear arrangement (also visible in resistivity surveys and GPR prospections) of various polygonal anomalies (mostly of types pII, IV and V). The course of this arrangement is corresponding to the outline of defensive settlement. The presence of various types of anomalies creating this pattern suggests the presence of a waste area or diluvial/colluvial material concentration rather than a reflection of moat.

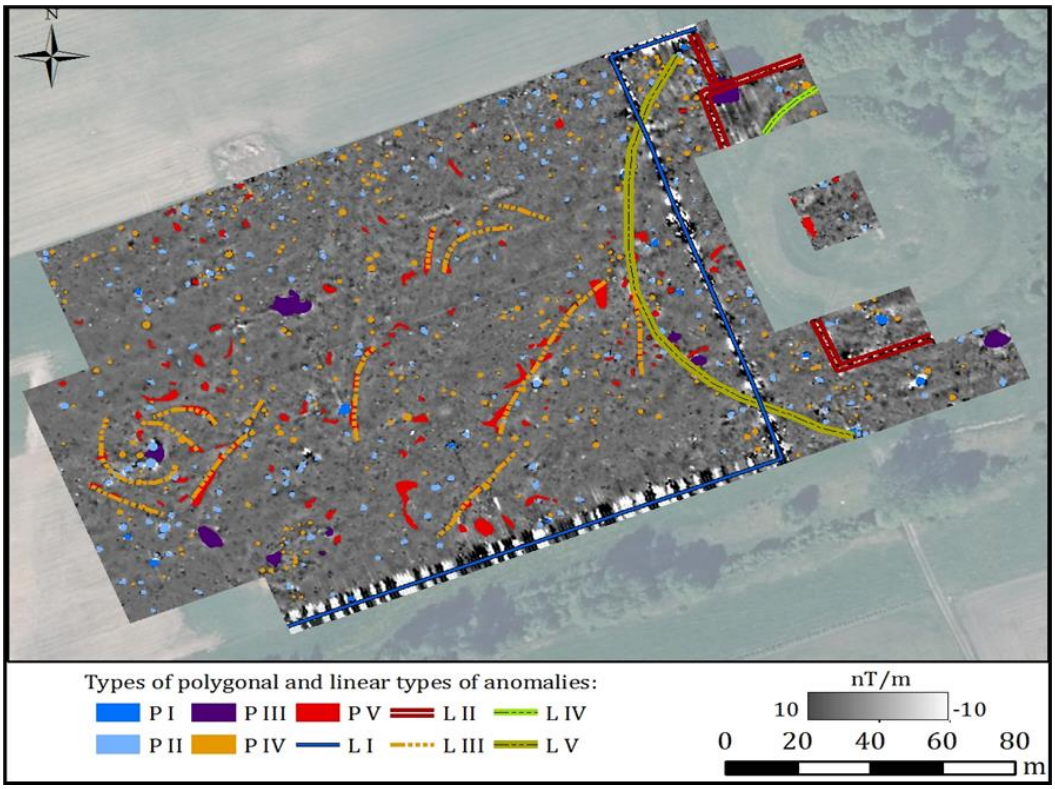

Figure 6. Interpretation of magnetic anomalies recorded during the magnetometry prospection in Grodzisk on the aerial orthophotography after geoportal.gov.pl

Based on the selected geological boreholes, detailed geological cross-sections along the A-B, C-D and E-F profile lines have been drawn (Fig. 3) however results only from E-F be presented in this paper (Fig. 7B). Strongly organic sands with single gravel appear in the upper part of the cross-section (Fig. 7B). The thickness of this layer does not exceed

70 cm and is the highest in the Gr 11 profile (Fig. 7A, B), which is most likely related to the transport of this material down the slope (which may be confirmed in the results of magnetic anomalies (Fig. 6 - LIV) and in GPR profile (Fig. 7C - 5) as well as in resistivity survey prospection (Fig. 3, 5). Based on the diagram of the relationship between the Mz and σ1 indices of the samples from the Gr 4 profile, these sediments can be classified as Quaternary sand-silt sediments [23] similar to the grain-size distribution of fluvioglacial sediments [24]. Below, only in the Gr 1, Gr 2, and Gr 20 profiles (0-20 r. m. of the profile line), there is a layer of yellow organic sands with single gravel. Its thickness does not exceed 25 cm. Deeper there are yellow medium-grained sands filling a part of the fluvioglacial gutter. This form disappears in this part of the site (Fig. 7B). It is also well visible in GPR profile E-F (Fig. 7C) interpreted as a moat. These sediments are also visible in resistivity surveys prospection as a high resistance zones (Fig. 3).

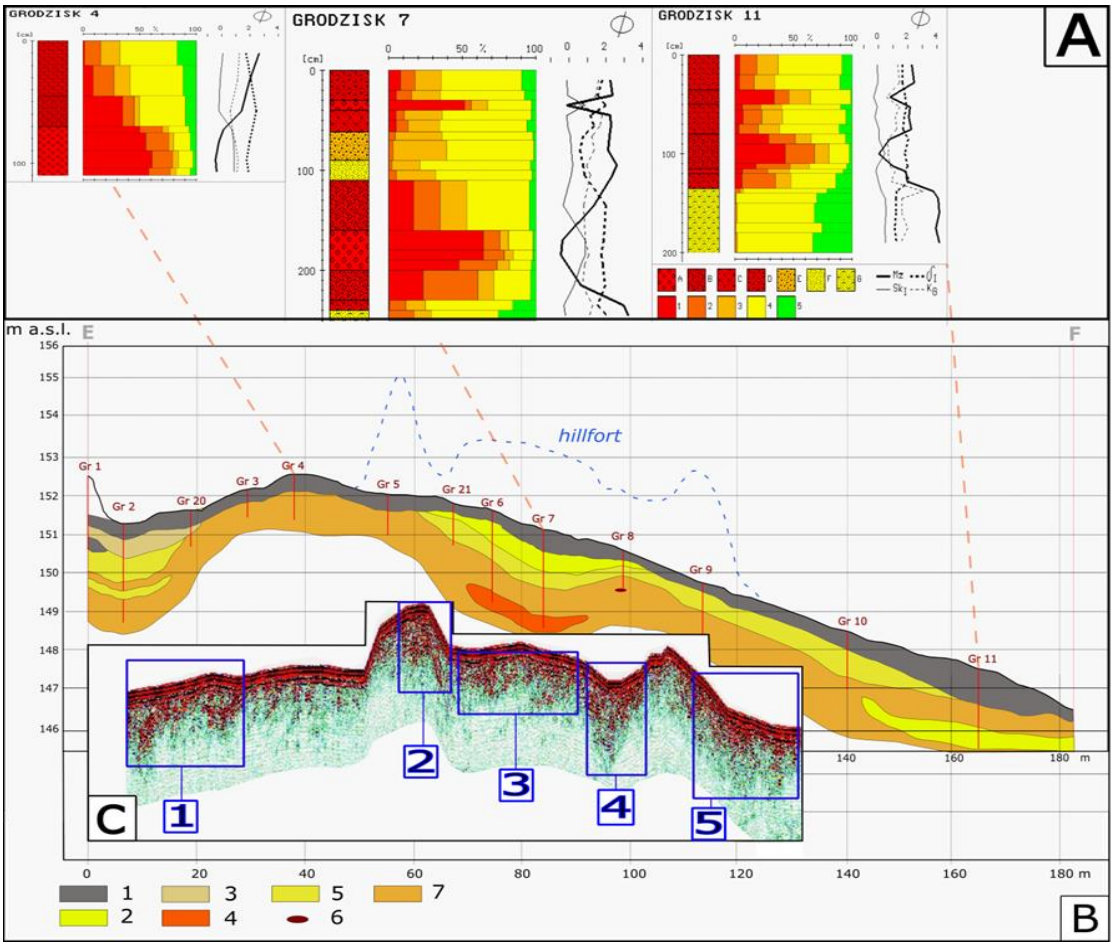

Figure 7. B) Geological cross-section E-F of the hillfort: 1 - organic sands with single gravels, 2 - yellow fine-grained sands, 3 - mixed fine-grained sands with single gravels, 4 - sandy clay, 5 - yellow medium-grained sands, 6 - pebble?, 7 - silty sands with gravels. A) lithology, grain size, and Folk-Ward's distribution parameters of selected profiles; Lithology: A - gravels with sand, B - sand with gravels, C - sands with single gravels, D - silty sands with single gravels, E - medium-grained sands, F - fine-grained sands, G - silty fine-grained sands; Fractions: 1 - gravel (under -1ϕ) 2 - coarse sand (-1 to 1ϕ), 3 - medium sand (1-2ϕ), 4 - fine sand (2-4ϕ), 5 - silt and clay (4-8 and above ϕ); Folk-Ward's distribution parameters: Mz - mean diameter, δl - standard deviation (sorting), Skl - skewness, KG -kurtosis. C) GPR profile with anomalies interpretation: 1- associated with a probable moat, 2 - related to the shaft structure (elements of a wooden box?), 3 - related to anthropogenic transformations of the yard, 4 - probably related to the filling of the ditch/moat, 5 - probably related to diluvial/colluvial deposits from the shaft structure

During the archaeological excavation five stratigraphic units were registered in trench 1/20 (location Fig. 3), including modern moat backfills (1, 3 layers) and unmixed Early Medieval layers (4, 5 layers). Layers 1-3 contained mixed historic material: Early Medieval and modern: fragments of vessels, bricks, stove tiles, and few animal bones. Modern ceramics, obtained from layers 1 and 3 in the trench 1/20, is characteristic for the second half of the 16th century and the begging of the 17th A total of 166 pieces of homogeneous ceramics (Fig. 8A) were discovered in layers 2, 4 and 5, initially dating to the 10th c 14C from the fragment of obtained from layer 4 from trench 1/20 gives 1220±30 BP (692-887 cal. yr AD, Poz-126419) (Fig. 8B). This date corresponds to the material from the moat filling and fully confirms the assumed theses.
Trenches 2/20-5/20, with a total area of 34 m², were located about 40 to 100 m to the west of the hillfort (Fig. 3). They contained 11 settlement objects dating the Early (7 pieces, objects no.2, 3, 6, 7, 9, 10, 11) and modern times (object no. 4, 5). All of them contained a modest inventory of sources: from 1 to 10 parts of pottery. Analysis of morphological features, technological and ornamental ceramic material collected indicates that we are not dealing with a homogeneous group. The settlement probably developed centrally, from the area near the hillfort (trench 1/20 - older part) towards the outer parts of the settlement (trenches 2/20-5/20; younger part).

Figure 8. Archaeological trench 1/20 (location Fig. 3) with fragments of Early ceramic (A) and C14 date - fragment of coal (B)

DISCUSSION

The anomalies detected on the magnetometry plan that can be connected with the defensive settlement are most probably those of linear type lII as they adjoin directly the slopes of the rampart. This kind of form is visible in geological boreholes in profile Gr4 (Fig. 7A, B) as a layer with a predominance of gravel in it. It could be connected with anthropogenic construction. Another linear anomaly at the western foothill of the settlement could be the result of slope processes and deposition of various materials (sediments, rocks, waste etc.) down the slope to a natural terrain lowering. There is no direct evidence of anomalies that could indicate a presence of the defensive settlement's borough. Only the anomalies of polygonal type ***pV*** might reflect pits or dugouts supported by wooden constructions. These kinds of anomalies are also visible in GPR prospection in polygon G1. Their linear arrangement in the central part of the investigated area can suggest the existence of some kind of a planned alignment, however this interpretation

needs further verification. Similarly, the linear anomalies of type lIII can represent some erosional features on a gentle slope instead of archaeological objects. These assumptions may be confirmed by geological boreholes and sedimentological analyses. The longitudinal profile of the slope along the C-D line (Fig. 3) shows the features of an agriculturally cultivated slope with characteristic transformations and evolution of slope covers including diluvial/colluvial prcesses. Anomalies (***pIV – pV***) should be treated as manifestations of single object, but also some small lithological differences as geological boreholes where we can presume that this kind of anomalies could be connected with very frequent mica concentrations.

One of the most interesting archaeological objects is the linear anomaly of type ***IV***. As the occurrence of various types of anomalies indicates the presence of a diluvial/colluvial material it might be possible that this diluvium/colluvium was deposited in a ditch. It can be associated either with a geological form or with a highly anthropogenic transformed area. This anomaly is very well visible in GPR prospection as well as in resistivity surveys prospection. Based on geological boreholes and sedimentological analyses, the occurrence of fluvioglacial deposits (fluvioglacial sands with gravels - Fig. 2D, C as a part of fluvioglacial plain wider than on Fig. 2B) cannot be excluded at this point.

The presence of numerous polygonal anomalies can therefore overlie the homogenous positive signal of a ditch backfill. This also needs to be supported by other verification methods. Aside from the anomalies representing possible activity, some of them might represent earlier stages of human presence in the area, i.e. the circular alignment of l**III** around the p***III*** type might resemble the remains of a nivelated barrow grave. Anomalies in the GPR profile E-F (Fig. 7C - 1 part) can be associated with the existence of a moat in this place, however sedimentological analyses does not exclude fluvioglacial sands with gravels in a wide fluvioglacial plain (Fig. 3B). In all cases: GPR prospection (Fig. 7C - 5 part), magnetic anomalies IV (Fig. 6), results on resistivity surveys prospection (Fig. 3), and in geological boreholes (Fig. 7A, B - Gr 11 profile) we can observe strong diluvial/colluvial processes.

In the context of the obtained research results this part of the hillfort and the settlement is located on a glacial and fluvioglacial sediments (much wider fluvioglacial plain than in Fig. 3B), which are currently subject to diluvial/colluvial processes as well as an agriculturally cultivated slope with characteristic transformations and evolution of slope covers.

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GEOLOGICAL CHARACTERISTICS OF THE NEOGENE VOLCANIC PLUGS IN INLICE (KONYA) AREA, CENTRAL TURKEY

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ABSTRACT

Around İnlice village (WSW of Konya), numerous volcanic plugs crop out as steep-sided conical hills within Neogene lava dome covered partially by nuée ardente deposits. Nine circular to ellipsoidal plugs have determined with heights ranging from a few meters to >50 meters, and hence creates usually visible topographic landscapes. Plug-4, tallest one, has a joint system developed typically in NE direction, which was cut by faults formed in N-S direction. In spite of the intensive alteration, mineralogical and petrographical characteristics of the samples suggests that the plugs are composed of dacite-andesite. The samples have also mafic enclave and some disequilibrium structures such as sieve texture in plagioclase, and acicular apatites, suggesting magma mixing and mingling in their petrogenesis.

Keywords: Plug, volcanism, geology, Konya

INTRODUCTION

Volcanic plugs is tower like landforms containing an igneous core of an dormant volcano whose outer layers have eroded away [1]. The plugs usually create visible topographic landscapes which are identifiable from a distance due to the resistance of the intrusive igneous rocks to erosion. The plugs necks have been usually associated in the literature with necks [2]. But, the plugs vary from necks as they correspond to a solidified mass of magmatic rock filling a volcanic vent or crater [3], inferring a considerably shallower location. The conduit thickness affects the magma rate, even variations in conduit geometry can affect the duration of an eruption [2] and likewise whether an eruption will be restricted or widespread.

In Turkey, the existence of plug or neck are reported in several studies, though no study exists to determine their features and occurences; In Almus (Tokat; Pontides) and in Yildizeli (Sivas; CACC) areas, the Middle Eocene volcanism may form as trachytic dikes, plugs, and stocks [4]. In the Afyon volcanic province (eastern part of Western Anatolia), Middle Miocene volcanics form as dome/plug-shaped bodies with lamproitic composition [5]. Dom and volcanic neck also occur in Kırka-Afyon-Isparta volcanic province of Pliocene-Quaternary Gölcük volcanics [6]. From the Kiraz Basin of the Küçük Menderes Graben (Western Anatolia), Miocene High-K calc-alkaline porphyritic andesites occur either lava flows or high-level dykes or volcanic necks in west of Karaburç area [7]. At the western basin margin of the Erciyes depression, near the city of Kayseri, a Late Middle Miocene-Early Pliocene basaltic neck, which cuts across the basement rock and lower pyroclastite horizons [8].

Well-known plugs in the World are Devil's Tower, Kapsiki Peak (Cameroon), Sigiriya Rock Fortress (Sri Lanka) and Ship Rock (New Mexico). There are also ancient castles

builded on a volcanic plug such as the Castle Rock in Edinburgh (Scotland), Deganwy Castle (Wales) and Trosky Castle (the Czech Republic).

STUDY AREA

The study area is located in central southern Anatolia, ~50 km to Konya (Figure 1, 2). Plugs and plug-like occurrences form in a valley as steep-sided conical hills (Figure 3, 4) around Inlice village (WSW of Konya), in where extensive Neogene volcanism took place in the area from Late Miocene. (11.9 Ma, Sille volcanics) to Pliocene (3.35 Ma, Gevrekli dome). Various volcanic and volcano-sedimentary units form in the region, namely, ignimbrite, nuée ardentes, volcanic breccias, agglomerates, tuffs, tuffites, lava flows, lava domes, dikes and sill, with composition of rhyolite, dacite, andesite, trachyandesite, basaltic trachyandesite, basalts and lamprophyres e.g. [9-16]. In the area, the volcanism also leads to the development of some economic mineralizations, such as Doğanbey Cu–Mo porphyry and Inlice Au epithermal deposits [17-18].

Figure 1: A Google map showing the location the studied plugs

The volcanic plug occurs within lava domes, which are suggested to be 10.9 to 3.35 Ma [10]. Western part of Konya volcanics are the youngest lava domes of the studied area. The lava domes in Karadağ Tepe next to the study area, is one of the largest, are partially covered by nuée ardente deposits.

METHODOLOGY AND DATA

Field studies were performed in the region; all plug and plug-like samples were examined, and 46 samples were collected. Thin sections were prepared from fresh samples at thin section laboratory of the Geology Department in Konya Technical University (Turkey), to determine their mineralogical and petrographical characteristics under polarising microscope. Google Earth images were also used in studying the plugs to determine joints systems and faults.

Nine circular to ellipsoidal plugs have been identified in a small area, an area of 3.83 km2, (Figure 4). The plugs have height ranging from a few meters to >50 meters. A Google-Earth image of location-4, the tallest one, and -5 show that joint system may

develop mostly in NE direction, which is cut predominantly by faults with N-S direction (Figure 5). The samples are light to dark grey in colour, and highly fractured due to joints and faults. It also contains mafic dark coloured enclave, indicating magma mingling.

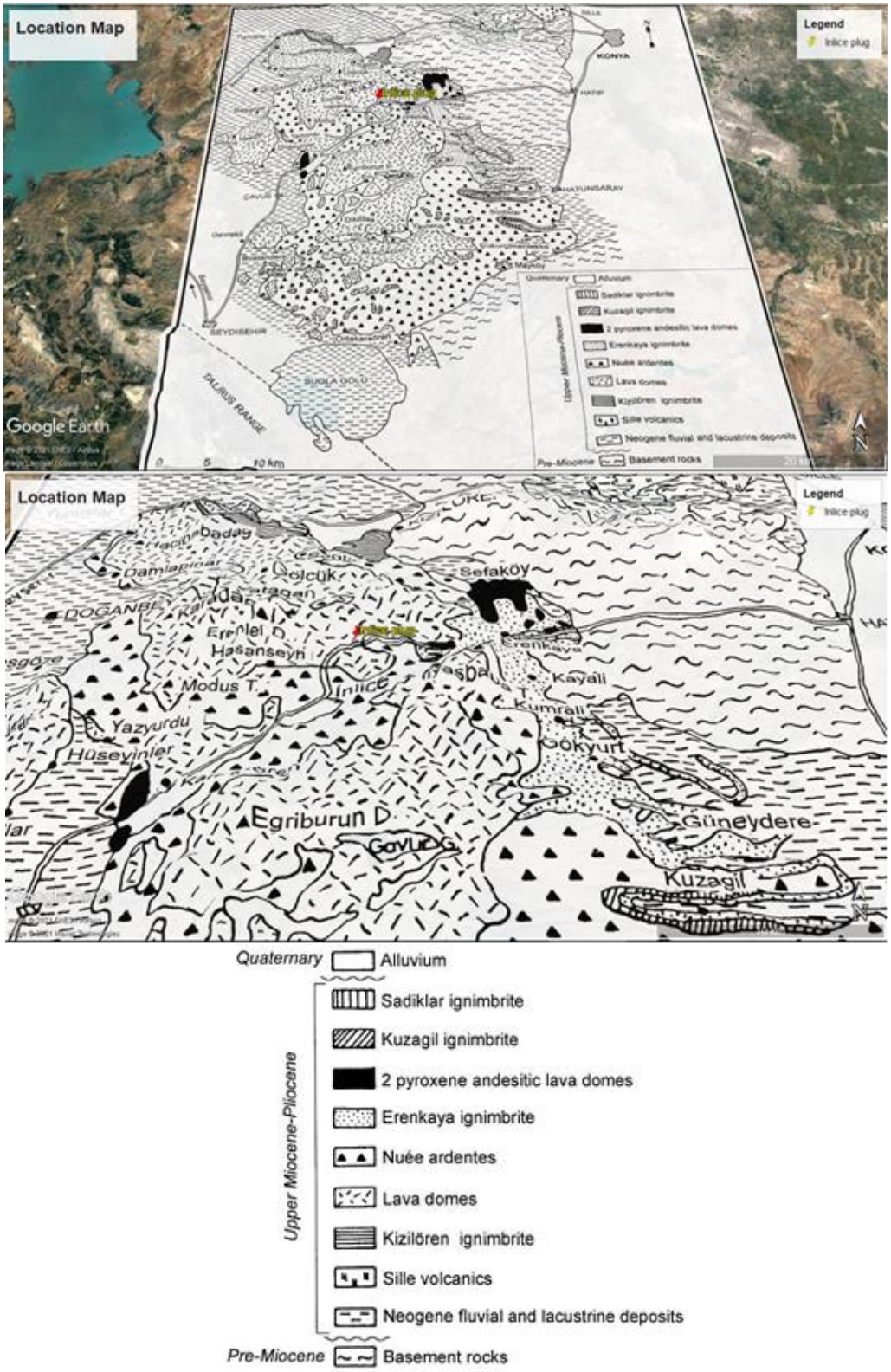

Figure 2: A Google Earth view and geological map of the area [9].

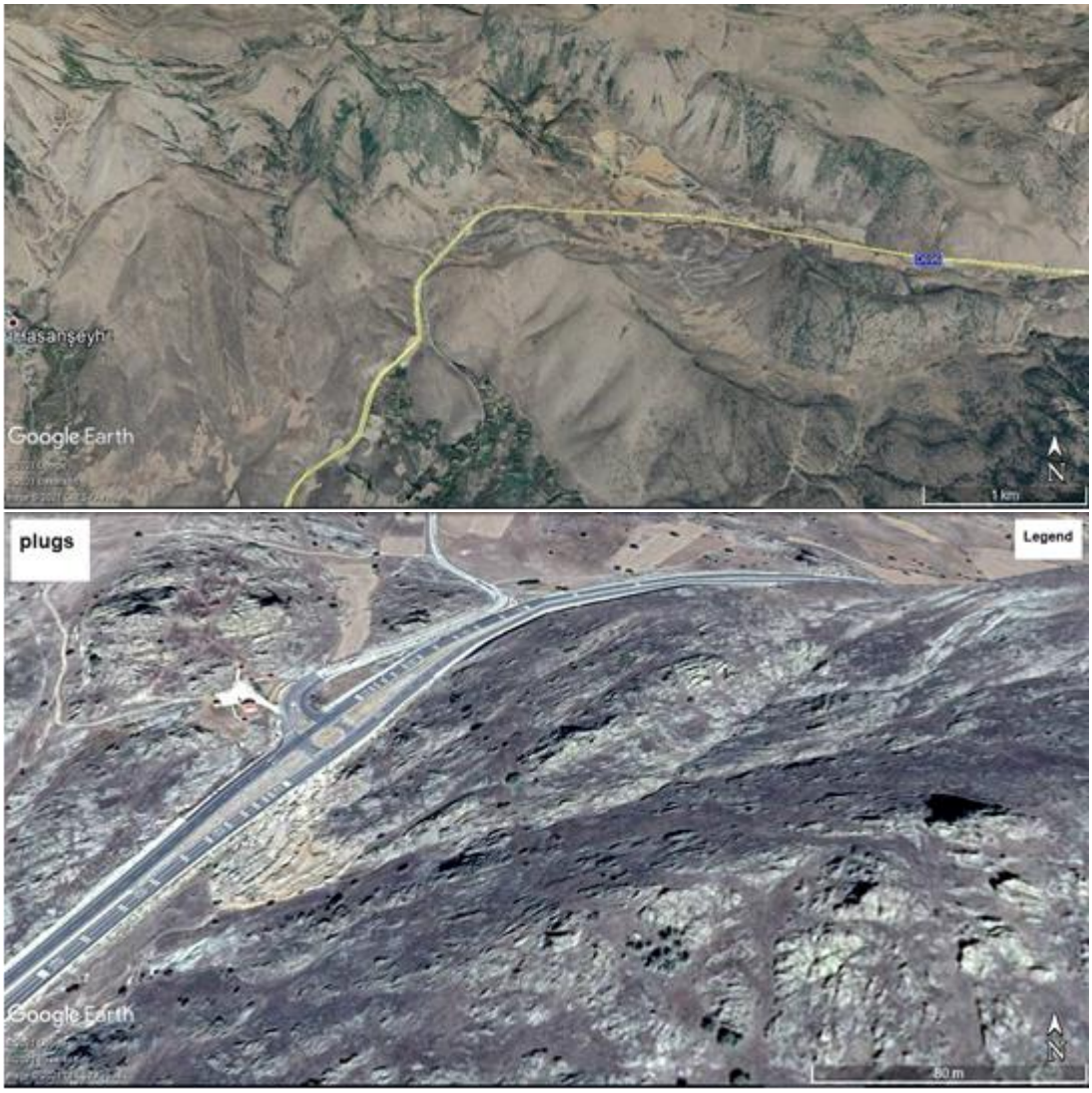

Figure 3: Google Earth view of the study area.

Figure 4: Location of the plugs -1-5.

Figure 5: Field view of plugs-4(a) and 7 (b).

Figure 6: Joint and fault system in plug 4.

Earth image of location-4, the tallest one, and -5 show that joint system may develop mostly in NE direction, which is cut predominantly by faults with N-S direction (Figure 5). The samples are light to dark grey in colour, and highly fractured due to joints and faults. It also contains mafic dark coloured enclave, indicating magma mingling

PETROGRAPHY

The plug samples have predominantly a hypocrystalline porphyric texture, including phenocryst of plagioclase (20-25 %), biotite (10%), quartz (1-2%), amphibole (1-2%) and opaque iron ore (5-15%). The matrix content ranges from 46% to 63% and contains volcanic glass and microlite and crystallite.

A composition of dacite-andesite is suggested for the samples based on their mineralogical characteristics, namely, lack of olivine, pyroxene and K-feldspar; and existence of amphibole and biotite in addition to minor amount of quartz, and porphyric texture.

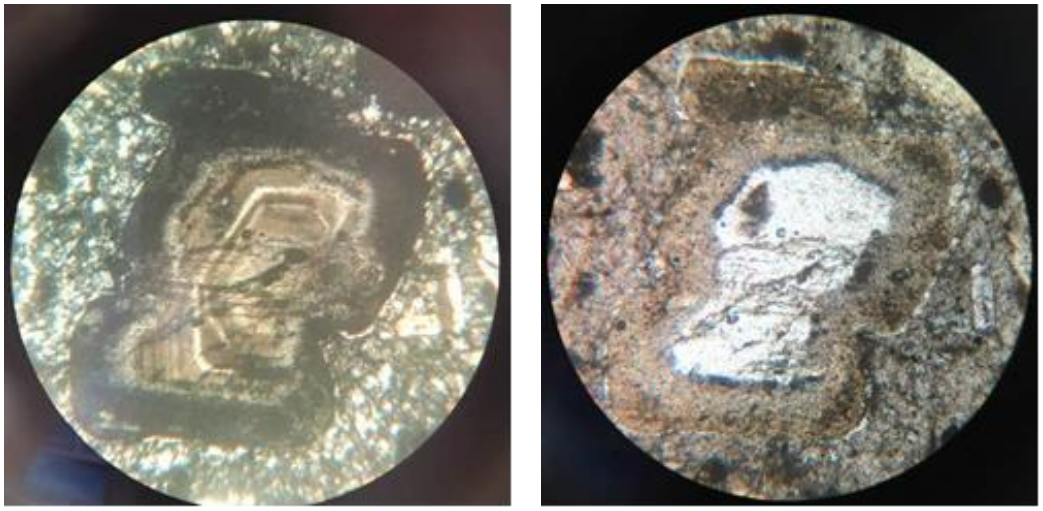

Figure 7: Oscillatory zoning and sieve texture. A) X Nicol, b) / Nicol , Scale bar is 0.6 mm

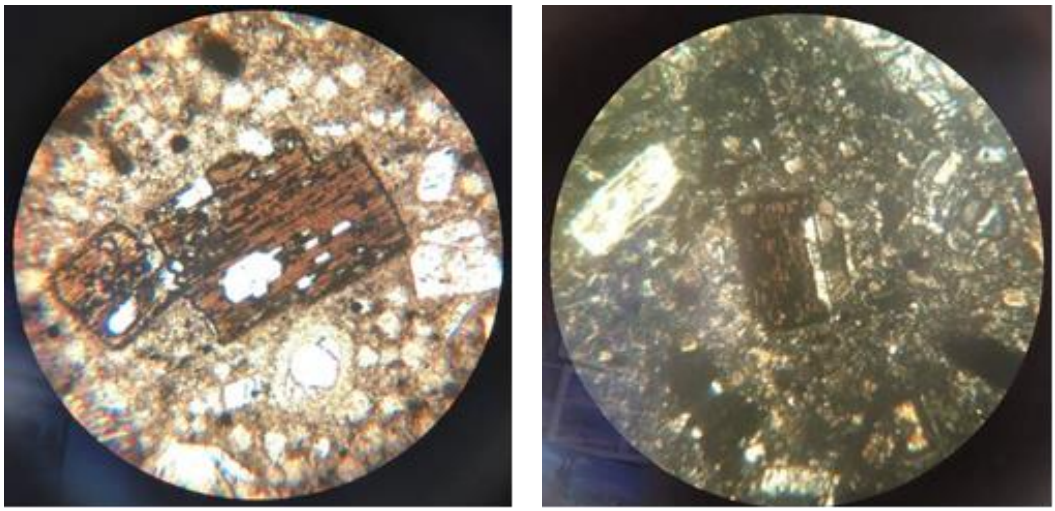

Figure 8: a) Biotite contains opacitic rim and resorption by plagioclase. / Nicol
b) The plagioclase develops next to (resorbed) biotite. X Nicol, Scale bar is 0.6 mm

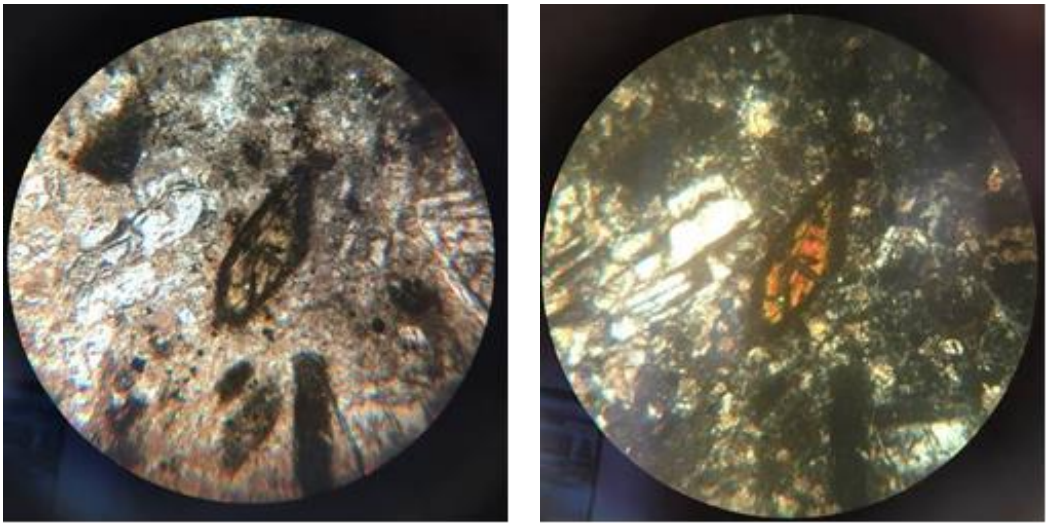

Figure 9: amphibole with opaque rim. Scale bar is 0.6 mm a) / Nicol, b) X Nicols

The plagioclase phenocrysts (2.5-6mm), show albite, albite-Carlsbad twinning, and oscillatory zoning with sieve structures (Figure 6). In some samples, the plagioclase crystals were granulated along its edge due to cataclastic process. The biotite (1.5-4 mm) exhibits strong pleochroism in the shades of brown colour and contains euhedral plagioclase crystals as an inclusion. The plagioclase may develop next to biotite by replacement. It is altered to chlorite and opaque iron ore. The amphibole exhibits strong pleochroism in the shade of green crystals. Biotite shows destabilization textures such as resorption by plagioclase (Figure 7 b). Both the amphibole and biotite may have opaque iron rim (Figure 7, 8). High content opaque iron ore is possibly resulted from intensive alteration. It forms sometimes as hexagonal crystals (2 mm). Minor epidote occurs in the samples. Accessory apatite crystals develop as needles, indicating chilling of the magma developed in a "quenching" environment as the magma is quickly cooled, which symbolizes significant indication for the magma mixing process [19], which is supported by existence of sieve texture in plagioclase.

CONCLUSON AND DISCUSSIONS

Around İnlice area (Konya), several circular to ellipsoidal volcanic plugs determined in a small area on the basis of field relations. They crop out within lava dome, with heights ranging from a few meters to >50 meters. Plug-4 and -5 joint system may develop mostly in NE direction, which is cut predominantly by faults with N-S direction.

Petrographic studies show that the samples are possibly dacite-andesite in composition, with phenocrysts of plagioclase (20-25 %), biotite (10%), quartz (1-2%), amphibole (1-2%), and opaque iron ore (5-15%) in a hypocrystalline porphyric texture. The samples have also some disequilibrium structures such as sieve texture in plagioclase, and acicular apatites, suggestive of magma mixing.

The plug and plug-like occurrences are important since no detail study exist in the literature for the plug occurrence in Turkey, and required further detail studies, such as joint measurement and mineralogical and geochemical studies.

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GEORADAR SURVEY OF THE BRZOZÓWKA RIVER VALLEY (NE POLAND)

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ABSTRACT

The investigated meandering Brzozówka River, a left tributary of the Biebrza river, is located in NE Poland in Podlasie Voivodeship. The river flow in a wide N-S orientated tunnel valley (glacial depression) between the Goniądz and Suchowola-Janów Uplands. The valley bottom is covered by peats.
The aim of geo-radar research (GPR) was to identify the geological structure of the depression bottom, determine the peat thickness and its mineral base.
First, two main research profiles - on both sides of the river - have been defined in the GIS environment. Then they have been divided into a number of sections, each of which has known spatial coordinates. The field, where GPR profiling was performed using the Mala ProEx geo-radar with a 500 MHz shielded antenna. The obtained data was processed in the program Ground Vision. In total, 21 echograms were obtained in the research area, with a total length of 3525 m. The result was the creation of a GPR profile crossing the Brzozówka River Valley in the W-E orientation.
A number of anomalies at different levels have been recorded on echograms. There can be interpreted as an irregular mineral base covered with an organic layer. These anomalies may be evidence of a remnant of the Pleistocene braided river system.

Keywords: Brzozówka river valley, Biebrza river valley, GPR method

INTRODUCTION

The investigated area of the Brzozówka valley is situated in the N part of the Białystok Upland in Podlasie Voivodeship (Fig. 1 – A and B). The relief of the region was mainly shaped during the Warta Cold Stage and transformed in periglacial conditions during the Vistulian glaciation [1], [2].
Brzozówka (a fourth order river, left-bank tributary of Biebrza river) is an underfit river with meandering pattern (Fig. 1 – C; 2 – A and C). It currently flows northwards and its vast valley is filled with peat. In the Pomeranian phase of the last glaciation, this valley was one of the southern outflows of the meltwater routes (Fig. 1 – B), [1]. The Pleistocene relief of the valley was shaped during the sandur spreading and was further evolved during the Late Glacial and Holocene (Fig. 1 – A and B). The controlling factors of evolution were climate change [4].
The GPR method used to determine the thickness of organic matter and the mineral substrate is very useful in the study of paleoenvironmental evolution. This method, together with verification by geological boreholes, provides a comprehensive tool for investigating changes in valley bottom environments [5], [6], [7], [8], [9].

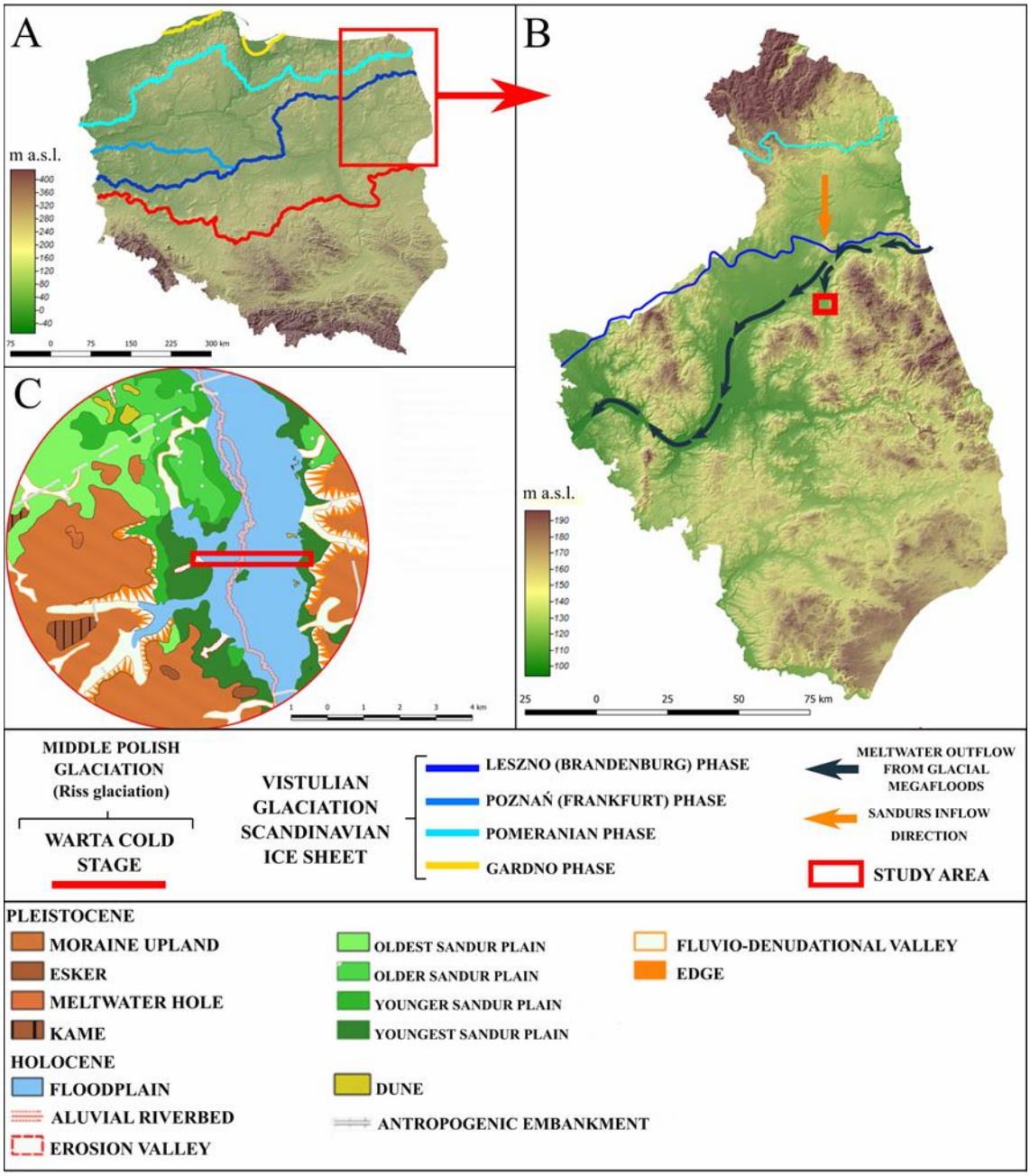

Figure 1. Location of the study. A – Hypsometric map of Poland with glaciation ranges (compiled after [2]); B – Hypsometric Map of Podlasie Voivodeship (compiled after [3]); C – Geomorphological map of the study area

AIM OF STUDY AND METHODS

The aim of the non-invasive GPR survey was to identify the geological structure of the Brzozówka river valley depression, to determine the depth of organic sediments and to record the mineral base. This is the first stage of research to identify the origins and evolutionary stages of this valley, which has been of marginal interest to research so far. The profiles were marked out with an RTK instrument (Leica GNESS with a GS12 antenna and CS15 controller) and their exact coordinates are registered in EPSG:2179 – ETRS89/Poland CS 2000 arrangement, zona 8, in Quantum GIS environment. In GPR

surveys, the Mala GeoScience ProEx System (Professional Explorer) was used, with a frequency of pulse repetition of 200 kHz. The system was equipped with a 500MHz shielded antenna. The GPR profile was located in the middle part of the Brzozówka river valley. A total of 21 echograms were obtained in the study area, with a total length of 3525 m. Profiles 0001 to 0011 are oriented W – E, while profiles 0012 – 0021 are oriented E – W. The result was the creation of a GPR profile crossing the Brzozówka river valley in W-E orientation. The data obtained were processed by the Ground Vision and Reflex programs [10].

Six geological boreholes were made to verify the echograms. Sedimentological analyses were carried out using sieve and laser methods on the mineral sediments, and the content of organic matter was determined using the loss on ignition method. The results are presented graphically in GRANULOM together with the parameters of the Folk-Ward distribution calculated. Samples obtained analyzed in the Geomorphology – Hydrology Laboratory of the Institute of Geography and Environmental Sciences at Jan Kochanowski University in Kielce (Poland).

Radiocarbon dating was carried out in the Absolute Dating Laboratory in Kraków.

This article will present selected GPR profiles within which verification geological boreholes were carried out.

GEOLOGICAL AND GEOMORFOLOGICAL BACKGROUND

Three main geomorphological units dominate the landscape of the study area. To the west and east – a moraine flat glacial upland [1], [11], [12], which decrease to the flat valley of the river Brzozówka (Fig. 1: B and C). The relief was shaped during the Middle Polish (Saalian) glaciations – Warta cold stage.

The Brzozówka depression itself is probably of melt out origin [2], and its evolution should be associated with the Vistulian glaciation. It probably proceeded in two stages (Fig. 1: A and B). The first, during which periglacial conditions in the foreland formed sandur tracks (middle and upper stage) and waters flowed southwards, created a series of fluvioglacial terraces (outwash valley plains) in the Brzozówka valley [11].

The second stage occurred around 15.5-15.0 ka BP, [13] or 16.2 ka BP, when the outflow from the Narocz-Vilnius and Skidel dam lakes and the river waters of the upper Nemunas followed the valley of the Łosośna River and through the Pripilin-Nurki gorge reached the Biebrza and Narew valleys [14], [15]. This flow could also have been partly directed southwards through the Brzozówka depression and the river had a braided pattern (Fig. 1: B).

The Pleistocene relief of the Brzozówka river valley was transformed during the Late Glacial and Holocene. As a result of the stream capture, the direction of the flow was reversed and the river then began to flow in a N direction and discharged into the Biebrza river. This may have been caused by headward erosion, which was responsible for the lowering of the erosion base after the incision of the Biebrza River at the end of the Younger Pleniglacial. In the study section river has meandering river pattern. The Brzozówka depression is filled with peats [1].

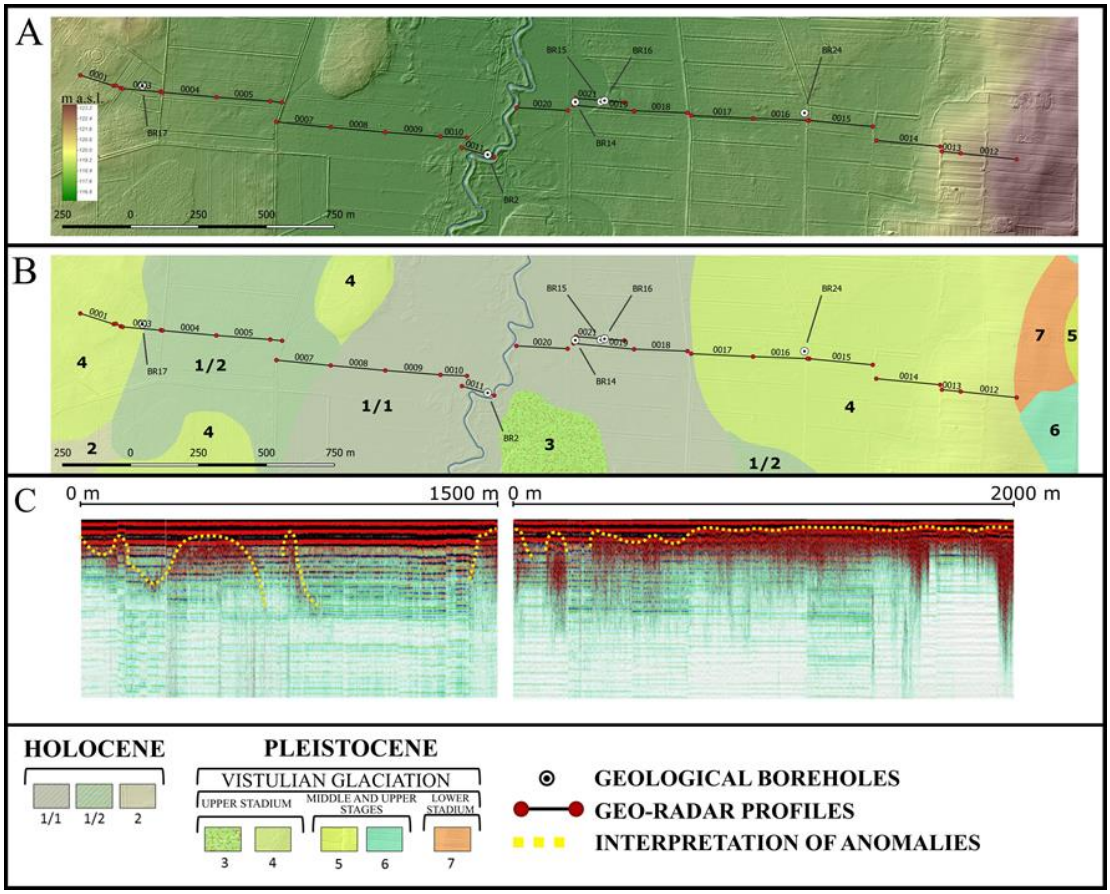

Figure 2. Location of GPR profiling in the bottom of the Brzozówka valley: A – against the DEM; B – against the geological map; C – Integrated geo-radar profile with anomaly interpretation.
Legend of geological map (compiled after [1]): 1/1 – peats on glaciofluvial sands; 1/2 – peats on glaciofluvial sands and gravels; 2 – peat silts; 3 – glaciofluvial sands; 4 – glaciofluvial sands and gravels; 5 – glacial sands and gravels, 6 – stagnation silts and sands, 7 – tills

RESULTS

During GPR prospection, a total of 21 echograms were obtained, with a total length of 3525 m. The result was the creation of a GPR profile with W-E orientation crossing the Brzozówka valley (Fig 2: A and B). A number of anomalies at different levels were recorded on the echograms. The profile data can be interpreted as an irregular layer of the mineral substrate covered by organic sediments (Fig 2: C).

In purpose of verifying the GPR data, six geological boreholes were made in the segments 0002, 0011, 0019 and 0016 (Fig. 3, 4, 5 and 6). The bottom of organic sediments were also dated using the 14C method (Fig. 5).

In echogram 0003 over its entire length of 145m, a sequence of anomalies ranging in depth from 0.3 to 1.5m was recorded. Interpolating their extent of occurrence, they take on a concave line representing an uneven strop. It can be interpreted as a boundary separating mineral sediments from organic matter. Confirmation is provided by borehole BR17 drilled at 77 m where the anomaly boundary coincides with a change in sedimentation type at 65 cm (Fig. 3). On this evidence, it may be assumed that the anomaly basin will be entirely filled with peats located on fluvioglacial sands and gravels which build the lower sandur level.

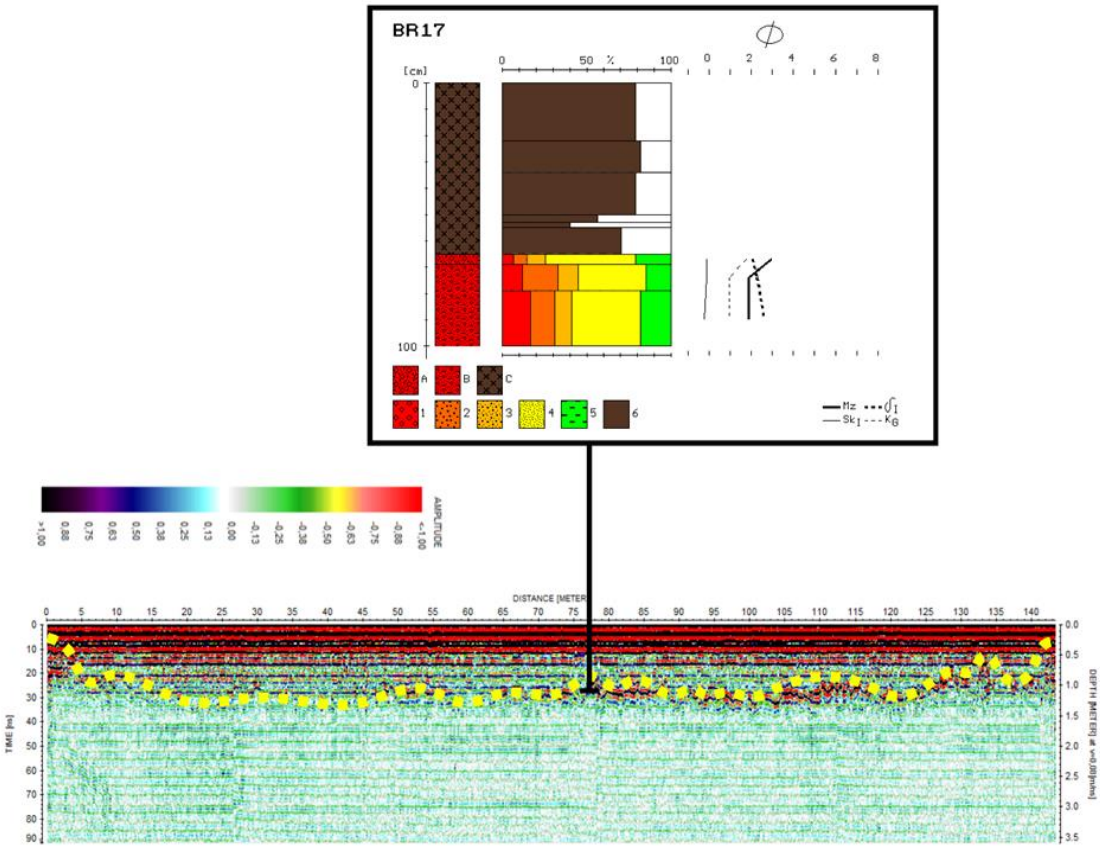

Figure 3. Echogram of profile 0003 with geological borehole BR17 Lithology:
A - sands with single gravels, B - silty sands with gravels, C – peats; Fractions: 1 - gravels, 2 - coarse sands, 3 - medium sands, 4 - fine sands, 5 - silts and clays, 6 - peats; Folk and Ward's distribution parameters; Mz - mean diameter, δl - standard deviation (sorting), Skl - skewness, KG – kurtosis.

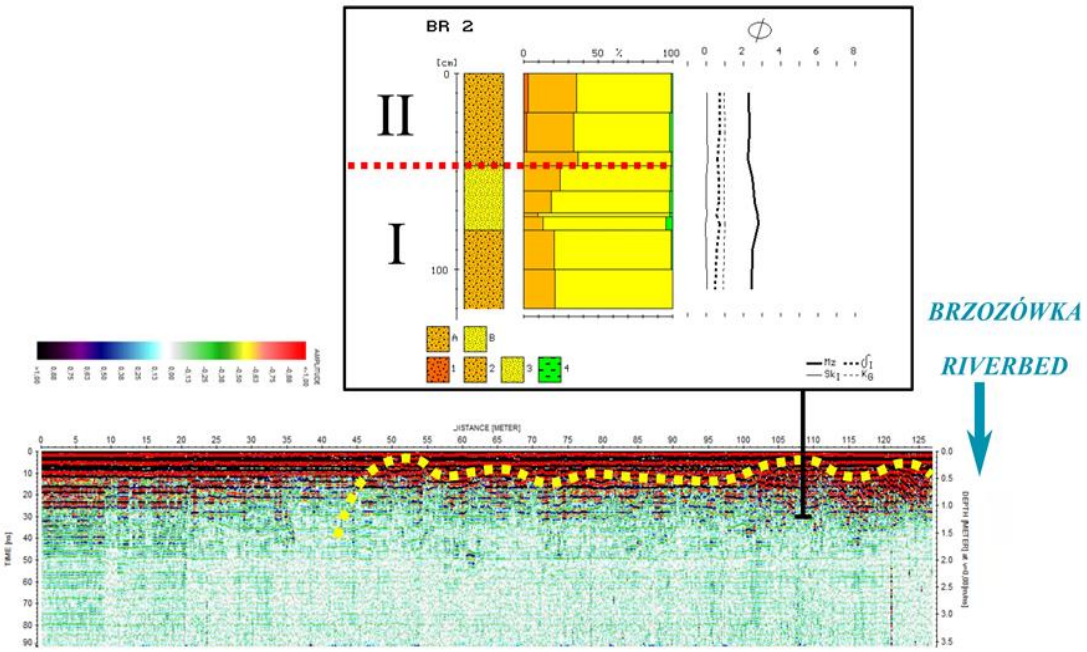

Figure 4. Echogram of profile 0011 with geological borehole BR2
Lithology: A - medium sands, B - fine sands; Fractions: 1 - coarse sands, 2 - medium sands, 3 - fine sands, 4 - silts and clays; Folk and Ward's distribution parameters; Mz - mean diameter, δl - standard deviation (sorting), Skl - skewness, KG – kurtosis

In echogram 0011, located directly on the left bank of the Brzozówka River, a series of distinct linear anomalies can be distinguished, which fade out to a depth of about 45 m. A series of anomalies from 45 m to 127 m related to a change in sedimentation type and should be interpreted as alluvium of the point bar. This is confirmed by the BR 2 borehole, which is composed of well-sorted medium and fine grain sands. It is possible to distinguish two links in it, which may testify to two episodes of alluvial aggradation. Alluvial are visible up to 45 m. The disappearance of the anomalies at 45 m probably indicates a boundary between mineral deposits and organic fill (Fig. 4).
Echograms 0019 and 0016 are located on the right bank of the river. In the first of these, a strong boundary formed by the anomaly was recorded at 50 m. This is confirmed by two geological boreholes - BR15 located beyond the anomaly boundary and BR16 located at 136 m. The BR15 profile will be 2 m deep. At 180 cm, it borders between mineral sediments, over which peats lie directly. This is not visible in the GPR profiling. In comparison, the BR16 well consists of medium to coarse sands with no peat deposits. They are sands of fluvioglacial origin. The anomaly marks the boundary between the palaeomeander that undercut the terrace (valley sandur) (Fig. 5).
A clear line between mineral and organic sediments at 200 cm was recorded in the BR14 borehole. It is not visible on the echogram. The bottom of the peats was dated to: 9770±110 BP (MKL-5082), that takes into account the probability at the level 95,4% gives intervals 9457 – 8805 BC (91,3%), 9551 – 9481 BC (2,4%) and 9657 – 9605 BC (1,7%) and the probability at the level 68,3% designates the interval 9371 – 9123 BC (57,4%), 8997 – 8997 BC (10,5%) and 8884 – 8880 BC (0,4%) (Fig. 5). In the last echogram 0016, a number of anomalies were recorded along the entire length. BR24 borehole, which recorded a series of sand and gravel that builds a higher level of the Pleistocene sandur terrace (Fig. 7).

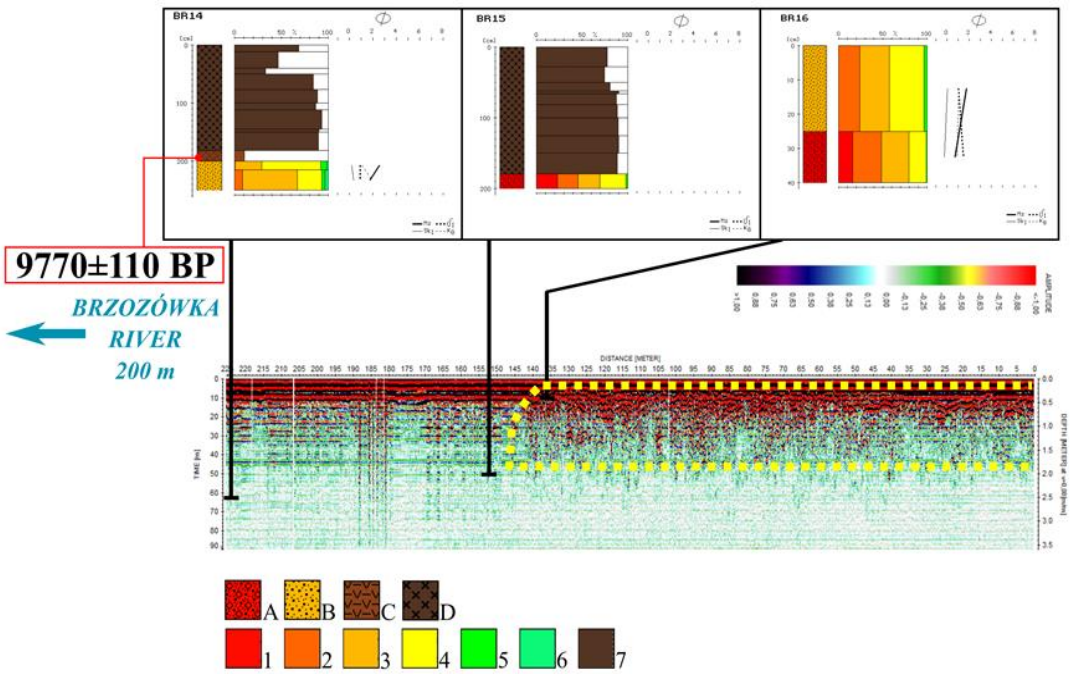

Figure 5. Echogram of profile 0019 with geological borehole BR14, BR15 and BR16
Lithology: A - sands with single gravels, B - medium - grained sands, C - peaty tills, D – peats; Fractions: 1 - gravels, 2 - coarse sands, 3 - medium sands, 4 - fine sands, 5 - silts and clays, 6 - clays, 7 - peats; Folk and Ward's distribution parameters; Mz - mean diameter, δl - standard deviation (sorting), Skl - skewness, KG – kurtosis.

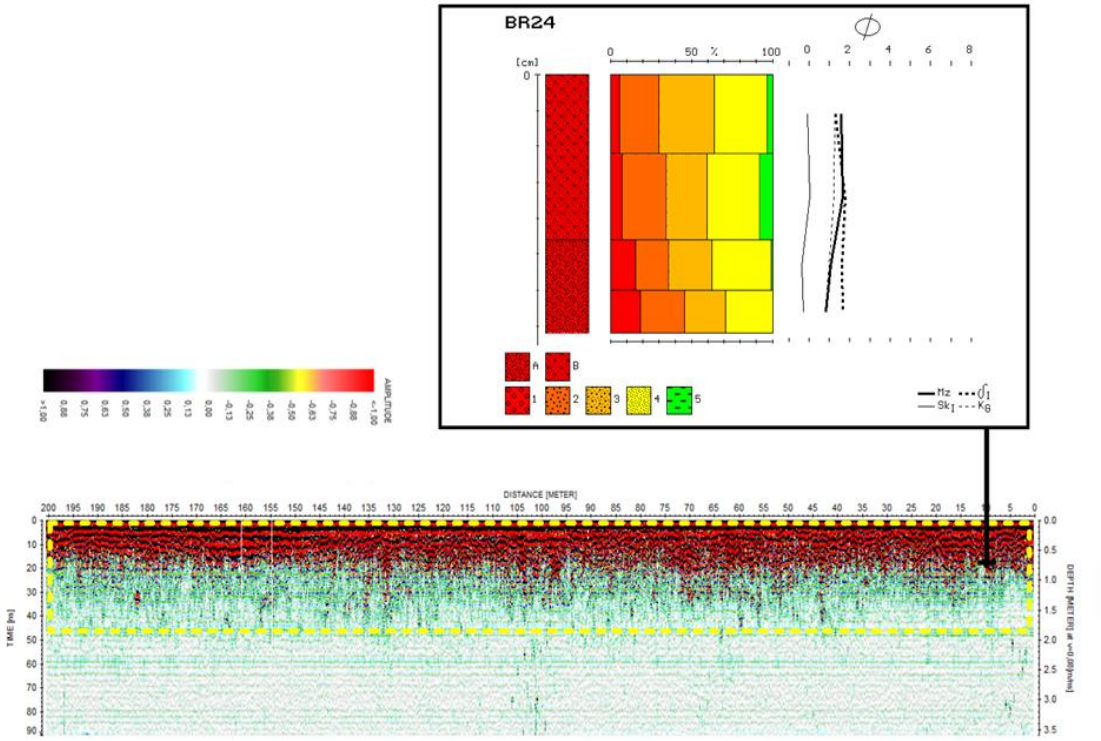

Figure 6. Echogram of profile 0016 with geological borehole BR24
Lithology: A - sands with single gravels, B - silty sands with gravels; Fractions: 1 - gravels, 2 - coarse sands, 3 - medium sands, 4 - fine sands, 5 - silts and clays; Folk and Ward's distribution parameters; Mz - mean diameter, δl - standard deviation (sorting), Skl - skewness, KG – kurtosis.

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GROUNDWATER LEVEL TREND IN THE LAST DECADES IN NORTH-EASTERN PART OF ROMANIA

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ABSTRACT

The evolution of groundwater levels is very difficult to predict over medium and long term, in any geographical conditions, in the context of global climate change and increasing human impact activities. For that is important to analyses trends of this hydrogeological parameters to estimate the evolution of underground water resources in different natural conditions. To estimate groundwater level trends, the Mann-Kendal test and Sen slope was used. In additional Innovative Trend Method (ITA) was applied to seasonal and annual groundwater level from 9 hydrogeological wells, with different depths of water, with data between 1983 to 2018. Most of the trends are related between these two methods (from 8 out of 9 hydrogeological wells). The seasonal datasets indicate that 55% of slopes values are statistically significant for summer and autumns season and 44% for annual values. The most increasing trends overlaps +3 cm/year (for 2 hydrogeological wells) and indicates an important decrease of groundwater volume. The results can be implemented in groundwater resources management projects at local and regional level.

Keywords: groundwater level, trends, Mann-Kendall test, ITA method, North-Eastern Romania

INTRODUCTION

The evaluation of the trends of the different hydro-climatic parametric indicators from a geographical region represents an important stage in estimating the behavior of these parameters in different scenarios of evolution of the environmental conditions. Against the background of more and more accentuated climate changes, with evolution scenarios adapted on short, medium and long term, the evaluation of the tendencies of variation of the groundwater level becomes obligatory in the water resources management projects. Practically two main directions were differentiated in the analysis of trends. The first is based on Mann-Kendall test and estimating trends by the Sen method.

The results obtained by applying to different climatic or hydrological parameters highlighted statistically significant trends of increasing average or maximum annual temperatures [1-3], precipitation [4,5] or river runoff [6,7]. Starting with 2012 [8] a new approach has been proposed to highlight these trends through graphical methods. This

method has also been widely used for hydro-climatic parameters (maximum river runoff, maximum temperatures or maximum precipitation) [9-11] and even hydrogeological (monthly and annual groundwater level [12]. In this paper we will try to apply the two types of methodologies in identifying trends in the seasonal and annual values of groundwater level for a series of hydrogeological wells in the north-eastern part of Romania. This analysis follows the research conducted in highlighting the groundwater level trends in this area, and is intended to be a scientific support in estimating the evolution of groundwater resources in this area, in different scenarios of regional climate evolution.

STUDY AREA

The north-eastern part of Romania is characterized by the presence of hilly plain with altitudes ranges between 30 and 250 m situated in a temperate continental climate (Figure 1). The maximum temperatures and precipitations are registered in summer (June, respectively July) and the minimum values are recorded during the winter season (in February). The rivers flow has a maximum runoff in the spring season and a minimum in the winter, when precipitation is stored on the surface in the form of a layer of snow and ice. These hydro-climatic features along geological structure has an important influence above groundwater resources which are stationed near surface in groundwater bodies with the groundwater level varying between 2 and 10 meters.

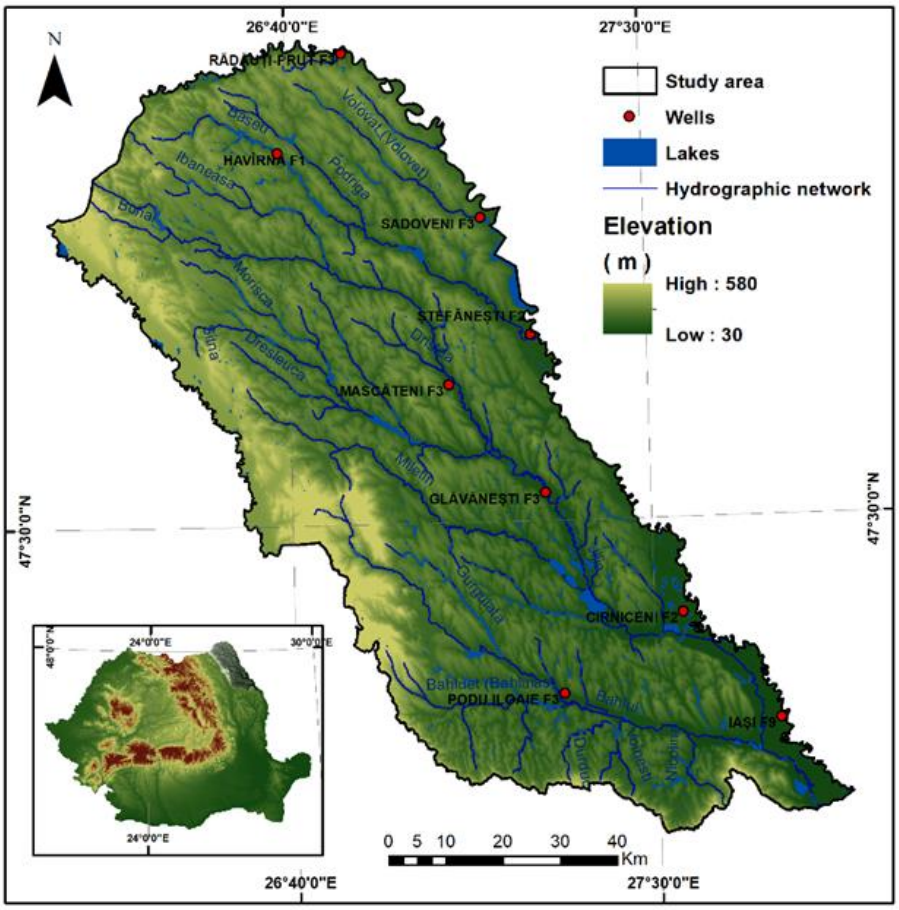

Figure 1. the position of wells in North-eastern part of Romania.

DATA SETS AND METHODOLOGY

In order to identify the trends of the groundwater level for the northeastern part of Romania, the data referring to the seasonal and annual average levels from 9 hydrogeological wells were used. These were made by the Prut Bârlad Water Basin Branch, integrated into the "Apele Romane" National Company during 1970-1980. The period taken into account is from 1983 to 2018. For the present analysis were used data from hydrogeological wells with different depths, located mostly in the major bed of the hydrographic network that drains this region.

To estimate trends of groundwater level the Mann-Kendall test for trend and Sen's slope estimates was used. The Mann-Kendall test is applicable in cases when the data values xi of a time series can be assumed to follow the equation [13]:

$$x_i = f(t_i) + \varepsilon_i ,$$

where: f(t) is a continuous monotonic increasing or decreasing function of time and the residuals εi can be assumed to be from the same distribution with zero mean. It is therefore assumed that the variance of the distribution is constant in time. Then the null hypothesis of no trend, H_0, is tested in order to accept or reject it. The x_i observations are randomly ordered chronologically, against the alternative hypothesis, H_1, where there is an increasing or decreasing monotonic trend [14].

To estimate the slope of an existing trend, the Sen's nonparametric method is used. It may be used if the trend can be assumed to be linear accordingly with the equation:

$$f(t) = St + B$$

where: S is the slope; B is a constant.

To get the slope estimate in previous equation the slopes of all data value pairs are calculated using the formula:

$$S_i = \frac{x_i - x_k}{j - k}$$

where: i =1 to n; xj and x_k are data values at times j and k $(j > k)$, respectively.

If there are n values xj in the time series, we get as many as $N = n(n-1)/2$ slope estimates Si. The Sen's estimator of slope is the median of these N values of Si. The N values of Si are ranked from the lowest to the highest and the Sen's estimator (S) is differently calculated if N is odd or even. Thus,

$$S = S_{[(N+1)/2]}, \text{ if } N \text{ is odd and } S = \frac{1}{2}\left\{S_{(N/2)} + S_{[(N+2)/2]}\right\}, \text{ if } N \text{ is even}$$

Statistical analysis of trends use different significance levels (α = 0.001, 0.01, 0.05, or 0.1) and for this study we retained only the level of α = 0.05.

This method was largely used to detect trends in climatic and hydrological data series [15, 16]. In Romania, the same methodology has also been used with very good results to identify trends in different data series (temperature, precipitations, rivers discharge etc.) [17-19].

Innovative Trend Method (ITA) proposed by Șen [8] simplifies the way of estimating the trends by graphically representing the analyzed values. Initially, the data series is divided into two series, which are then represented graphically in the scatter-plot system.

Depending on the position of the representation points, the tendency of increase, decrease or constant of the analyzed parameters can be estimated. At the same time, the trend of the data string can be estimated by applying the formula [20]:

$$s=\frac{2\,(\overline{y_2}-\overline{y_1})}{n}$$

where: *s* is the slope of the trend, $\overline{y_1}$, $\overline{y_2}$ are the averages of the first and second series, and *n* is the total number of data. An important aspect must be mentioned in the analysis of the results. Taking into account the fact that in the case of groundwater level the actual measurements are related to the land surface, the interpretation of the trends is made inversely to the interpretation of the trends in the case of hydro-climatic parameters. (Figure 2).

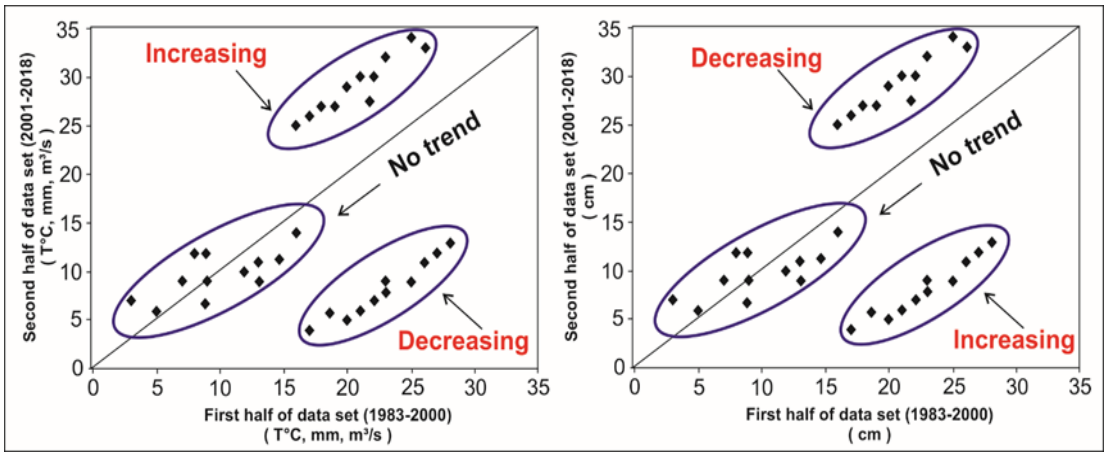

Figure 2. Graphical interpretation for climatic and hydrological parameters (A) and groundwater level (B) trends using ITA [12]

RESULTS

By applying the specific methodologies described above, a series of results have been obtained that highlight the positive or negative trends of groundwater level variation in recent decades. The slope values obtained by applying the Mann-Kendall test and the Sen's nonparametric method show that in 44% of the hydrogeological wells analyzed the results obtained are statistically significant for the annual values.

Table 1. Slopes for groundwater level trends using Mann-Kendal test and the Sen's nonparametric method

No.	Well code	Average depth (m)	Winter	Spring	Summer	Autumn	Annual
1	RĂDĂUȚI-PRUT F3	13	-2.03*	-2.16*	-1.70*	-1.91*	-2.17*
2	HAVÎRNA F1	2.5	-0.94	-1.46	0.11	-0.05	-0.31
3	SADOVENI F3	9	3.78*	3.39*	2.84*	3.31*	3.41*
4	ȘTEFĂNEȘTI F2	6	0.28	0.08	0.19	0.03	0.08
5	MASCĂTENI F3	6.5	1.98*	1.61	2.56*	2.03*	2.22*
6	GLĂVĂNEȘTI F3	5	-0.18	-0.62	-0.29	-0.29	-0.44
7	CIRNICENI F2	5	3.68*	3.88*	3.65*	3.57*	3.81*
8	PODU ILOAIE F3	2	-0.6	-0.83	-0.91	-0.21	-0.42
9	IAȘI F9	5	1.01	1.44	1.74*	1.70*	1.38

*values wist statistical significante for α = 0,05

The same weight is kept in the case of values corresponding to the winter season. The most statistically significant results were obtained for the summer and autumn seasons (over 55%). At 30% of the analyzed hydrogeological wells (Rădăuti-Prut F3, Sadoveni F3, Cirniceni F2) the statistical significance of the slopes obtained by this method was maintained throughout the year. At two other wells (Mascateni F2 and Iasi F9) there are slopes with high statistical significance within the annual and seasonal values. In wells with higher groundwater depths, the slope values remain high (regardless of the trend throughout the year, Figure 2). It should be mentioned that in the case of groundwater level trends the interpretation of the results must be done in reverse to the interpretation of the trends in the case of surface hydro-climatic parameters. The highest values of the trends +3.81 cm/year at Cirniceni F2 and +3.41 cm/year at Sadoveni F3 show a clear tendency of decreasing groundwater level relative to the land surface. Practically in 5 of the 9 boreholes 9 (4 having statistically significant values) the tendency to deepen the groundwater level is obvious.

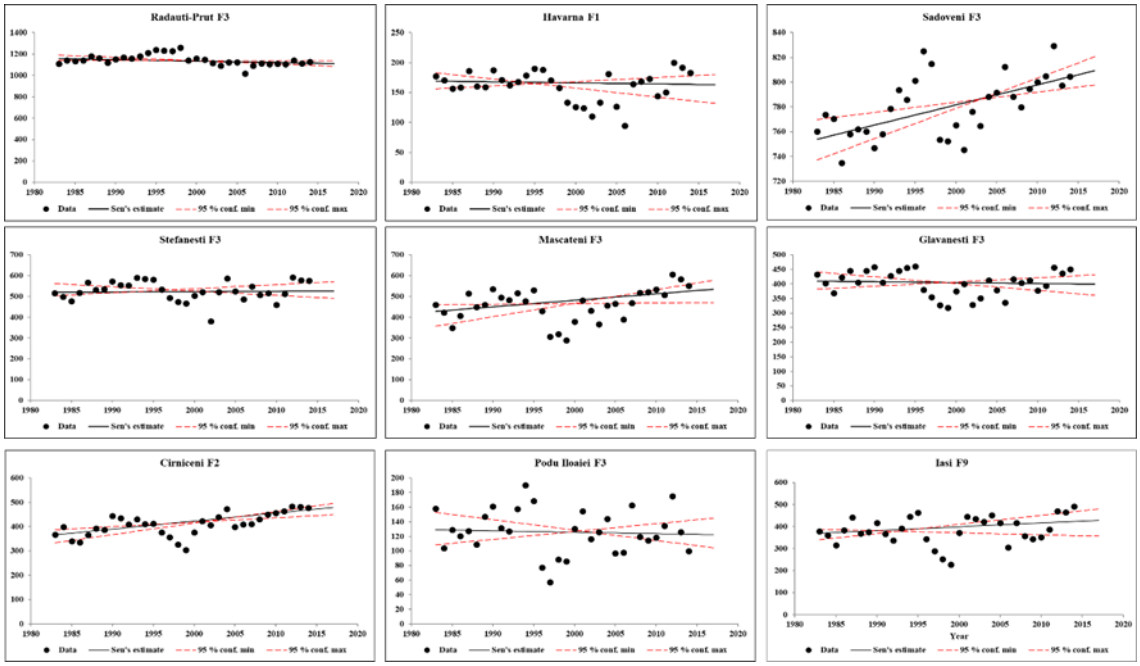

Figure 3. Annual trends of groundwater level for different wells in north-eastern part of Romania using Mann-Kendall test

In the spring and summer seasons due to the marked variations of the monthly average values of the groundwater level under the impulse of the hydric water supply from the surface (from precipitations or hydrographic network) the slopes of the trends have the lowest significance [21] (Figure 3). In hydrogeological wells with less deep groundwater relative to the land surface (Havarna F1 and Podu Iloaiei F3) the trends remain negative, but the statistical significance of the results is low.

The application of the ITA method highlighted the same trends in 8 of the 9 hydrogeological wells analysis. The only wells where the trend is different between the two applied methods is Stefanesti F2 which by the ITA method has a negative groundwater level variation trend, and by the Mann-Kendal method a positive one (Table 2). This divergence can be explained by the influence given by the presence of a large accumulation lake near this hydrogeological drilling (Stanca-Costesti lake, at the eastern border between Romania and the Republic of Moldova) which substantially changes the

water supply infiltrated underground in this area. In general, slope values are lower (in the case of positive trends) and higher (in the case of negative trends) than the values obtained by the Mann-Kendall test and the Sen's nonparametric method.

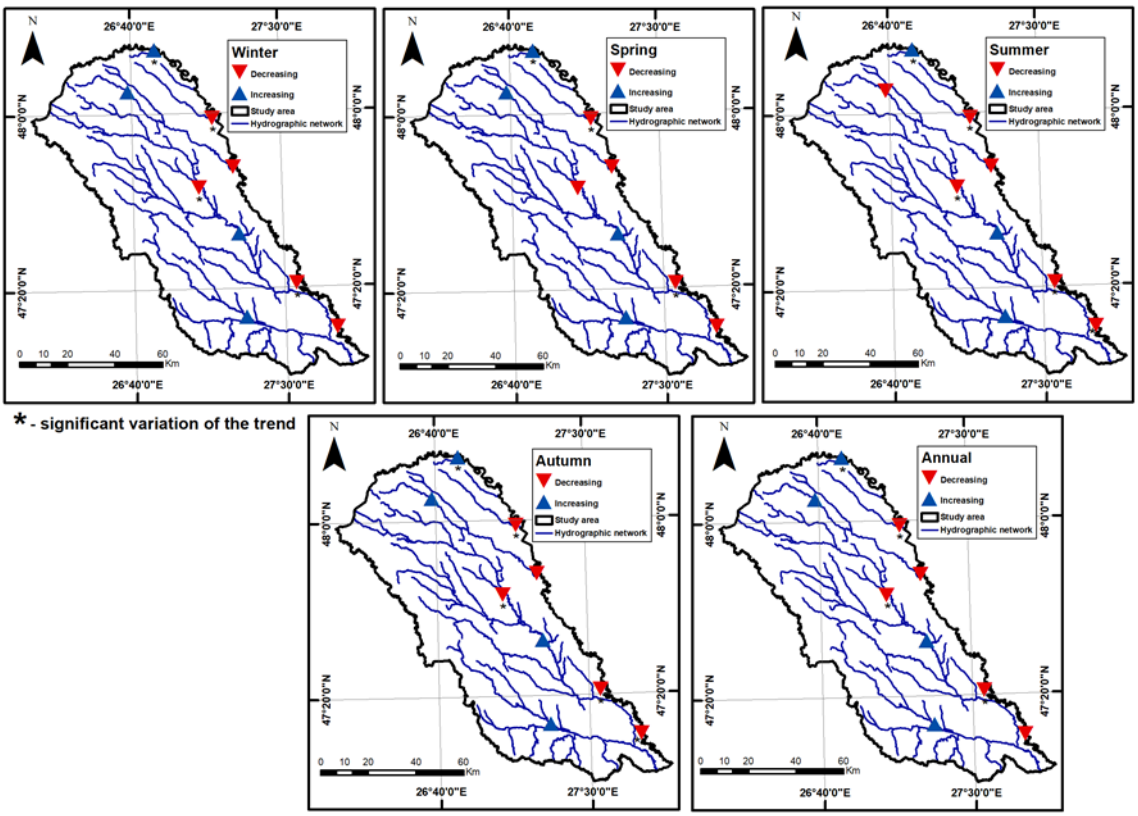

Figure 4. the seasonal and annual trends of groundwater level in north-eastern part of Romania using Mann-Kendall test

The annual trends of groundwater level by the ITA method are more clearly highlighted in the case of the Radauti Prut F3, Cîrniceni F2 and Iași F9 wells (Figure 4). The same clear evidence of the trends is kept at seasonal level with the mention that in the case of hydrogeological wells: Sadoveni F3, Mascateni F3 and Podu Iloaiei F3, on the graph representing the trends (figure 8) they seem to remain relatively constant (Figure 5).

Table 2. Slopes of groundwater level trends using ITA method.

No.	Well code	Average depth (m)	Winter	Spring	Summer	Autumn	Annual
1	RĂDĂUȚI-PRUT F3	13	-3.21	-3.72	-4.9	-3.72	-3.92
2	HAVÎRNA F1	2.5	-1.31	-1.81	-1.12	-0.92	-1.35
3	SADOVENI F3	9	0.21	1.18	0.57	0.69	0.85
4	ȘTEFĂNEȘTI F2	6	-0.81	-1.41	-1.21	-1.15	-1.16
5	MASCĂTENI F3	6.5	1.12	0.87	2.12	2.53	1.53
6	GLĂVĂNEȘTI F3	5	-1.52	-2.31	-1.32	-0.89	-1.56
7	CIRNICENI F2	5	2.42	2.72	2.62	3.26	2.78
8	PODU ILOAIE F3	2	-0.33	-1.05	-0.33	-0.36	-0.5
9	IAȘI F9	5	0.87	0.98	2.51	2.31	1.62

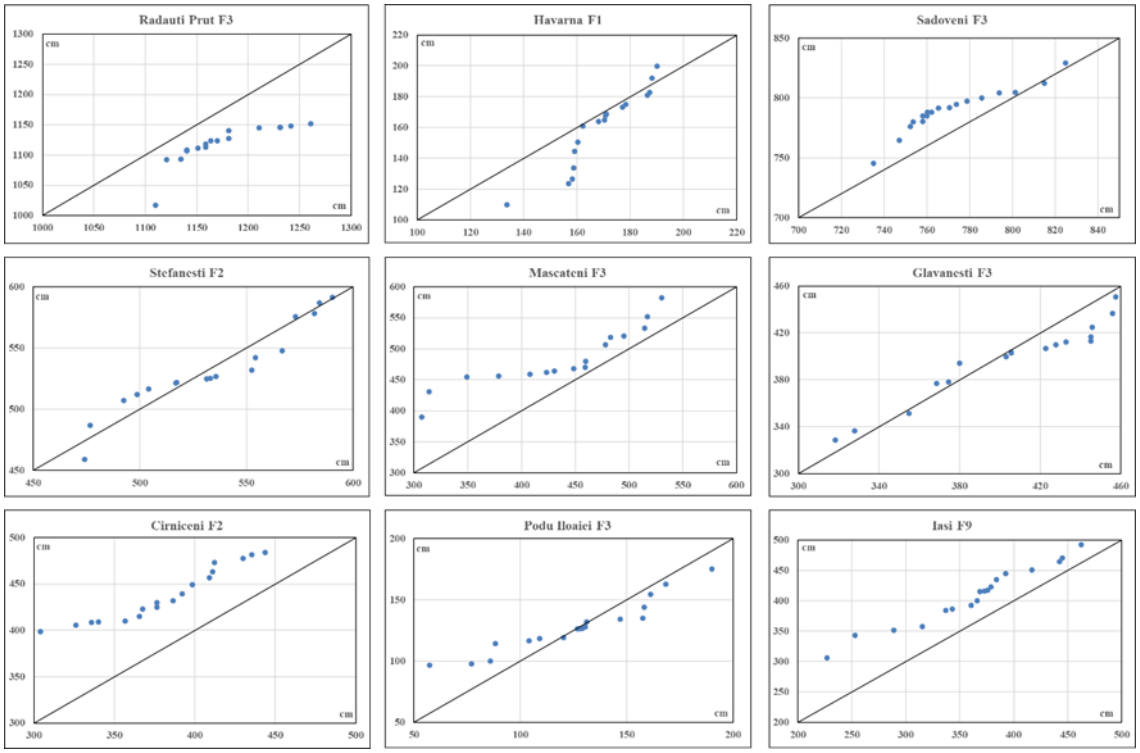

Figure 5. Annual trends of groundwater level for different wells in north-eastern part of Romania using ITA method.

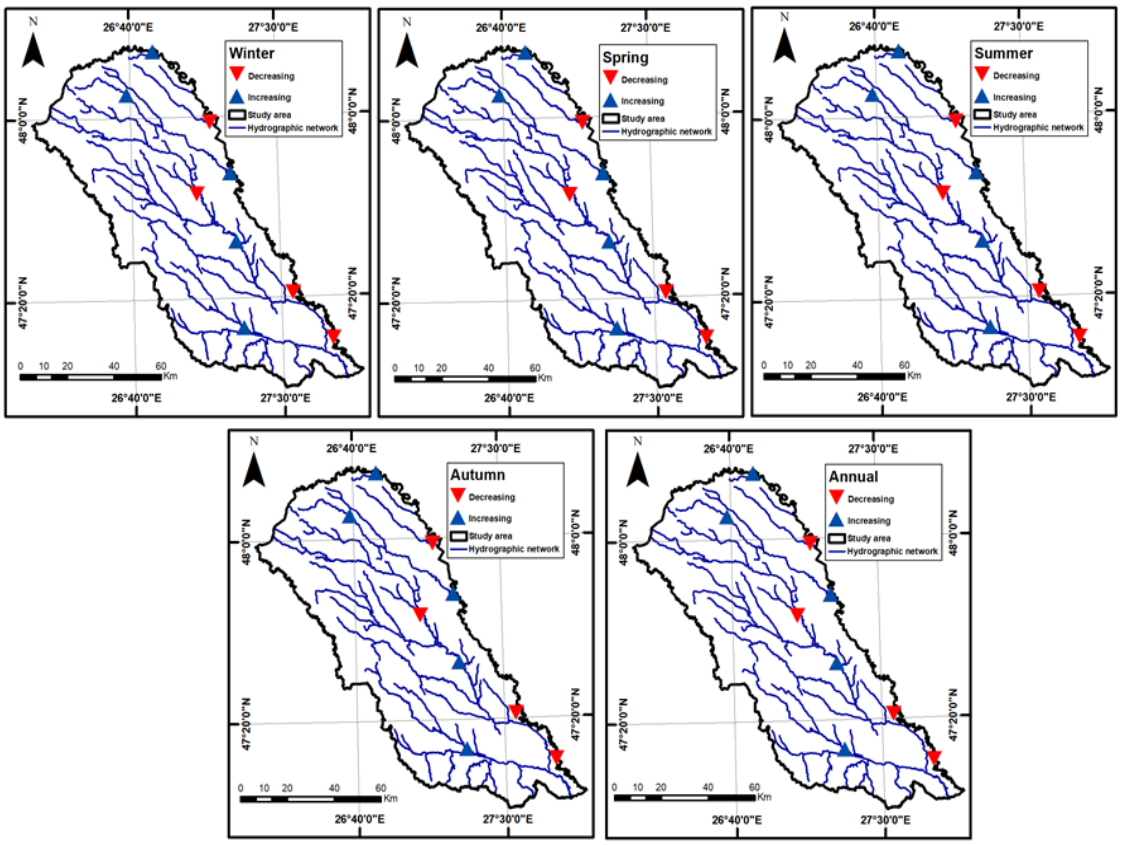

Figure 6. Seasonal trends of groundwater level for different wells in north-eastern part of Romania

CONCLUSIONS

Following the analysis, a series of conclusions can be drawn that can be helpful in groundwater resources management projects at local and regional level. First of all, both methods can be applied to highlight the trends of groundwater level variations, the results obtained, in terms of the trend sign being identical in over 88% of cases. The values obtained using the Mann-Kendall test and the Sen's nonparametric method have a higher statistical significance (in 55% of cases in the analysis of data on summer and autumn seasons and 44% in the case of data on annual values of groundwater level). The ITA method, even if it is more expeditious, and the obtained results have a lower statistical significance, has the advantage of easier graphical identification of the trends of groundwater levels variations. At the same time, we consider that the trends obtained for seasonal and annular groundwater level can be correlated with the trends obtained by the same methods in the case of hydro-climatic parameters from the surface (precipitation, river runoff, etc.).

Acknowledgement
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SUSTAINABLE USE OF WATER RESOURCES IN POTKOZARJE REGION

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ABSTRACT

Potkozarje is a complex regional system in the north-west Republic of Srpska, Bosnia and Herzegovina. From the administrative and territorial aspects, it encompasses different organizational units – cities of Banja Luka, Prijedor and Gradiska and municipalities of Novi Grad, Kostajnica, Kozarska Dubica and Laktasi. This regional system covers 1848.3 km2 with the population of 91.097 according to the 2013 population census, which represents 7.7% of total Republic of Srpska's population. The specificities of development processes in Potkozarje result from the impact of the neighboring centers of development.

Potkozarje is characterized by low relief plains and high relief rolling hills, with mild elevations and ununiformed terrain, which limits the advancement of human activities. The low relief plains of Potkozarje cover the contact zone between the Kozara Mountain lower slopes on one side and Lijevce Polje plain, Prijedorsko Polje plain and alluvial plains of the Una, Vrbas, Sava and Sana rivers on the other side.

From morphostructural and functional points of view, Potkozarje is linked to the area of the Kozara Mountain, making the whole region suitable for specific types of mountain tourism. Morphophysiognomy of the hills and foothills, their geological formation and climate conditions determine the hydrographic properties of the region. More recently, the anthropogenic activities have had a considerable impact.

Potkozarje incorporates an elaborate hydrographic network with surface watercourses (rivers, brooks and creeks) being the most dominant features. Other hydrographic forms are groundwater and regular and thermal springs.

Microclimatic characteristics are rather specific and the precipitation plays a pertinent role in the regime of both surface water and groundwater.

The major hydrological characteristics of Potkozarje are the rivers of Una, Sava, Vrbas and Sana with their tributaries. The opportunities to valorize these rivers are many, particularly in the fields of agriculture and tourism. Still, there are certain limitations, such as floods resulting from the precipitation regime, high water level, asynchronous water flow, unattended river beds, etc.

The aim of the paper is twofold. Firstly, to assess the hydrographic potentials of Potkozarje. Secondly, to define a model of sustainable development within which different processes regarding ecological sustainability and water use in agriculture and tourism occur.

The paper analyzes the natural complex of the region, focusing on hydrographic and hydrogeological features. Taking into account the defined hydrographic characteristics, we assess the use of mineral water, surface water and groundwater, focusing on the development of spa tourism and water supply networks. Finally, the hydrotechnical

solutions for the regulation of water regime and protection of agrarian soil are being accounted for.

Keywords: region, Potkozarje, surface water, groundwater, protection from water.

INTRODUCTION

The Kozara Mountain system and its corresponding area of Potkozarje are located at the rim of Pannonian Basin as a part of the flysch formation ranging from Petrova Gora and Zrinska Gora in the Republic of Croatia to the Cer and Vlasic mountains in West Serbia. This mountain system and its wider region represent a merging area between the Pannonian Basin in the north, and the mountain and lowland area in the south.

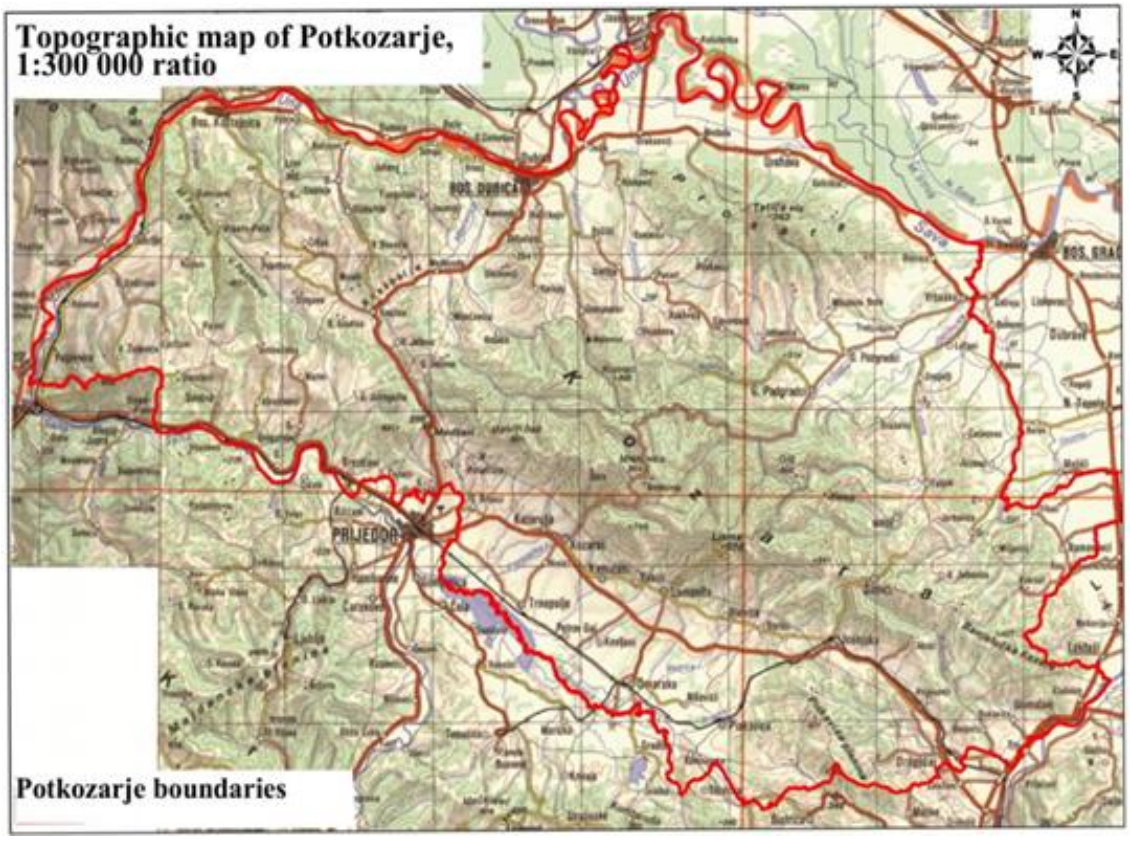

Figure 1. Topographic map of Potkozarje, 1:300 000 ratio [1

Dubica Plain in the north-west and slopes of Veliko Pastirevo and Malo Pastirevo in the west of Potkozarje touch the right bank of the Una River, which represents the boundary line with the Republic of Croatia. The northern slopes of the Prosara Mountain touch the Sava and Una river banks. In the north-east, there is a line of demarcation between Potkozarje and Lijevce Polje plain (120 m altitude), along the rivers of Jablanica, Vrbaska and Ljubinja, which run through an alluvial plain flooded by currents from the Kozara and Prosara mountains. The eastern and south-eastern slopes of the mountain system (Banjalucka Kozara and Piskavica mountains) reach the left bank of the Vrbas River. The southern boundaries of the area are rims of Prijedorsko Polje plain and the Sava River alluvial plain.

High hills and their contact zones with lowlands of Lijevce Polje plain, Prijedorsko Polje plain, Dubica Plain and alluvial plains of the Una, Vrbas, Sava and Sana rivers represent the basic morphostructural and functional characteristics of Potkozarje.
The hilly terrain, rich in both intermittent and perennial water streams, is the contact area between lowlands and highlands. The usability of the agrarian soil is limited due to water streams flowing down from the hills, resulting in erosion.
Taking into account the geological and tectonic framework of the Kozara Mountain and Potkozarje region, there are substantial deposits of minerals, metals, non-metals and caustobioliths. The complex geological composition (including tectonics, stratigraphy and lithology) resulted in a complex hydrological network and the occurrence of water streams with different physical and chemical (thermal and mineral) properties, especially in the north of the region (Ljesljani and Mljecanica) [8].
It is the pedological characteristics that are directly connected with other elements of the environment. Large zones covered in alluvial plains and different types of soil in hilly areas, resulting from different pedogenic factors, are pertinent from the agrarian point of view. Generally, various types of soil and specific climate conditions are beneficial for distinctive biogeographical communities and natural ecosystems, including cultivation of specific plants and performance of unique human activities.

SURFACE WATER AND GROUNDWATER AS COMPONENTS OF REGIONAL DEVELOPMENT

The hydrographic network of Potkozarje is a result of the hydrogeological relief evolution and it represents some of the basic functional characteristics of the region.
In line with the hydrogeological properties, the rock mass of the Potkozarje region is classified into three categories: highly permeable, permeable, and impermeable. [2].
Highly permeable rocks are located at the contact zone between the lower slopes of the Kozara Mountain and the rim parts of Lijevce Polje plain. This category of rock includes limestone deposits, carstified dolomites, dolomitic limestone, gravel and sand.
Hydrological diversity of the Potkozarje region is associated with the hydrogeological composition and hypsometric position of the rock mass. The groundwater circulates through permeable rocks characterized with intergranular porosity and high permeability. This category of rocks may be found in the Prijedor Basin, Dubica alluvial plain, parts of the Una Basin, the area between the towns of Novi Grad and Kozarska Dubica, and next to the Sava River bank.
Highly permeable rocks originate from the Miocene and Pliocene epochs. The following types of rocks belong to this category: argillaceous limestone, dolomitic limestone and limestone with random hornstone occurrence. The rock formations share specific hydrogeological properties as they stretch along several long and narrow zones: Knezica-Pucari, Dragelji-Jurkovica and Puharska-Kozarac.
The rock formations originating from the Pliocene epoch are located at the contact zone between the north-eastern slopes of the Kozara Mountain and Lijevce Polje plain (next to Jablanica) and at the contact zone between lower southern slopes of the Kozara Mountain and Prijedor Basin.
„It is in these rocks that random aquifers occur. The discharge takes place at springs with the flow rate of 10 l/s and rarely higher. Springs are typically located in either erosive areas or at the contact point with impermeable rocks”[3].
Highly permeable rocks are commonly typified by an elaborate groundwater circulation, with intergranular and fissure porosity, the permeability of which varies from high to

none. These hydrological properties are usually found in the contact zone between lower slopes and higher plain rims, affecting the valorization and agrarian function.
It is the impermeable rocks that play the most pertinent role in the hydrology of the Potkozarje region. These rocks include Jurassic and Cretaceous sediments (feldspar, serpentinite, peridotite, limestone, etc.), Eocene flysch and Neogene clastic sediments located at several elongated zones: the Prosara Mountain, the Banjalucka Kozara, and west Potkozarje area (Ljesljani – Devetaci - Donja Dragotina) [2].
The Kozara Mountain ridge (Jelavac - Kozarski Kamen- Mostanica) represents a hydrogeological barrier. North and south-east from the ridge, there are branches of two discontinuous zones of banked and massive limestone, where many perennial springs are formed.
„The flow rate of the springs located in these rock masses is poor. The springs are commonly shallow and gravitation-dependent. They are located at the contact points between decomposed rocks and lower impermeable layers. Many of these springs are drained in the summer season" [3].
The mountain ridge represents a watershed of the Una, Sava and Sana river basins [7].
The alluvial plains of the Sana River, the water stream of Jablanica, the springs in Matarusko Polje plain (north-east of the region) and Medjedja (north-west of the region) are valuable for the exploitation of groundwater accumulations, which might provide local settlements with water and irrigate the agrarian soil.
Alluvial sediments of the Sana River (gravel) are actually highly permeable rocks [9] [10]. There is a dense network of aquifers of different water levels. Basically, gravel has far better accumulation properties than carstified carbonates of the Middle Triassic epoch. Nevertheless, the thickness of gravel (3–7 m) reduces the importance of the Sana River alluvial sediments [3].
The recharge of the alluvial aquifers is mainly possible due to the Sana River infiltration and the precipitation within the Kozara Mountain system. Parameters of average discharge speed (the mean value being k=2.90x104 m/s) were obtained in the alluvial gravel deposits. The alluvial plain of the Sana River, downstream towards Novi Grad, is characterized by alluvial sediments separated with limestone by a thick clay layer [3] [10].
Hydrogeological properties in the south of the region are complex because the Quarter sediments partly lean directly against limestone. As a consequence, many aquifers are formed within limestone with karst and fissure porosity.
Such hydrogeological properties cause shallow aquifers and frequent floods, which reduce an opportunity to manage and use agricultural soil in the south Potkozarje region. There are many fissure aquifers in the Miocene limestone in the west Potkozarje region, south from Kostajnica (Mrakodol area). Six springs are being abstracted for the purpose of providing the municipality of Kostajnica with water supplies. Their minimum flow rate is rarely higher than 3 l/s [3].
In the north Potkozarje region, at the mouth of the Una River into the Sava, there is a groundwater accumulation in the gravel layers of the two water streams. The greatest abstraction of water is performed in Medjedja (the municipality of Kozarska Dubica). In the gravel sediments of the Sava River, there is a dense network of aquifers. The groundwater abstracted from the Medjedja area is used for supplying the north-west Potkozarje region. The average water abstraction rate (three active springs) from Medjedja is 95 l/s [3]. Aquifer formed in gravel sediments in the contact zone between lower north-eastern slopes of the Kozara and Lijevce Polje plain are under the impact of

the lower Jablanica water stream. The gravel located in the upper stream contains some fractions characterized by bigger grains and sand. In the north-east Potkozarje region, water supplies are provided by the water abstraction from the Zeravica area. The agricultural soil is irrigated by water from the Jablanica and Jurkovica rivers and by aquifers drained from the Kozara slopes. The complex stratigraphic composition and tectonic relations in west Potkozarje (Ljesljani near Novi Grad) cause diverse hydrogeological properties and rock mass functions, which further results in spillage of mineral and thermal water. The thermal water in Ljesljani is famous for its hyper-alkalinity (pH 11.7). At this location, a detailed hydrogeological mapping in 1980s registered twelve springs (a typical flow rate being 0.1 l/s and rarely up to 0.5 l/s) – 11 mineral water springs (952-2758 mg/l) and only one thermal water spring (Slatina Ljesljani location, the water temperature being 20ºC). The idea was to drill a bore hole at the location of the thermal spring near a modern Ljesljani spa center (currently in construction). The bore hole covered a large amount of water, the temperature being 30ºC. The flow rate at the bore hole was (and still is) 7 l/s. In addition, there are indications of oil and gas deposits in deeper layers [3], which make this location appropriate for further hydrogeological research. Mineral springs in the region are commonly located in west Potkozarje (Ljesljani) and north-west Potkozarje (Mljecanica). Nowadays, the mineral water is only exploited in Mljecanica (spa tourism). The flow rate of mineral springs in Ljesljani zone is 0.1–0.5 l/s, rarely up to 1.0 l/s. Mineral springs are located in the villages of Svodna, Prusci, Strigova, Jelovac, Hajderovci and Mljecanica. The only valorized spring is the one in Mljecanica, where the mineral water is pumped through a well for the purpose of the spa [3].

The mineral water in Mljecanica is exploited through several minor springs formed along the Mljecanica River at two separate sites. The bore hole is 80 m deep but an attempt to drill a bore hole in older sediments in order to reach water of higher temperature failed. What is interesting is the fact that drilling deeper than 80 meters resulted in reaching a mixture of mineral and fresh atmospheric water. The reservoir water balance is 10 l/s, and the potential reservoir is 30 l/s. The water temperature is 14.7ºC and the degree of mineralization is 2.900 mg/l. The following categories were singled out by the calculation of water reservoirs in Mljecanica in 2004: category A (2.00 l/s), category B (5.00 l/s), category C1 (10.00 l/s), and category C2 (30.00 l/s) [3].

Taking into consideration hydrographic properties of the Potkozarje region, there is a potential for the mineral water exploitation for the purpose of spa tourism as well as fresh water exploitation for water supplies.

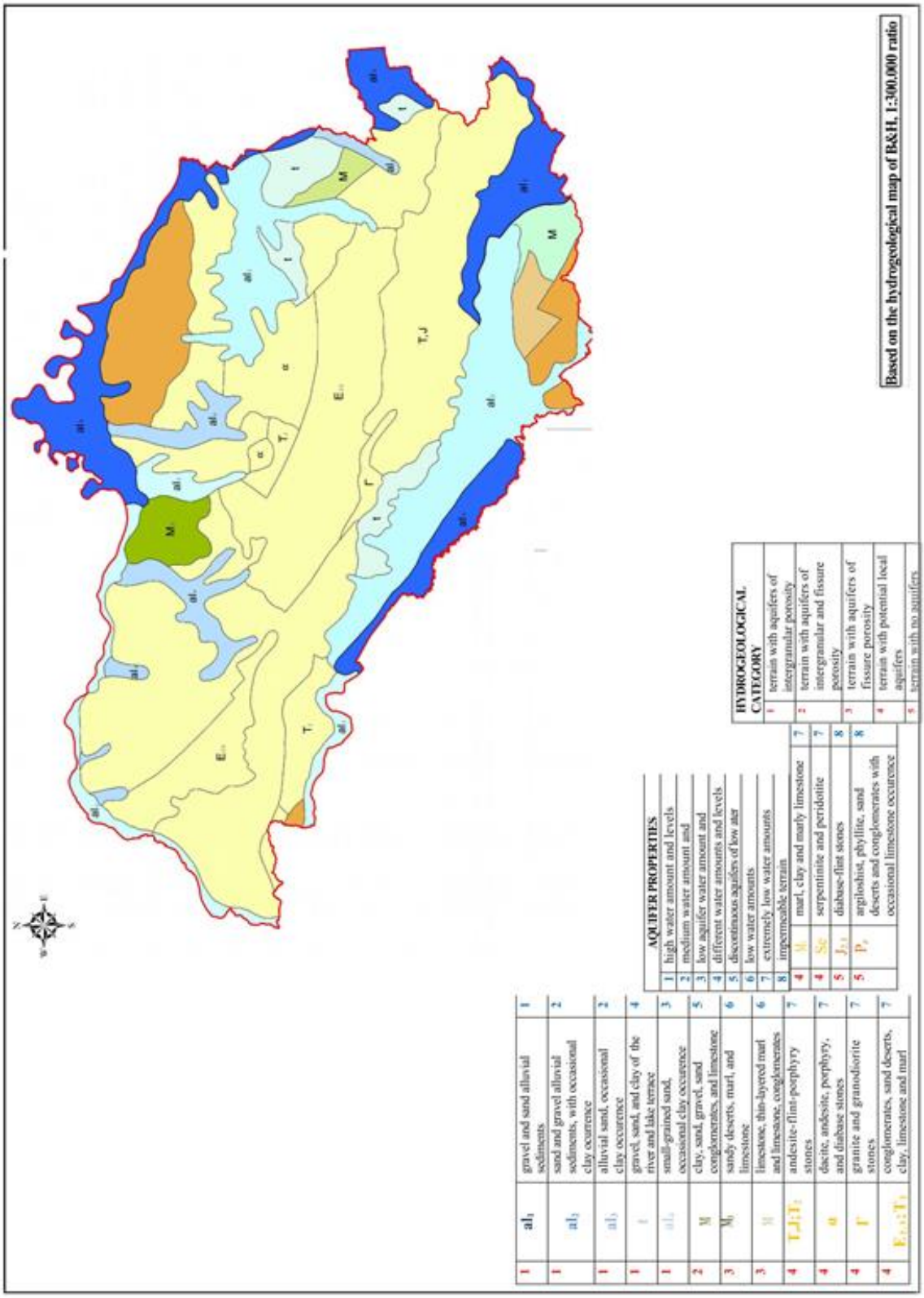

Figure 2. Hydrogeological map of Potkozarje, 1:300 000 ratio.

PROTECTION OF AGRICULTURAL SOIL FROM SURFACE WATER AND GROUNDWATER

There are hydrotechnical solutions for the protection and exploitation of agrarian soil taking into account the morphophysiognomic composition of the region. The solutions involve the valorization of the contact zone between the lower Kozara slopes and the alluvial plain rim with an aim to protect the agrarian soil from surface water and groundwater. [6].

The drainage of surplus groundwater is conducted through the drainage systems in Posavina-Novi Grad, Dubica Plain, Liman-Cerovljani, Dolina and Bajinci areas.

There are high embankments in Dubica Plain protecting the soils from high waters of the Una and Sava rivers and a dyke constructed in the south to protect the soil from waters in the foot of the Kozara Mountain.

„In the Dubica Plain area, there are pumps and dykes, which drain the surplus water into the recipient streams and protect the soil from groundwater. Generally, the protection from surface water and groundwater is unsatisfactory. The position of the defensive constructions is not high enough and there are plans for their reconstruction. The dykes are not maintained properly and their permeability is decreasing, which negatively affects the whole system. ” [4].

For the purpose of flood control, there are embankments 8 km long along the right Una River bank and 19.5 km long along the right Sava River bank. The embankments were built during the period 1956-1960 in line with the existing criteria. There is a plan for the reconstruction of the embankments, which would ensure the 1.0 m cant in cases of maximum water level. A part of the reconstruction is already completed in the Donja Gradina memorial zone covering the length of around 3.100 m. In addition, a master project for the reconstruction has been designed. Some sections of the embankment zone are still being flooded [4].

„The protection from mountain water in the south of Dubica Plain is provided by a dyke 7.500 m long from the mouth of the Mostanica River into the Una all the way to the Rakovica River and a dyke 12.250 m long from the Rakovica River to the village of Orahova. The upper dyke flows into the Una River and the lower dyke flows into the Sava River. There have been occasional overflows of water in both dykes” [4].

The drainage of surplus groundwater in west Potkozarje (Posavina-Novi Grad) is performed through a pump station constructed in 1956 (the capacity being 5,5 m3/s) and a pump station constructed in 1986 (the capacity being 4 l/s). The main drainage network covers the surface of 1.400 ha [4].

The drainage of surplus groundwater in north-east Potkozarje (Liman-Cerovljani) is performed through the Liman pump station, whereas the southern parts are drained through Jurkovica-Jablanica and Topola-Jablanica dykes. The drainage system is satisfactory. Beside the main and secondary dyke system, there is an incomplete pipe drainage system.

The drainage of surplus groundwater in this area is performed through Dolina and Bajinci pump stations. The drainage system is inadequately maintained so the drainage takes place via natural drains.

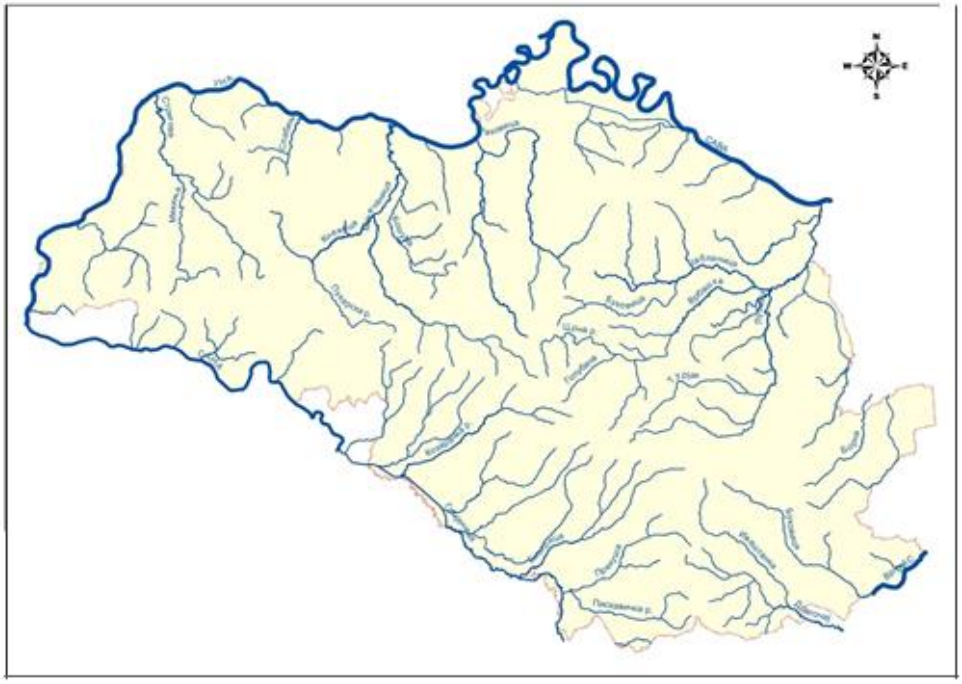

Figure 3. Hydrographic network of Potkozarje.

In line with the current state of the agrarian soil protection system, the drainage system is incomplete and unable to provide adequate protection.
„Provisionally, around 50% of the area is not covered by the drainage system, which demands an urgent reconstruction and upgrade" [4].
Given the hydrotechnical management and usage of the agrarian soil, we should point out agrarian areas with detailed drainage systems [6]. There is an elaborate drainage system constructed in Dubica Plain (the settlements of Klekovci, Medjedja, Crnac and Poljice) and in south Potkozarje region in the contact zone between lower mountain slopes and Prijedor Basin (the settlements of Bistrica, Omarska, Orlovci and Kamicani). The drainage system in Dubica Plain covers 820 ha and in south Potkozarje it covers 370 ha.
Drainage systems in the region tend to be inadequately maintained and the assessment of their capacities and functioning should be prioritized.
Regarding hydromelioration system in the Potkozarje region, Dubica Plain and valleys of the Una and Sava rivers should be included [4].
Hydrotechnical systems require reassessment in order to provide the proper soil irrigation in the entire region.
Speaking of the minimum stream flow in the summer season when the irrigation is most essential, the water streams of Potkozarje cannot provide the sufficient amount of water unless new regulation systems are constructed (the exceptions being the rivers of Una, Sana and Vrbas) [5] [7].

CONCLUSION

The hydrogeological composition and hypsometric position of the rock mass resulted in the hydrological diversity of the Potkozarje region. The groundwater circulates through permeable rocks of intergranular porosity, which have pronounced permeability properties. These rock masses are located in Prijedor Basin, Dubica alluvial plain, parts of the Una Basin (from Novi Grad to Kozarska Dubica) and along the Sava River bank.

Groundwater circulation is evident in areas of highly permeable rocks with intergranular and fissure porosity, where permeability varies from relatively low to high. Such hydrological features are typical in the contact zone between lower Kozara slopes and rim parts of Lijevce Polje plain, Prijedorsko Polje plain, and Dubica Plain. It is in these locations that hydrological properties affect the valorization and the development of agriculture.

The alluvial Sava Plain in south Potkozarje, Jablanica water stream, and fissure aquifers in Matarusko polje (north-east Potkozarje) and Medjedja (north-west Potkozarje) are of an utmost pertinence for the hydrotechnical solutions which might help exploit groundwater for the purpose of water supplies and irrigation of the agrarian soil.

Hydrogeological features of south Potkozarje are very complex because the Quarter sediments partly lean directly against limestone. As a consequence, many aquifers are formed within limestone with karst and fissure porosity. The results are shallow aquifers and frequent floods, which limit the valorization of agricultural soil.

Aquifers formed in gravel sediments in the contact zone between lower north-eastern slopes of Kozara and Lijevce Polje plain are highly affected by lower Jablanica water stream. The agricultural soil is irrigated by water from the Jablanica and Jurkovica rivers as well as by aquifers drained from the Kozara slopes.

The complex geological composition in west and north-west Potkozarje (Ljesljani near Novi Grad and Mljecanica near Kozarska Dubica) resulted in diverse hydrogeological features and rock mass, which further enabled the occurrence of mineral and thermal water.

Besides, there are indications of oil and gas deposits in deeper layers in Ljesljani, which makes the location pertinent for further hydrogeological studies.

Given the hydrographical properties of the region, there is a potential for thermal mineral water exploitation, especially for the purpose of spa and medical tourism.

In line with the current state of the agrarian soil protection system, the drainage system in the contact zone between lower Kozara slopes and rim parts of Lijevce Polje plain, Prijedorsko Polje plain and Dubica Plain is incomplete and unable to provide adequate protection. The drainage systems are generally poorly maintained and the assessment of their functioning should be a priority. Regarding hydromelioration system in the Potkozarje region, the agricultural soil in Dubica Plain and valleys of the Una and Sava rivers should be included.

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THE CAUSES OF UNDETERMINED FOREST FIRES: CASE STUDY FROM THE KIELCE FOREST DISTRICT (POLAND) IN 2010-2019

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ABSTRACT

The research area is located in central Poland (Świętokrzyskie Voivodeship). The Kielce Forest District (KFD) is one of the administrative forest divisions of Poland. The main goal of this district is to control and protect forest complexes. The area of the KFD is about 166 km2, and the average forest stand is 285 m³/ha. The study area is characterized by a predominance of coniferous habitats and the average age of pine is around 70 years. The fires monitoring in this area enables to their fast detection and extinguishing. The documentation shows the general characteristics of each forest fire, including its causes. Often the cause of each fire cannot be clearly identified (undetermined causes of forest fires). For this purpose, in the following studies, a summary of weather data from meteorological stations (air temperature and humidity, hot days, duff moisture) and data from fires with undetermined causes (location period and time of occurrence) were used. The comparison of these data with the existing knowledge on the occurrence of fires enables the estimation of the probability that the fire occurred as a result of human activity or natural events (ignition in favourable conditions). The results of these works are an attempt to explain these dependencies on the example of fires that occurred in the study area within 10 years.

Keywords: forest fires, Kielce Forest District, duff, meteorological conditions, fire protection system

INTRODUCTION

Weather conditions and duff moisture are the two main factors determining forest fire susceptibility. The ignition and combustion of forest duff in temperate forests are so far poorly understood. There is no doubt that the long-term lack of rainfall reduces the moisture of the duff. It is also favored by high air temperature and on this basis the fire hazard is determined in Polish forestry. Research conducted at the Forest Research Institute [1] showed that "fire weather" with an increase in the frequency of forest fires is characterized by: no precipitation, little cloud cover, high air temperature and low relative air humidity. Under the conditions temperate climate, the phenomenon of duff self-ignition was practically excluded [2], although it probably occurs in the forests of Canada [3], and is common in the eucalyptus forests of Australia [4].
Lightning discharges are often given among the natural causes of forest fires. According to data from the Polish State Forests this cause accounts for only 2% of all fires in the forests of Poland [5]. According to the European Union data, lightning strikes in Sweden

cause about 4% of forest fires [6]. Lightning strikes without rainfall pose a real threat, as the duff usually extinguish the fire before it will expand.

STUDY AREA

The research area is located in central Poland (Świętokrzyskie Voivodeship) (Fig. 1). The Kielce Forest District (KFD) is one of the administrative forest divisions of Poland. The main goal of this district is to control and protect forest complexes. The area of the KFD is about 166 km2, and the average forest stand is 285 m³/ha. The study area is characterized by a predominance of coniferous habitats and the average age of pine is around 70 years.

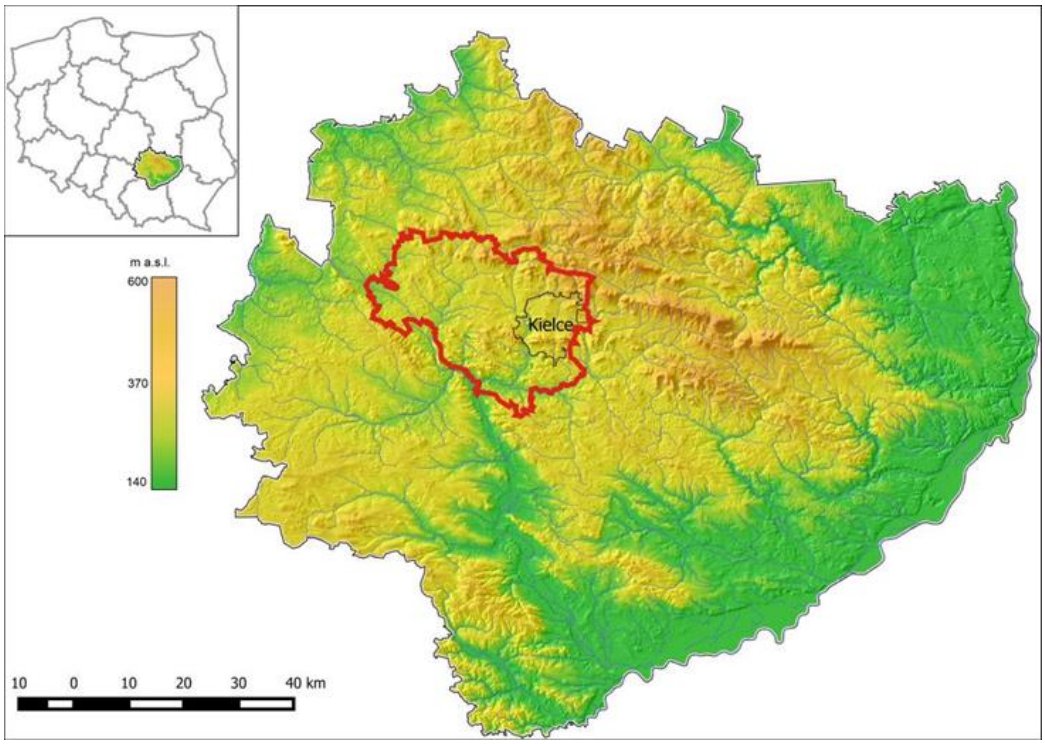

Figure 1. Location of Kielce Forest Department (KFD) area on DEM ed. by M. Frączek based on date from CODGiK (MGGP Aero, Nr GI-FOTO.703.44.2014)

AIM OF THE STUDY AND METHODS

The aim of the study is an attempt to explain the causes of fires, the ignition sources of which were not determined in 2010-2019, based on the example of the KFD (Fig. 1). In particular, it was about determining the weather and synoptic conditions in which such fires occurred and what role the moisture of the duff played in fire formation.

The course of selected meteorological data in the studied period, which could be conducive to fires, was analyzed. Basic data, such as monthly and annual averages: air temperature, maximum air temperature, rainfall, number of hot days, were obtained from the Kielce-Suków station and the IMGW (Polish Institute of Meteorology and Water Management) database. Data on the average temperature at the ground surface at a 5 cm level and the average duff moisture on a monthly basis were obtained. For selected fires with unexplained causes of their outbreak, measurements of duff moisture at 8:00 and

13:00 on a daily basis were obtained from the "TRAX elektronik" database for the station in Jędrzejów [7].
Source data on fires in the KFD in 2010-2019 were obtained from the digital database "Information System of State Forests - SILP, Llas.2" and the "Data Bank of Forests" system.

RESULTS

In the analyzed decade, 92 fires were recorded (140 reports). They were classified in terms of the number of fires that occurred in a specific year during the analysis period, the size of the fire in ha, the method of detection and the their occurrence reasons. The 54 fires were classified as unexplained (undetermined) of ignition causes (Fig. 2). Fires that occurred at the same time in the immediate vicinity, e.g. in the same department, were merged into one (49 fires in total). For these selected fires, additional synoptic data were obtained, which were then combined with each other in order to determine the weather conditions that could have caused to fire ignition, or could be related to human impact.
As the duff moisture content was not established in two cases, this limited the data to 47. On each day (except August 31, 2016, when the one measurement was missing), the duff moisture at 1:00 pm was lower than that at 8:00 am (Fig. 3). This indirectly indicates that there was no rainfall between these dates. from the Kielce-Suków synoptic station did not indicate rainfall in the days and periods before the fire was reported. The increase in air temperature and a decrease in relative humidity led to a decrease in duff moisture, which was also caused by an increase in radiation and wind speed. Therefore, it is so important to determine the weather conditions just before the fire.

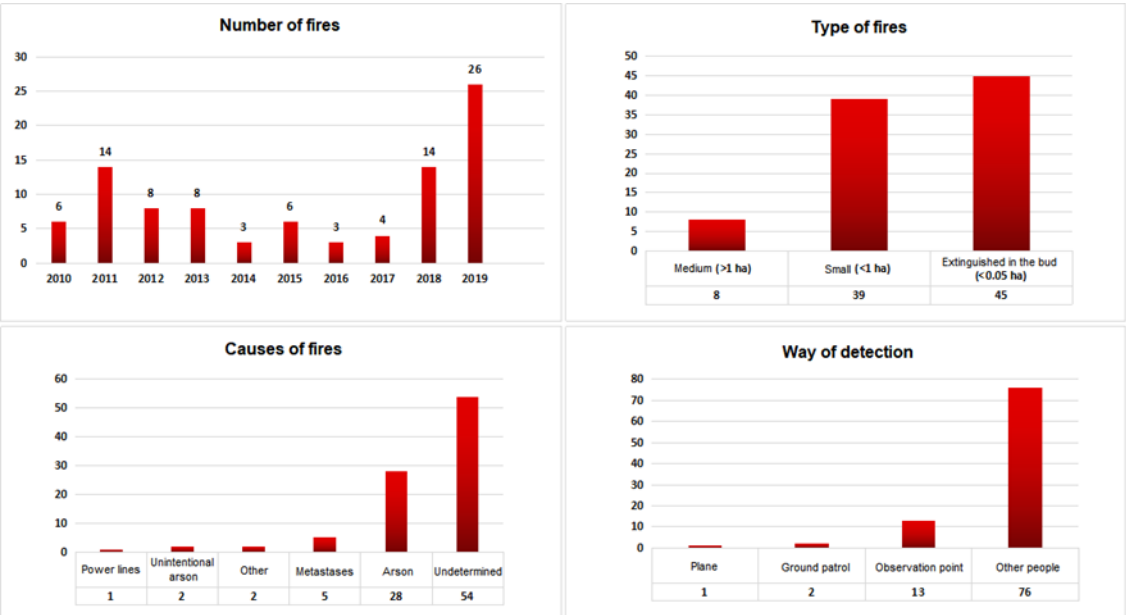

Figure 2. Summary data from „SILP, Llas.2" base about forest fires in the Kielce Forest District in 2010-2019

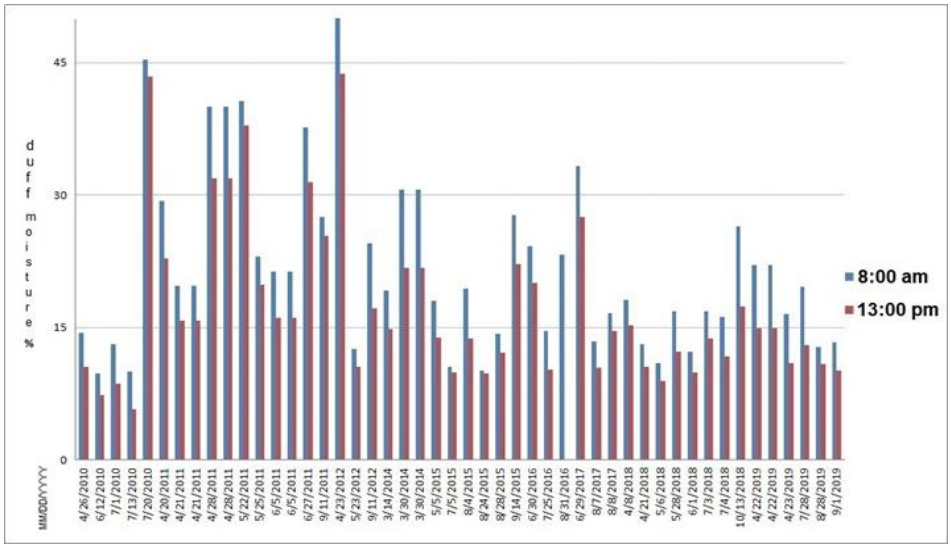

Figure 3. The duff moisture in % in two observation dates from days of fires with undetermined causes (FUC). Data obtained from the Jędrzejów Forest District station [7]

Table 1. Fires of undetermined causes (FUC) [7] under specific weather and synoptic conditions for Kielce-Suków station [8], [9]

No.	Date of fire	Forestry (section)	Notification time	Forest stand Duff moisture	Tmax (h) Before fire	fmin (h) Before fire	Synoptic situation
1	26/04/2010	Słowik (97 a)	16.02	SO 85	21.0 (15)	33 (15)	SE a
2	12/06/2010	Niewachlów (124 d)	13.46	SO KO	29.6 (12)	43 (11)	SW c
3	01/07/2010	Dobrzeszów (25 g)	14.15	SO 70	26.4 (12)	41 (12)	SW c
4	13/07/2010	Oblęgorek (85 f)	14.54	JD 55	29.9 (14)	41 (13)	E a
5	20/07/2010	Oblęgorek (85 d)	14.30	JD 60	25.5 (14)	63 (13)	E a
6	25/03/2011	Bilcza (141 c)	no data	OL 9	9.0 (12)	59 (12)	W c
7	20/04/2011	Gruchawka (79 d)	16.50	SO 70	17.7 (14)	25 (14)	E a
8	21/04/2011	Oblęgorek (88 c)	19.50	SO KDO	20.4 (15)	25 (15)	SE a
9	**28/04/2011**	Oblęgorek (88 c)	12.35	SO KDO	22.0 (11)	29 (11)	SE a
10	**28/04/2011**	Niewachlów (108 c)	16.45	SO 79	22.0 (11)	29 (11)	SE a
11	22/05/2011	Dąbrowa (1 c)	18.05	SO 60, 28	25.3 (13)	42 (13)	S a
12	25/05/2011	Dąbrowa (1 p)	13.50	SO KO	16.6 (12)	35 (12)	NW a
13	05/06/2011	Oblęgorek (85 a)	10.04	SO 70	26.3 (10)	35 (10)	S a
14	05/06/2011	Oblęgorek (83 c)	16.05	JD 60, SO KO	27.8 (14)	32 (15)	SE a
15	27/06/2011	Oblęgorek (84 d)	11.30	JD 55	19.5 (11)	37 (11)	N a
16	11/09/2011	Dyminy (11 a)	19.34	SO 60	26.8 (14)	51 (14)	SW a
17	**23/04/2012**	Podzamcze (163 n)	no data	SO 55, 65,	13.0 (12)	57 (12)	W c
18	23/05/2012	Oblęgorek (85 i)	14.00	JD 55	26.9 (13)	29 (12)	NE a
19	11/09/2012	Oblęgorek (152 g)	15.04	SO KO	29 (13)	27 (13)	SW a
20	14/03/2014	Sojowa (133 g)	13.00	SO 57	15.3 (12)	26 (12)	NW c
21	30/03/2014	Oblęgorek (85 g)	14.12	JD 55	16.2 (14)	19 (14)	S a
22	30/03/2014	Gruchawka (79 a)	14.02	SO 70	16.2 (14)	19 (14)	S a
23	05/05/2015	Czartoszowy (81 a)	15.30	SO 82	23.9 (14)	46 (13)	SE a
24	05/07/2015	Oblęgorek (87 a)	13.40	SO 109	31 (13)	40 (13)	S a
25	04/08/2015	Oblęgorek (91 d)	16.33	JD 75	31.5 (13)	30 (13)	SE a
26	24/08/2015	Niewachlów (138 f)	15.00	SO 50	26.9 (13)	37 (13)	SE a
27	28/08/2015	Niewachlów (108 d)	14.20	SO KO	32.4 (13)	32 (13)	S a
28	14/09/2015	Niewachlów (137 i)	8.25	SO 56	17.5 (8)	66 (8)	SE c
29	30/06/2016	Niewachlów (105 c)	21.00	SO 79	30.2 (14)	35 (14)	SW a
30	25/07/2016	Niewachlów (133 c)	17.30	SO 79	28.5 (15)	40 (15)	S a
31	31/08/2016	Sojawa (112 c)	8.43	JD 60	18.1 (8)	57 (8)	NW a
32	**29/06/2017**	Niewachlów (111 f)	13.14	no forest stand data	27.7 (13)	42 (13)	SW c
33	07/08/2017	Oblęgorek (89 f)	18.07	SO 11	21.0 (15)	44 (16)	E a
34	08/08/2017	Oblęgorek (98 f)	15.41	SO 11	23.2 (15)	48 (14)	SE a
35	08/04/2018	Gruchawka (71 j)	17.48	SO 74	21.5 (14)	40 (14)	S a
36	21/04/2018	Oblęgorek (86 z)	18.03	SO 94	24.8 (12)	37 (14)	W a
37	**06/05/2018**	Oblęgorek (98 d)	17.00	SO 57	19.6 (14)	36 (16)	NE a
38	28/05/2018	Niewachlów (121 a)	13.50	SO 76	25.7 (13)	36 (12)	SE a
39	**01/06/2018**	Niewachlów (121 h)	13.18	SO 15	29.1 (13)	32 (13)	SE a
40	03/07/2018	Dobrzeszów (38 h)	14.34	SO 105	22.6 (14)	36 (14)	N c
41	04/07/2018	Oblęgorek (157 c)	13.12	DB 100	26.5 (12)	28 (12)	W a
42	13/10/2018	Oblęgorek (157 c)	10.30	JD 65	19.0 (10)	52 (10)	NE a
43	06/11/2018	Gruchawka (62 b)	12.15	JD 70	17.2 (12)	49 (12)	S a
44	22/04/2019	Dąbrowa (59 f)	10.28	JD 65	13.4 (10)	59 (10)	E a
45	22/04/2019	Dąbrowa (68 a)	12.55	SO 5	14.4 (12)	47 (12)	SE a
46	23/04/2019	Oblęgorek (98 g, 161 a)	18.20	SO 16	17.4 (15)	30 (16)	SE a
47	28/07/2019	Sojawa (151 g)	15.15	SO 90, 4	31.7 (15)	33 (15)	SE a
48	**28/08/2019**	Niewachlów (137 a)	17.41	SO 73	29.8 (14)	45 (14)	S a
49	01/09/2019	Podzamcze (203 h)	16.37	SO 18	29.3 (15)	46 (14)	S a

Medium fire is marked in bold

SPRING	<15%		
SUMMER	very dry duff	25.1 - 30.0 °C hot	30 -49% dry
AUTUMN	>27%		
	non-flammable duff	> 30.0 °C very hot	< 30% very dry
	no data		

DISCUSSION

In general, fires of undetermined causes (FUC) can arise from carelessness or even intentional human action. Because these reasons cannot be verified, and the perpetrator may not even know that he set fire to the forest. For this purpose, attempts were made to link FUC with factors occurring without human intervention, i.e. weather conditions and the moisture content of the duff.

The intensity of the fire spread depends primarily on the amount and type of combustible materials covering the soil surface (forest duff) and the wind speed. Pine duff has the best flammable properties. The duff of other conifers (spruce, fir, larch), due to its compact structure, ignites worse than pine. Beech duff after the growing season, i.e. in late autumn, is also a good combustible material [10].

Out of 49 FUC, only in one case the type of forest stand was not established (Tab. 1). Among the specified communities, the most, 32 communities (66.6%) were pine forests, 10 fir forests (20.8%), 4 mixed forests (8.3%) and 1 oak and alder (2.1%). The vast majority of 95.8% of fires for unknown causes occurred in coniferous stands, where the duff is the most flammable. In the analyzed decade, FUC occurred in every year except 2013. The highest number was 12 in 2011 and 10 in 2018. In total, 44.9% of FUC occurred in the summer months (June-August) (Tab. 1).

In the spring period (March-May) there were as many as 42.9% of FUC, while in the autumn period (September-November) only 12.2%. Spring fires resulted largely from the lowest relative air humidity in the year [11], [12]. The FUC was reported the earliest on March 25, 2011, and on November 6, 2018 at the latest (Tab. 1). In the KFD, conditions conducive to FUC were recorded on very dry days of April 2011 (Gruchawka, Oblęgorek - medium fire and Niewachlów - medium fire), as well as in May 2012 (Oblęgorek) and March 2014 (Sojawa, Oblęgorek and Gruchawka Forests) (Tab. 1).

Weather favorable to fires was the 43% of all days with FUC. In total, FUC occurred mostly in anticyclone situations (83.6%) and in advection from the southern sector (77.6%). The most common situations were SEa (28.5%) and Sa (22.4%). It can be concluded with high probability that FUC in more than half of the cases were associated with the inflow of very warm and dry tropical air mass. This mass causes a quick drying of the forest duff.

Non-flammable duff occurred only in six fire terms (12.8%), which indicates a intentional forest fire ignition (5 of them is the Oblęgorek, one is Podzamcze). In 16 cases (34%), the fire was registered at the duff which was not too dry (16-27%), but could have caught the fire due to intentional or accidental arson. Especially could happen when the duff has a moisture content of less than 15%. There were 26 such dates, which accounts for 55.3% of unidentified fires. As far as forest stands are concerned, in 21 cases (80%) they were pine forests, in three (12%) fir forests and in one oak-hornbeam forest. Since boron assemblages are characterized by a high content of volatile flammable substances in the duff, the initiation of ignition with even a single spark may lead to a violent forest fire.

The favorable thermal and humidity conditions with very dry duff occurred in 15 FUC (30.6%). In 2010, this concerned three fires (Niewachlów, Dobrzeszów, Oblęgorek) and once in 2012 (Oblęgorek). In 2015, there were 4 fires (2 each in the Oblęgorek and Niewachlów) and all of them were associated with summer heat waves that were passing through Poland at that time [13]. Hot and very hot days also occurred during a fire in the summer of 2016 (Niewachlów), in spring and summer 2018 (Niewachlów - medium fire in summer) and 3 times in 2019 (Sojawa, Niewachlów - medium fire, Podzamcze) (Tab. 1). Unfortunately, due to the very local nature of the occurrence of storms, especially

lightning, it was very difficult to establish such a cause for the KFD. The meteorological conditions at the Kielce-Suków synoptic station were taken into account, but no Cumulonimbus storm clouds with precipitation were found on the dates of FUC. Of course, such a possibility cannot be completely exclude, although it is very unlikely after additionally analyzing the thermal, humidity and circulation conditions (atmospheric fronts). There is no evidence to conclude that lightning was the cause of any FUC in the KFD in the analyzed decade.

CONCLUSIONS

FUC in the analyzed decade ware mostly in coniferous communities, especially in the most flammable pine forests. Their causes were mainly anthropogenic and natural. They were caused by the convergence of the strong flammable properties of the forest duff in time, favourable weather and synoptic conditions, and anthropogenic ignition of fire. It can be assumed with high probability that the human-initiated accidental ignition of forest litter occurred in about half of the FUC. The causes of intentional arson should be sought due to high moisture of the duff. Lightning discharges were practically excluded among FUC. Also, self-ignition is practically impossible in the conditions that take place in the studied area.

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THE HISTORY OF THE DEVELOPMENT OF THE NATURAL ENVIRONMENT IN THE KOKORITSA MICROREGION (BELARUS)

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ABSTRACT

The history of the development of the natural environment of the Kokoritsa microregion and its relationship with humans in prehistory were studied. Kokoritsa microregion is a group of archaeological sites located at a close distance from each other within the territory of the Sporovsky Biological Reserve (western Belarus). The most active excavations were carried out on the territory of the archaeological site "Kakoryca-4" (mostly Neolithic and Bronze Age finds). The paper presents mainly the results of field paleogeographic research in 2020. Based on radiocarbon and spore-pollen analyses, some data were obtained indicating early agricultural activities of prehistoric people.

Keywords: Kokoritsa microregion, paleogeography, Holocene, peat bog deposits.

INTRODUCTION

Kokoritsa microregion is a group of archaeological sites situated at a close distance from each other on sandy elevations in the basin of the Yaselda River (Pripyat tributary) and Lake Sporovskoye on the territory of the Belarusian Polesie (Fig. 1).

Figure 1. Location of the Kokoritsa microregion and the border of the LGM

In 2020, during the expedition, new field data were obtained, which complement the already published materials on the Kokoritsa microregion about the development of the natural environment over the last 11,700 calendar years (Holocene period) [1, 2]. Lake

Sporovskoye was much larger during the Preboreal (PB) and Boreal (BO). At that time (PB-BO), carbonate deposits were accumulating in it. At the turn of the Boreal and the Atlantic, there was an intensification of the processes of bog formation and a decrease in the size of Lake Sporovskoye [1]. Earlier, we also made some assumptions about the dynamics of the Yaselda riverbed throughout time [2, 3]. We presume that in the middle and the end of the Atlantic period (approx. from 7000 14C yr BP to 5600 14C yr BP), the Yaselda riverbed was closer to the Sporovo II site, which led to the accumulation of silty peats due to floods (as the close location of the riverbed facilitated the delivery of more mineral material). At the end of Atlantic (5600±70 14C yr BP), the Yaselda riverbed moved to the south, forming an oxbow lake, which is still connected with the Yaselda active riverbed.

METHODS

This publication provides new field data and mainly field observations. Sediment samples taken at different points in the Kokoritsa microregion are currently being processed in the laboratory. During the field work, drilling was carried out using a hand drill, and outcrops were dug with the sediment sampling. The article also presents new data from palynological studies of the Cerealia cultural pollen from the Sporovo II profile and new cartographic material. However, in general, methods such as spore-pollen analysis, radiocarbon analysis, OSL and TL dating, sedimentological analysis, carpological analysis, cartographic method and archaeological excavations are used in our study of the Kokoritsa microregion. The photos presented in this article were taken by D. Tsvirko and M. Kryvaltsevich.

RESULTS

Drilling of geological boreholes and sampling of sediments were carried out at several points within the Kokoritsa microregion: KAK-5 (or “Кокорица-5”; 52°23'14.82"N 25°17'33.04"E); KO-20 (52°23'06.259"N 25°17'06.947"E); PKK-1 and PKK-2 (or “ПКК-1” and “ПКК-2”; 52°23'38.448"N 25°17'35.545"E); KV-11 (or “Квадрат-11”; approx. 52°23'37.56"N 25°17'35.39"E) (Fig. 2).

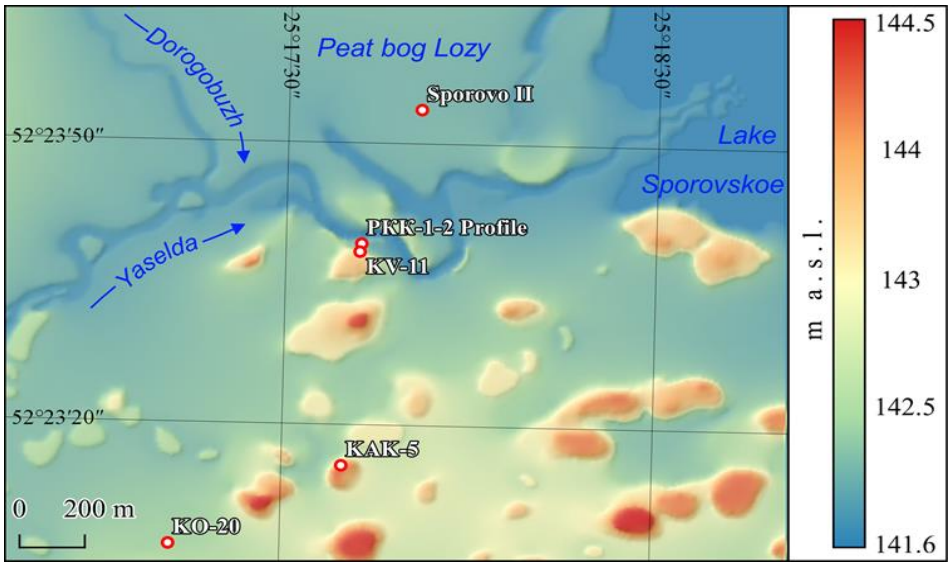

Figure 2. The investigated site with study points on a fragment of the digital elevation model (DEM) based on aerial photography materials [4]

The field description of the sandy elevation deposits from the KAK-5 profile is given in Table 1. The KAK-5 profile was made from the wall of the ditch located on a sandy hill (Fig. 3). The upper part of the black sands with humus was destroyed by human activities. Sediment samples were taken for sedimentological analysis and OSL dating.

The main feature of the KAK-5 profile is the presence of horizontal bedding of the sediments. In the middle and lower parts of the KAK-5 profile, where the deposits are not disturbed by human agricultural activities, there is an alternation of coarse sands with medium and fine sands, as well as with silts (Fig. 4).

Table 1. Field description of the KAK-5 sediment column

KAK-5			
Depth, cm	**Lithology, field description**	**Depth, cm**	**Lithology, field description**
0-13	*medium sands*, with humus, black	114-117	*silts*, greenish-white
13-37	*fine sands*, yellow	117-123	*medium sands*, yellow
37-49	*fine sands*, horizontally layered, yellow	123-125	*coarse sands*, yellow
49-54	*medium sands*, horizontally layered, yellow	125-133	*fine-medium-grained sands*, yellow
54-60	*fine sands*, horizontally layered, yellow	133-138	*coarse sands*
60-62	*medium sands*, yellow	138-172	*fine sands*
62-68	*fine-medium-grained sands*, horizontally layered, yellow	172-175	*medium sands*
68-74	*fine sands*, horizontally layered, yellow	175-177	*coarse sands*
74-98	*fine-medium-grained sands*, horizontally layered, yellow	177-189	*medium sands*
98-101	*coarse sands*, yellow	189-190	*coarse sands*
101-105	*fine sands*	190-193	*silts*
105-108	*silts*, greenish	193-214	*fine-medium-grained sands*
108-113	*fine sands*, white	214-215	*coarse sands*
113-114	*coarse sands*	215-220	*fine sands-silts*

Figure 3. Deposits of the KAK-5 profile. A – before sampling; B – after sampling. Sampling was carried out from the wall against which the shovel was leaning

Figure 4. A-B – Horizontal bedding of the KAK-5 profile sediments

Table 2 shows the results of drilling of bog deposits at point KO-20 with a field description of the sediments. The peat bog massif, inside which the KO-20 point is located, is very expressive in the relief as a flat area overgrown with tall herbaceous vegetation. The relief of the bog is more clearly visible from the hill on which the KAK-5 point is situated (Fig. 5). The samples from KO-20 will be used for sedimentological analysis and radiocarbon dating (Fig. 6).

Table 2. Field description of the KO-20 sediments.

KO-20			
Depth, cm	**Lithology, field description**	**Depth, cm**	**Lithology, field description**
0-11	*silty peats*, brown	81-146	*silty peats*, brown
11-81	*silty peats*, black	146-185	*silts*

Figure 5. View of the peat bog massif, within which the KO-20 point is located.
A – view from the hill with the point KAK-5; B-C – view of the bog from point KO-20

Figure 6. Core of peat deposits (A-C) underlain by silts (C-D), KO-20 profile

Sections PKK-1 and PKK-2 represent one profile (PKK-1-2 Profile), however, for PKK-1 the samples were taken with a drill (since the part of PKK-1 deposits is below the groundwater level), and for PKK-2 the samples were taken from the outcrop wall (Fig. 7). The selected samples are in the process of sedimentological, radiocarbon and carpological analyzes. The field description of the deposits of the PKK-1-2 Profile is given in Table 3.

Table 3. Field description of the sediments from PKK-1-2 Profile.

PKK-1-2 Profile (for carpology)			
Depth, cm	**Lithology, field description**	**Depth, cm**	**Lithology, field description**
PKK-2		**PKK-1**	
0-23	*highly decomposed peats*, brown	60-110	*highly organic peats*, brown, brown-black
23-28	*highly decomposed peats*, sandy, brown	110-133	*peats*, brown-black
28-33	*peaty silts with sands*, brown-black	133-150	*fine-medium-grained sands*
33-40	*peaty silts with sands*, black		
40-49	*peaty silts*, black		
49-60	*highly organic peats*, brown, brown-black		

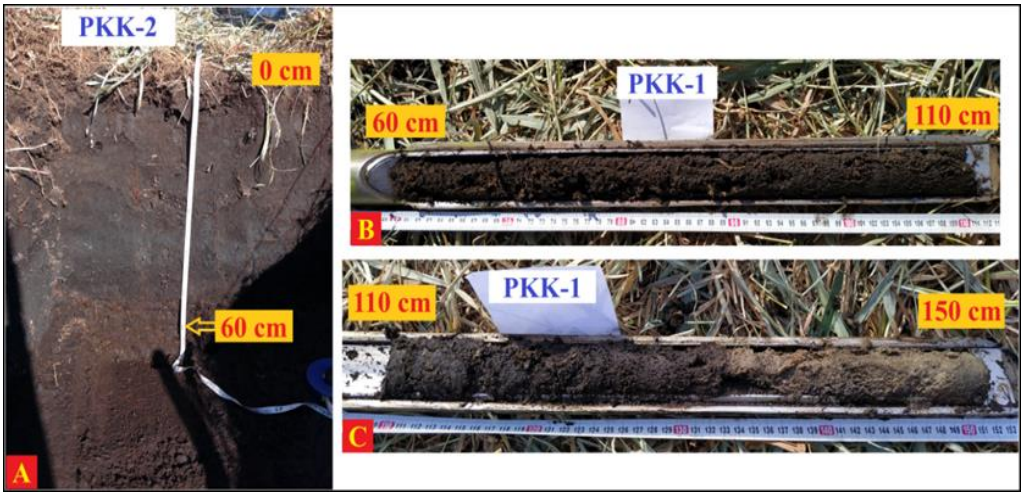

Figure 7. Peat deposits (A-C) of the PKK-1-2 Profile underlain by fine-medium sands (C). A – PKK-2 sediments from the outcrop wall; B-C – PKK-1 sediment core

After macroscopic evaluation of the sediments from the PKK-2 outcrop, a dark layer of peaty silts with an admixture of sands was found, which extends along all the walls of the outcrop (Fig. 8-9). To date this layer 2 samples for radiocarbon analysis were selected from the east wall of the PKK-2 outcrop (from which samples for carpological analysis had been already taken) – ≈ above and below the black layer of peaty silts with sands (Fig. 9). One of the most important discoveries from the PKK-1-2 Profile is the finding of the Early Neolithic pottery in the peat deposits of the PKK-2 section (east wall) at a depth of 50 cm (Fig. 9). The Early Neolithic pottery lies approximately on the border of 2 layers: a brown layer of highly organic peats and a black layer of peaty silts with sands. Another object was found on the south wall of the PKK-2 outcrop – wood in a brown layer of highly organic peats at a depth of approximately 80 cm (Fig 8).

Figure 8. A black layer of peaty silts with sands on the north (A), south (B) and west walls of the PKK-2 outcrop (upper part of the PKK-1-2 Profile). D – buried wood

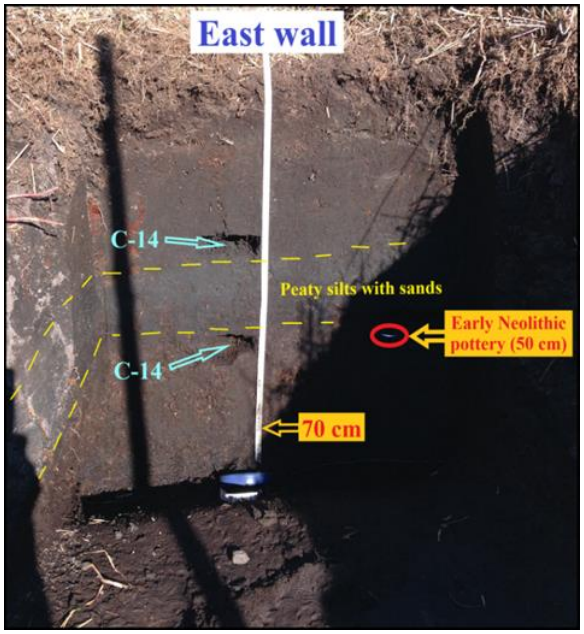

Figure 9. A black layer of peaty silts with sands on the east wall of the PKK-2 outcrop (upper part of the PKK-1-2 Profile). The Early Neolithic pottery in the PKK-2 section

The core of KV-11 sediments was taken from square 11 of the archaeological excavation 2 at the "Kakoryca-4" site and had the following field description presented in Table 4. KV-11 samples were taken for sedimentological analysis, radiocarbon and OSL dating (Fig. 10). From excavation 2 of the archaeological site "Kakoryca-4", 3 samples of pottery were taken along with the surrounding deposits for thermoluminescence (TL) dating (squares 10, 11 and 12).

Table 4. Field description of the KV-11 sediments.

KV-11	
Depth, cm	**Lithology, field description**
0-27	*silty peats*, black-brown
27-49	*fine sands*, silty, black, sticky
49-95	*fine sands*, organic, gray, gray-white

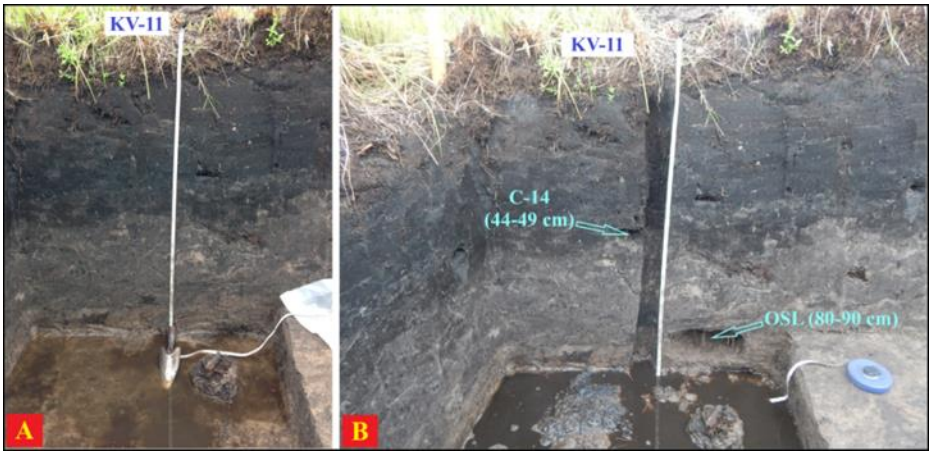

Figure 10. KV-11 deposits from the wall of excavation 2 of the archaeological site "Kakoryca-4": silty peats underlain by fine sands. A–before sampling; B–after sampling Spore-pollen analysis of Sporovo II deposits revealed the presence of Cerealia pollen in several samples at different depths. The oldest pollen grains of Cerealia lay at depths of 145-155 cm and were dated to approximately 7000 14C yr BP (Fig. 11).

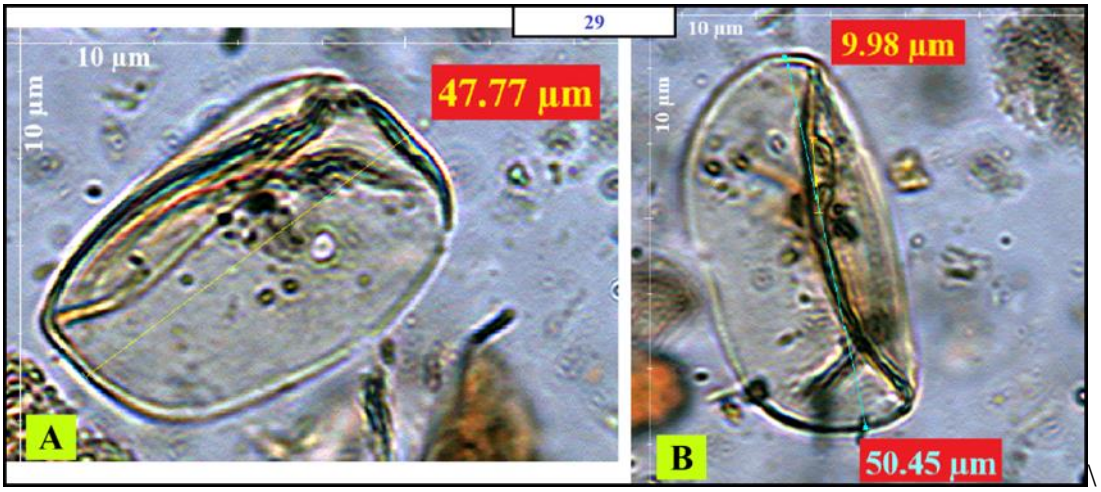

Figure 11. Cerealia pollen grain from a depth of 145-150 cm in different positions under a light microscope. A – the length of the long axis (47,77 µm); B – the length of the long axis (50,45 µm) and diameter of annulus (9,98 µm) in a different grain position.

Cerealia pollen was also found at a depth of 95-97 cm, as well as in the uppermost (≈subrecent) layer of peat deposits (0-5 cm) (Fig. 12). The results of measurements under a light microscope of Cerealia pollen grains from Sporovo II profile are presented in Table 5.

Table 5. Results of measurements under a light microscope of the long axis and diameter of annulus of Cerealia pollen grains from Sporovo II profile

Estimated age	**Sample Name (Depth, cm)**	**Long axis** (polar diameter), µm		**Diameter of annulus** (ulcus/porus+annulus), µm	
		Average	All measurements	Average	All measurements
7181 ^{14}C yr BP (8086 cal yr BP)	30 (155-150 cm)	47,02	46,05; 46,88; 47,07; 48,86; 50,46; 46,13; 44,8; 45,21; 45,22; 44,76; 50,72; 50,36; 45,65; 46,13.	9,24	8,98; 8,81; 9,62; 9,83; 8,46; 9,54; 9,63; 9,5; 8,83.
7031 ^{14}C yr BP (7924 cal yr BP)	29 (150-145 cm)	49,83	47,51; 47,77; 50,98; 51,63; 50,94; 50,45; 49,52.	9,96	10,64; 9,98; 9,89; 9,85; 9,67; 9,68; 9,98.
≈5600 ^{14}C yr BP (6391 cal yr BP)	B19 (97-95 cm)	49,73	49,94; 49,77; 49,81; 50,06; 50,12; 50; 49,54; 49,09; 49,83; 50,06; 49,88; 49,81; 48,57.	8,93	9,08; 8,91; 8,97; 8,91; 8,7; 8,65; 9,06; 9,08; 9,04.
	B19 (Re-measurement)	49,73	49,49; 49,72; 49,95; 50; 50,46; 50,1; 49,26; 49,64; 49,72; 50,01; 48,67.	9,01	9,05; 8,83; 8,83; 9,14; 8,67; 9,38; 9,16.
End of the Subatlantic (≈subrecent)	1 (5-0 cm)	46,57	46,41; 46,56; 46,73.	9,68	8,85; 8,99; 10,95; 9,92.

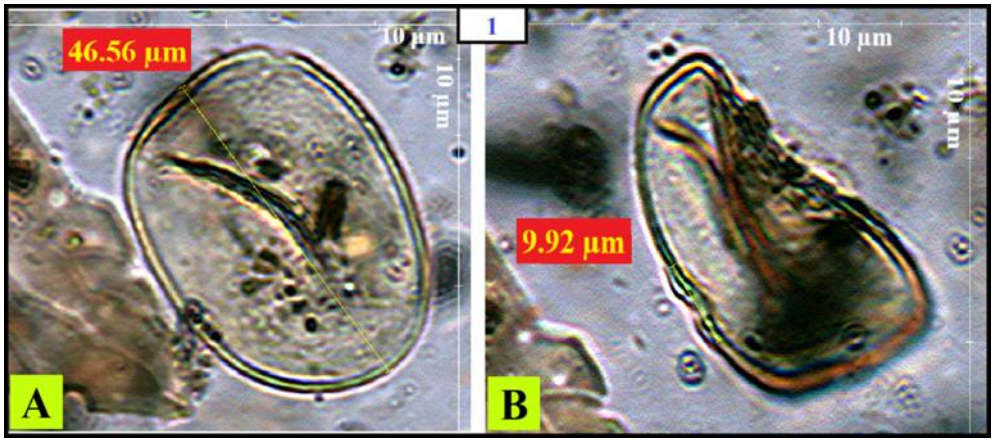

Figure 12. Cerealia pollen grain from a depth of 0-5 cm in different positions under a light microscope. A – the length of the long axis (46,56 µm); B – diameter of annulus (9,92 µm) in a different grain position

DISCUSSION AND PRELIMINARY CONCLUSIONS

The field observations obtained during the 2020 expedition to the Kokoritsa microregion and samples taken for laboratory analyses complement the general picture of the development of the natural environment of this territory.

As a result of field studies, some conclusions were made about the features of the processes that formed the sandy elevations, one of which is the archaeological site "Kakoryca-4". Based on the lithological structure (which was revealed at the KAK-5 profile) of one of these sandy hills it can be assumed that the horizontal bedding of coarse-medium-fine sands and silts indicates the accumulation of these deposits by a braided river with small dynamic triggered by the very small slope of the river. In Belarusian literature and on geological maps with the Kokoritsa microregion, these deposits from the sandy elevations are called "limno-alluvial" [5].

The time of formation of the black layer of peaty silts with sands in the PKK-2 section, which extends along all the walls of the PKK-2 outcrop, is of considerable interest. We assume that between 7000 14C yr BP and 5600 14C yr BP, the Yaselda riverbed was closer to the Sporovo II profile, which led to the accumulation of silty peats in it. Then, about 5600±70 14C yr BP (when at point Sporovo II the accumulation of silty peats stopped), an increase in fluvial activity took place and the Yaselda riverbed laterally migrated to the south, forming an oxbow lake. This change in the position of the riverbed occurred during the phase of an increase fluvial dynamic known from other Belarusian river valleys [6]. Increased fluvial activity and a change in the position of the Yaselda riverbed (the Yaselda river became closer to the PKK-2 point) led to the beginning of the accumulation of the layer of peaty silts with sands in the PKK-2 outcrop. Accordingly, we presume that the black layer of peaty silts with sands in the PKK-2 section began to accumulate tentatively around 5600±70 14C yr BP (the approximate beginning of the period of increased fluvial activity of Yaselda). The Early Neolithic pottery found at the boundary of the layers (a black layer of peaty silts with sands and a brown layer of highly organic peats) does not contradict the date 5600±70 14C yr BP and may correspond to it.

The obtained spore-pollen materials, in particular, the Cerealia pollen data, allow us to make the assumption-reconstruction of 7000 BP old vegetation (Fig. 13). It is assumed that at that time on the territory of the Kokoritsa microregion there was an early form of agriculture, or there was a wild form of Cerealia. Probably single Cerealia could grow near dwellings or temporary sites of prehistoric people. These prehistoric settlement sites

were located on elevated places (on sandy hills), from which the Cerealia pollen was probably carried by the wind and deposited on the surrounding peat bogs.

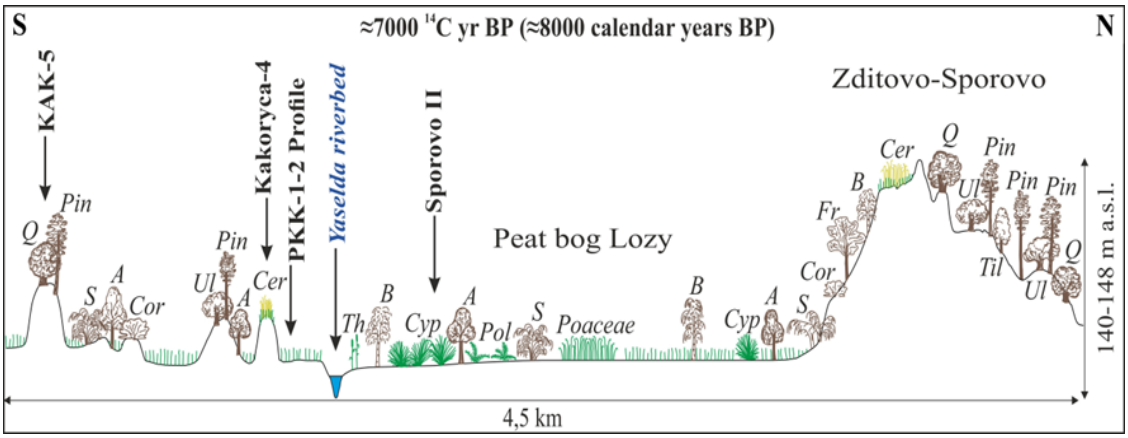

Figure 13. Reconstruction of the composition of vegetation on the territory of the Kokoritsa microregion 7000 BP (8000 cal yr BP) based on spore-pollen analysis. Pin – Pinus; Q – Quercus; Ul – Ulmus; Til – Tilia; Fr – Fraxinus; B – Betula; A – Alnus; Cor – Corylus; S – Salix; Cyp – Cyperaceae; Cer – Cerealia; Th – Typha; Pol – Polypodiaceae [3].

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THE IMPACT OF CLIMATE CHANGE ON THE WATER REGIME IN THE VRBANJA RIVER BASIN

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ABSTRACT

Essentially, climate is a natural framework within which its impact on water resources in a specific geographic area is being monitored and defined; the focus of the paper is the Vrbanja River Basin. Climate elements such as precipitation and those which increase the evaporation and decrease the amount of water flowing into water streams, such as air temperature, air humidity and wind frequency and speed, are crucial for changes in the watercourse supply.

The analysis of climate elements suggests that the Vrbanja Basin is characterized by temperate continental climate with harsh winters and warm summers, making the basin a part of pluvio-nival regime belonging to a larger system of the Sava River Basin. Air temperature and precipitation are basic climate elements which largely determine hydrological processes and water balance of a specific basin.

The Vrbanja River is one of the largest right tributaries of the Vrbas River and one of the most pertinent autochthonous water streams in the Republic of Srpska. The Vrbanja Basin covers 791.33 km2. The dominant direction of the elongated Vrbanja watershed is southeast-northwest. The river flow is 96.30 km long, and the length of the watershed is 97.18 km with the maximum width of 30.4 km. The total decline of the Vrbanja River flow is 1371m, which indicates a strong geogenic and anthropogenic differentiation of the watershed area.

The paper analyzes data on basic climate elements (air temperature and precipitation) in the Vrbanja River Basin from 1961 to 2015 and the impact which the variations of these elements might have had on the river regime. The data on the Vrbanja River regime (water level and flow rate) are analyzed during the period 1926-2019. The analysis suggests that there has been a constant increase in air temperature, especially from 2010 onwards, and that the precipitation timeline has been changing. Given that water is directly connected to climate, each modification in climate parameters directly affects the water regime. The extremes were documented in 2014 when the highest ever water level (592 cm) and water flow (843.8 m3/s) on the Vrbanja River were registered. The results were catastrophic floods in both the Vrbanja River Basin and the neighboring areas.

The registered increase in mean air temperature, especially over the last decade, is one of the best indicators of global climate change. Consequences of the air temperature increase are many and may involve high flood and drought risks, the decline of snow coverage, the loss of biodiversity, or threats to human health and life.

Keywords: the Vrbanja River Basin, climate change, water level, water flow, trends.

INTRODUCTION

In the late 20th and early 21st centuries, the global warming trend continues. The Earth atmosphere and oceans are getting warmer, the snow and ice layers are melting, and the sea level is increasing [1]. The resulting risks and negative effects are many and very likely to intensify. Europe is expected to encounter massive effects of global warming in the decades to come [2]. Threats to both humans and the environment will largely be related to the extreme climate event changes, which occur due to an increase in their intensity and frequency different than normal[3].

Global studies on climate change suggest that there has been a large global air temperature increase, whereas the annual precipitation values display a decreasing trend in the Mediterranean climate zone and an increasing trend in North Europe.

Global annual air temperature has grown since 1880 with an average growth rate of 0.07 °C per decade [4]. It is in the northern latitudes that the warming has been most pronounced over the last few decades [5].

The last thirty years were the warmest over the entire observed period. Each decade was successively warmer than the previous one, and the first decade in the 21st century was the warmest ever since 1850 [6],[1]. It is in the 21st century that fifteen out of sixteen warmest years during the observed period were recorded. 2015 was the warmest year and 2011-2015 was the warmest five-year period [7].

Annual and seasonal air temperature analyses in Serbia, Croatia, Slovenia, Montenegro, and Greece indicate significant positive trends in most of the region in the second half of the 20th and early 21st centuries [10],[8],[11],[9]. Previous studies conducted in some Bosnia and Herzegovina regions [12],[13],[14],[15] suggested that there was a positive trend of air temperature in the country.

The last few years have witnessed the impact of climate change on the precipitation regime.

Linear trends for the period 1961-2015 suggested that the amount of precipitation in Bosnia and Herzegovina either stagnated or slightly increased and that changes were more evident seasonally rather than annually. Despite the fact that there were no significant changes in the amount of precipitation, the pluviometric regime and the annual distribution were largely affected.

Climate change has a great impact on Bosnia and Herzegovina's rivers' regime, which is evident in frequent extremely dry and watery periods largely affecting both water supplies and human health. [16]. Consequently, the dry periods last longer and the precipitation intensity grows, causing floods. In areas of mountain and hilly terrain, the rainfall quickly outpours over the ground surface after which the drought increases the water deficit. The consequences are enormous as they affect the agriculture, plant growth, biodiversity, water balance, and water supplies in Bosnia and Herzegovina [17].

The flood risk is particularly high in north-east Bosnia and Herzegovina, where the most catastrophic flood in history occurred in 2014.

The water flow is negatively correlated with air temperature during the entire year (with a short exception in the winter), whereas there is a significant positive correlation with precipitation [18].

Earlier studies conducted in south-east Europe registered strong changes in the river flow rates in some parts of the region [19]. A significant negative trend of both annual and seasonal flow rates was registered in the entire Serbian territory (in all seasons except autumn) [20]. A significant decrease of average flow rates was monitored in most rivers in Slovenia [21]. In Croatia, the flow rate increased in the autumn and winter, and

decreased in the summer [22]. Results of studies conducted in Macedonia suggested that there were significant negative seasonal trends in flow rates in the entire country [23]. Nevertheless, local climate change should be observed as a consequence of the global change, but still depending on local impacts (latitude and longitude, topography, altitude). It is the climate elements (precipitation and other elements affecting the decrease of water amounts by causing evaporation, such as air temperature, air humidity, wind speed) that clearly have the strongest impact on the water stream recharge [24]. Hence, the paper will analyze modern changes in air temperature and precipitation and the effect they have on the flow rate and water level changes in the Vrbanja River Basin.

DATA AND METHODS

The Vrbanja River Basin is located in central Bosnia and Herzegovina, west Republic of Srpska (south-east Banja Luka nodal-functional region). It is positioned between 44º47'39" and 44º20'44"N north latitude and 17º12'33" and 17º14'42"E east longitude. The Vrbanja River is one of the longest right Vrbas tributaries and one of the most pertinent autochthonous water streams in the Republic of Srpska. The Vrbanja River Basin covers nearly 99.7 % of the Republic of Srpska's territory and 0.3 % (the river source) of the water stream is located in the Federation of Bosnia and Herzegovina.

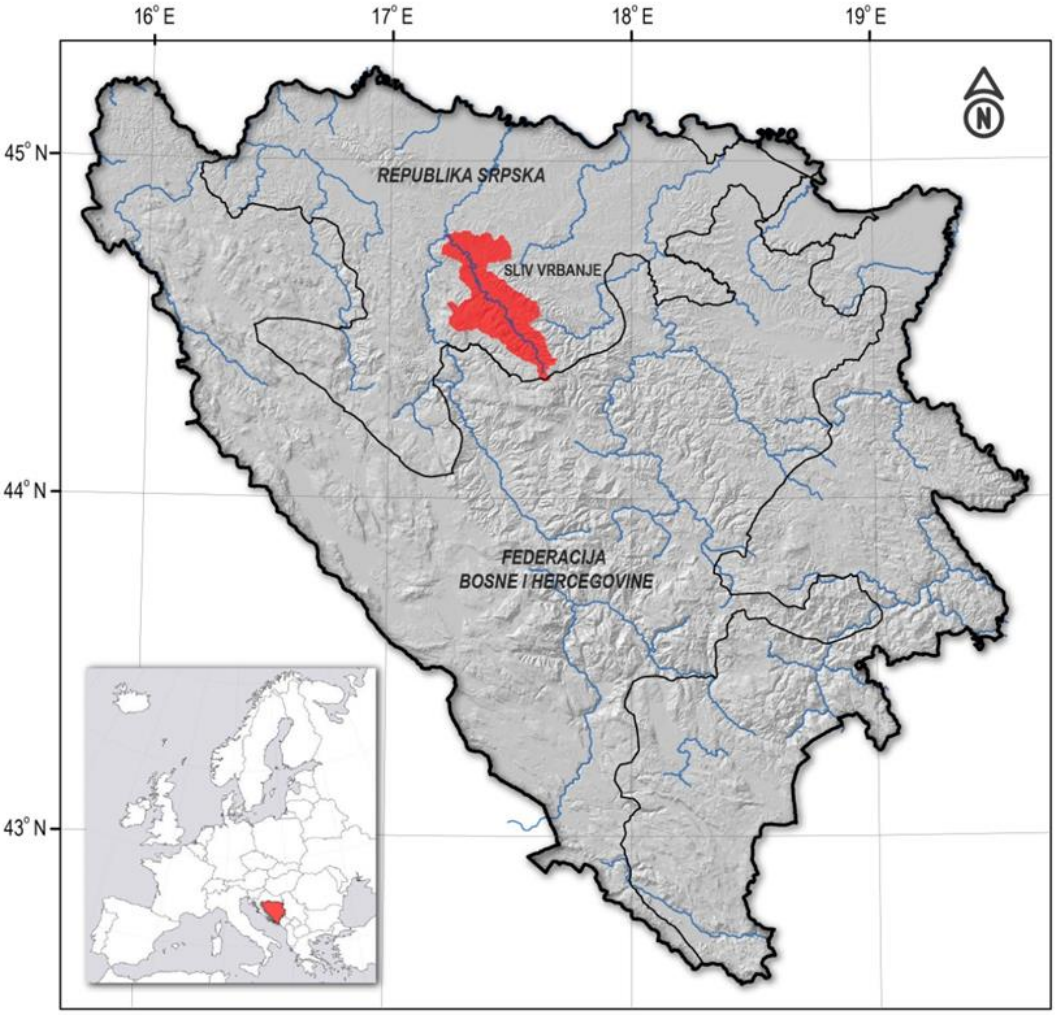

Figure 1. Geographic position of the Vrbanja River Basin.

The Vrbanja River Basin is located at the contact point between two macro regions – the highland region and the Pannonian region. The source of the Vrbanja River is located at the Vlasic Mountain (1563 m altitude) and the river mouth is located near the City of Banja Luka (147 m altitude) [25].
The topographic surface of the Basin covers 791.33 km^2. The dominant direction of the elongated Vrbanja watershed is southeast-northwest. The river flow is 96.30 km long, and the watershed length is 97.18 km with the maximum width of 30.4 km. The total decline of the Vrbanja River flow is 1371m, which indicates a strong geogenic and anthropogenic differentiation of the watershed area.
The statistical analysis of climate elements found that the Vrbanja River Basin is characterized by moderate continental climate, with cold winters and warm summers. Accordingly, the basin belongs to the pluvio-nival regime, Posavina type, with highest water levels in April and lowest water levels in August.
The Vrbanja hydrological observation station was founded in 1922 and it is under the jurisdiction of the Hydrometeorological Institute of the Republic of Srpska. The station is located 8.33 km upstream from the Vrbanja River mouth into the Vrbas. The topographic point „O“, where the water gauge is installed, is set at 166.22 m altitude.
During the last war in Bosnia and Herzegovina (1992-1995), the measurement and monitoring at the Vrbanja hydrological station suffered long interruptions. Data for the years of 1991, 1993, 1994, 1995 and 1996 are either incomplete or none, so these years are excluded from our analysis.
The paper analyzes the air temperature and precipitation fluctuations and their impact on the Vrbanja River regime. The data used in the analysis were collected from Banja Luka meteorological station during the period 1961-2015. The moving average method was used to analyze climate elements and the river regime. The purpose of the method was to annul the shortest lasting fluctuations related to annual time intervals and point out the fluctuations covering several-year periods [26]. Recent studies suggest that it is most productive to use sequences of moving average obtained by five-year mean values. The following formula was used [26]:

$X_{n+1} = X_n\,(X_{6+n} - X_n) : 6$, in which (1)

$X_n = 1/6 \sum_{i=1}^{n+5} X_i$;

X_i – individual value per a year;
n = 0,1,2,3,…m – the observed year range in which m stands for a five-year time interval.
The analysis of climate variations and changes in air temperature and precipitation is presented on the basis of decade and seasonal values. The timeline for average annual air temperature values and the amount of precipitation with differentiated trends during the periods 1961-2015 (referential sequence) and 1991-2015 is presented.
The Vrbanja River regime was defined based on the water level and flow rate. The regime was analyzed via data collected at the Vrbanja hydrological observation station from 1926 to 2019. Current trends of average annual and seasonal water levels and flow rates were estimated. The Pearson correlation coefficient was used to determine interdependency between the climate elements and water flow rate.
In order to estimate the annual deviation from the average flow rate (i.e. the occurrence of less or more watery years), the years were ranked in line with wateriness [19]. This method enables the monitoring of changes in a river's water regime. The application of

the method in hydrological and geographical studies helps register trends of wateriness in a water stream. [27]. Based on the average annual flow rate and its standard deviations during the analyzed period, years were ranked in line with wateriness as follows [28]:

- < -3δ Catastrophically dry year
- -3δ − -2δ Very dry year
- -2δ − -1δ Dry year
- -1δ − 1 δ Average wateriness
- 1δ − 2 δ Watery year
- 2δ − 3δ Very watery year
- > 3δ Catastrophically watery year

RESULTS AND DISCUSSION

The analysis of air temperature fluctuations

The aforementioned formula was used to calculate a series of the moving average for air temperature, as presented in Figure 2. The average annual air temperature during the period 1961- 2015 was 11.2 ºC. The average annual air temperature trend is positive with a tendency of increase at 0.46 ºC rate per decade. Specific air temperature fluctuations are evident. The five-year moving average clearly indicates that there were several different time periods with pronounced temperature fluctuations.

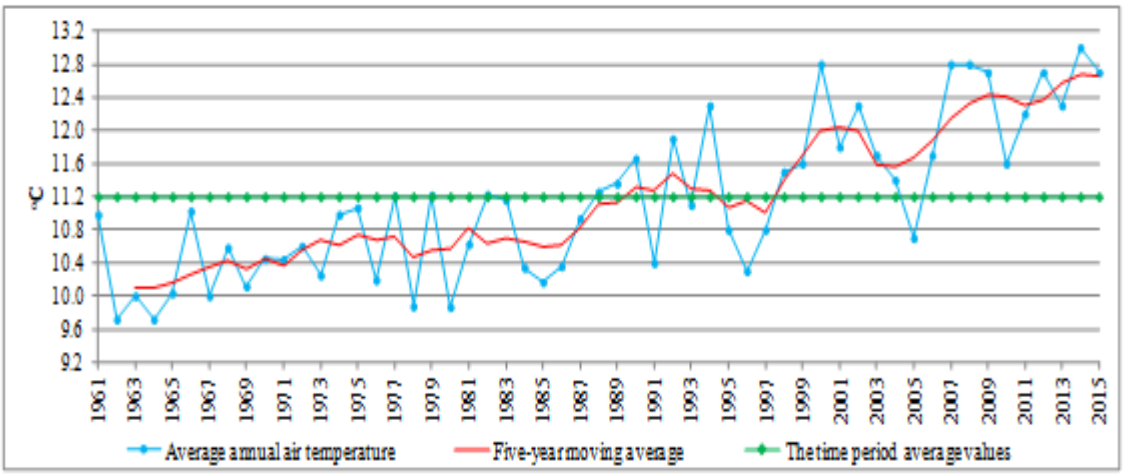

Figure 2. The air temperature fluctuations at the Banja Luka meteorological station during the period 1961-2015

The first period lasted the longest, from 1961 to 1988, and the air temperature was above the multiannual average. The second period lasted from 1988 to 1992, and the air temperature was slightly above the multiannual average. The third period lasted from 1992 to 1997, and the fourth period lasted from 1997 to 2015 (the air temperature had a tendency of constant growth). The year of 2014 was the warmest within the observed period with the average annual air temperature of 13 ºC.

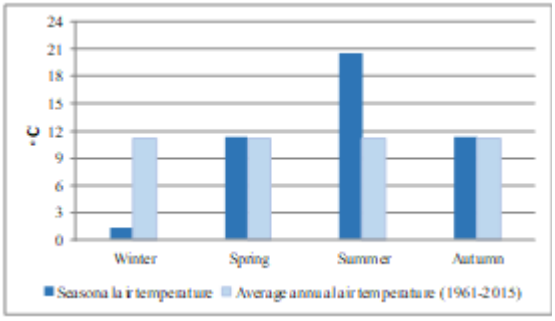

Figure 3. The average seasonal and annual air temperatures at the Banja Luka meteorological station

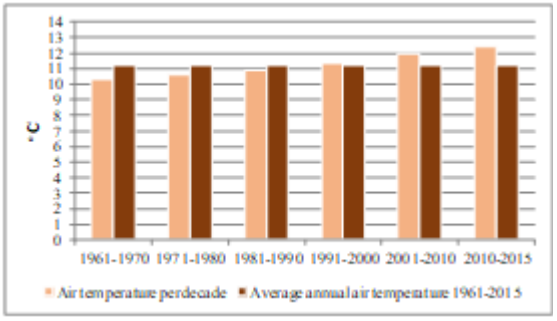

Figure 4. The average decade and annual air temperatures at the Banja Luka meteorological station

The analysis of seasonal air temperature found that the warmest month was July (21.4 ºC average), and the coldest one was January (0.2 ºC average). The seasonal average of 11.4 ºC made the spring slightly warmer than the autumn (11.3 ºC).

Figure 4 shows that there is a trend of the air temperature increase per decade and each decade is warmer than the previous one. In the last two decades, the recorded air temperature was 1 ºC higher than the multiannual average and in the first four decades, the recorded air temperature was 0.4 ºC lower than the multiannual average, during the observed period.

Figure 5 displays the timeline of average annual air temperature with differentiated trends for the whole observed period, during the periods 1961-1990 (referential sequence) and 1991-2015. There is an evident intensification of the trend for the last 55 years. The deviations from the average annual air temperature during period 1961-1990 are increasing. The period 1991-2015 was 1.2 ºC warmer than the "referential sequence" and 0.6 ºC warmer than the multiannual average.

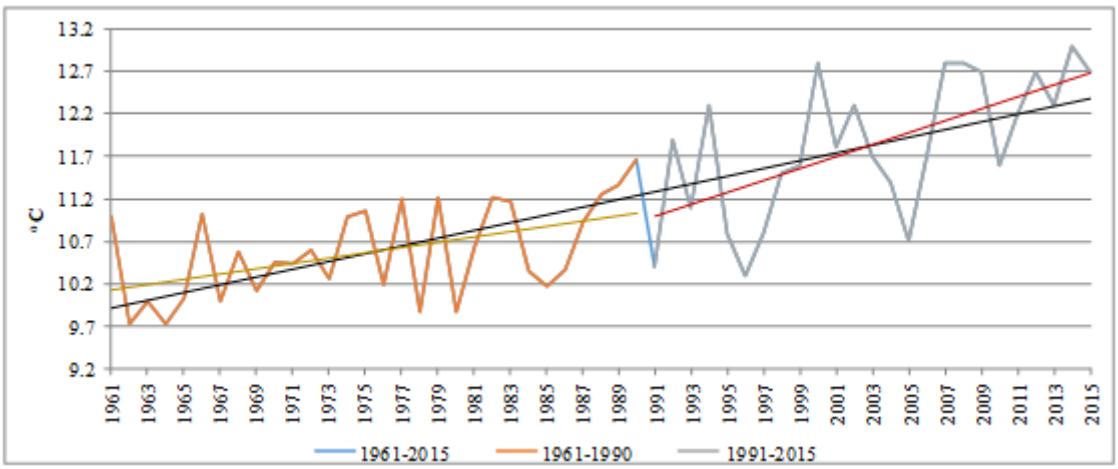

Figure 5. The air temperature deviation trends in specific periods

The analysis of precipitation fluctuations

The pluviometric regime of the Vrbanja River Basin is under a large impact of maritime air masses from the west (the Atlantic Ocean) and the south (the Mediterranean), and the orographic properties of the local area. The local impact is most evident in the summer when the pluviometric regime is affected by the local air depression accompanied by downpours. Studying precipitation fluctuations is one of the fundamental indicators of the water regime of the Vrbanja River and its tributaries.

A series of the moving average for the amount of precipitation calculated using the abovementioned formula is presented in Figure 6.

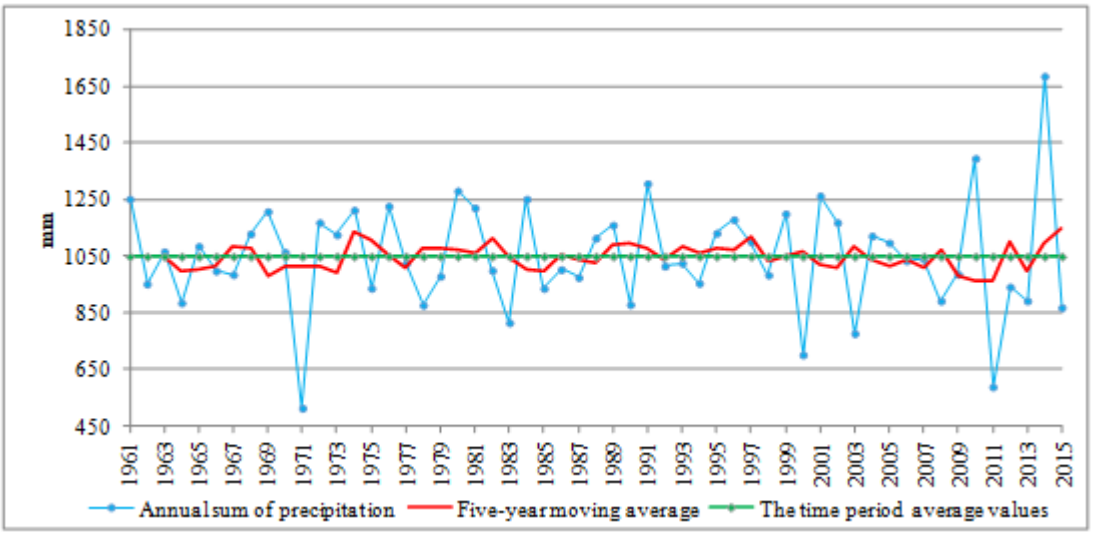

Figure 6. Fluctuations of the amount of precipitation at the Banja Luka meteorological station during the period 1961-2015.

The mean value of the sum of precipitation is 1049 mm, but there is an evident fluctuation of the multiannual average. The results show that the trend of the average amount of precipitation is negative with a tendency of decline (-4,33 mm per decade). The five-year moving average suggests that there are several different periods with intensive precipitation fluctuations. The first period lasted from 1961 to 1969 and the precipitation amount was around the multiannual average. The second period lasted from 1969 to 1974 and the precipitation amount was below the multiannual average. The third period lasted from 1974 to 1982 and the precipitation amount was slightly above the multiannual average. The precipitation amount was below the average during the fourth period (1982-1989). During the fifth period (1989-2000), the precipitation amount fluctuation was around the annual average. The sixth period (2000-2011) registered the trend of decline of the amount of precipitation. It was in this period that the two driest years were recorded (2003 and 2011). The latest fluctuation period started in 2011 and the precipitation fluctuation was evident. The amount of precipitation in 2014 (637,2 mm) was higher than the annual average, resulting in catastrophic floods with human losses and material damages

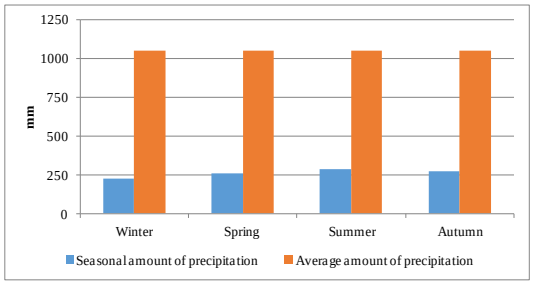

Figure 7. The average seasonal and annual amount of precipitation at the Banja Luka meteorological station

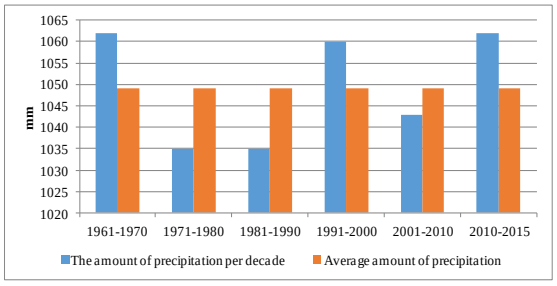

Figure 8. The average decade and annual amount of precipitation at the Banja Luka meteorological station

The analysis of the seasonal amount of precipitation suggested that June (107,4 mm) and May (94,4 mm) were the months with most rains. The autumn had the seasonal average of 276 mm, which made it more humid than the spring (260 mm). Figure 8 shows that the first and the last decades had the equal amounts of precipitation with most evident annual fluctuations.

The analysis of the water level fluctuations

The Vrbanja hydrological observation station has had reliable hydrological monitoring instruments since 1922. The period 1926-2019 was used for the purpose of analysis of water level and flow rate of the Vrbanja River. The methodology used for the studying of water level and flow rate matches the methodology used for the analysis of climate elements.

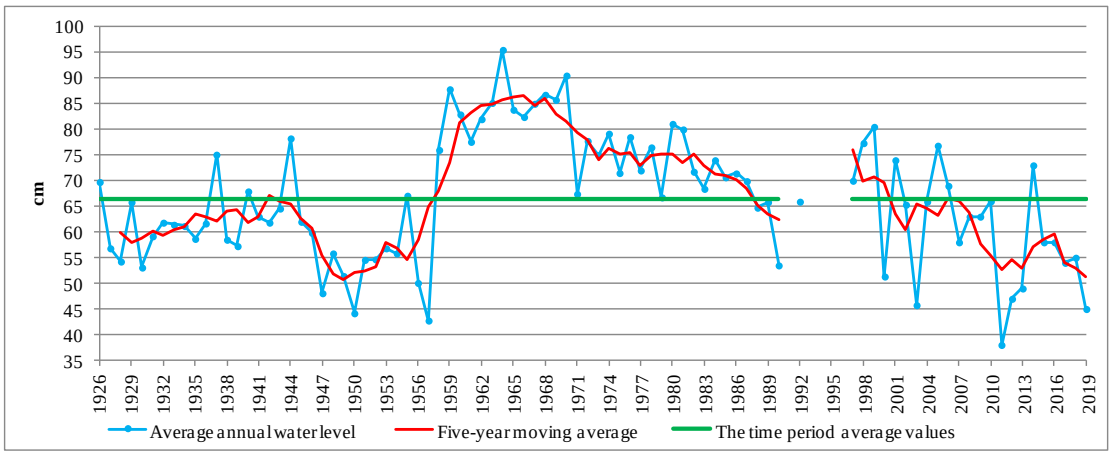

Figure 9. The fluctuations of water levels at the Vrbanja hydrological station during the period 1926-2019

Based on the aforementioned formula, the series of moving average of water levels is presented in Figure 9. The average water level during our target period was 66,28 cm. The highest water level was registered in May 2014 (592 cm), and the lowest water levels were registered in July, August, September and October. It was in April and May that the water levels were the highest. The average monthly precipitation values result from the cyclic downpours in May, June and July. In other words, the summer downpours cause the short-lasting high water levels. The high water level is also caused by the snow melting in the spring, especially in the Vlasic Mountain area.

The trend of the average annual water level is negative, with a tendency of decline (-0,75 cm per decade). The five-year moving average clearly shows that there are several different periods with pronounced water level fluctuations. The first period of the water level fluctuation lasted from 1926 to 1936 with the water level below the multiannual average. The second period lasted from 1936 to 1944 and the values were mostly below the average. The third period lasted from 1944 to 1957 with values far below the average. The fourth period lasted from 1957 to 1971 and the water level largely increased. The fifth period lasted from 1971 to 1991, when the water level had a tendency of decline but the values were above the average. Even though the period 1990-1997 was not monitored (except in 1992), there were indications of the declining water level. The sixth period of the water level fluctuation lasted from 1997 to 2005 and a tendency of decline was observed. It was in this period that one of the driest years occurred (2003). The last,

seventh period of water level fluctuations started in 2003 and is still pending. It was in 2011 that the lowest water level at the Vrbanja hydrological observation station was recorded (38 cm). The Vrbanja River and its tributaries are relatively small and the usage of their water stream potential is limited due to the fluctuations of the hydrological regime. During the dry periods, the Vrbanja River water level and flow rate are minimal, particularly in the upper and middle streams. During the intense recharge (snow melting and heavy rainfalls), the river stream turns into a torrent and is polluted by both mineral and organic materials.

The analysis of water flow rate fluctuations

The calculated series of the moving average for water flow rate is presented in Figure 10. The average flow rate during the observed period was 15,26 m3s. The trend of average annual flow rates was negative, with a tendency of decline (-3,08 m3s per decade).

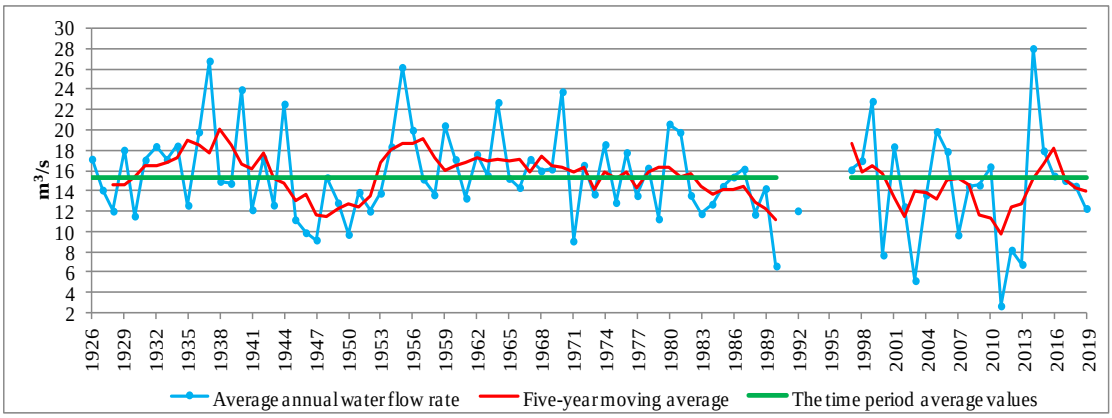

Figure 10. The water flow rate fluctuations at the Vrbanja hydrological observation station from 1926 to 2019

The five-year moving average clearly indicates that there were several different periods with pronounced flow rate fluctuations. The first period lasted from 1926 to 1936 with significant fluctuations in regard to multiannual average. The second period lasted from 1936 to 1950 and was characterized by great wateriness. The third period lasted from 1950 to 1970 and the significant fluctuations were mostly above the multiannual average. The fourth period lasted from 1970 to 1986, and the values were largely below the average. The fifth period lasted from 1986 to 1997, and the flow rates were low. The sixth period with pronounced fluctuations lasted from 1997 to 2005, and the flow rates were extremely low. It was during this period that one of the driest years was recorded (5.18 m3s flow rate). The latest, seventh period lasted from 2005 to 2019, and during this period the driest year ever was recorded (2011) with only 2.69 m3s flow rate. The last period is characterized by another extreme value: the highest flow rate ever recorded. It was registered in May 2014 and was 843.8 m3s.

The Pearson correlation coefficient found a statistically significant positive correlation between precipitation and flow rate (+0.633) and statistically poor correlation between air temperature and flow rate (-0.295).

Figure 11 displays a high correlation in regard to quantitative values of the average annual amount of precipitation and average annual flow rates.

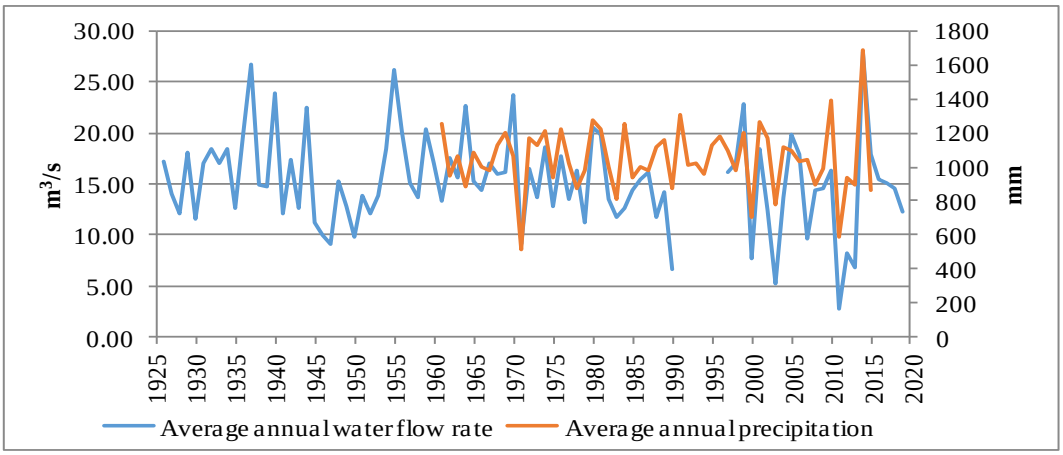

Figure 11. Ratio between precipitation and flow rates.

The causes of floods in the Vrbanja River Basin are long heavy rainfalls and sudden snow melting, very often combined. The distribution and volume of high water levels in the Vrbanja Basin essentially depend on the dry and watery periods. Table 1 shows the year ranking in line with wateriness according to data from the Vrbanja hydrological station during the period 1926 – 2019.

Table 1. Quantitative and percentage ratio of specific years per wateriness categories according to the records from the Vrbanja hydrological observation station from 1926 to 2019 (years without monitoring are not included)

Vrbanja hydrological station		
Rank	Number of years	%
Catastrophically dry	-	-
Very dry	2	2.3
Dry	9	10.2
Average wateriness	63	71.6
Watery	11	12.5
Very watery	3	3.4
Catastrophically watery	0	-
Total	88	100

Table 2. The year ranking in line with wateriness as recorded at the Vrbanja hydrological observation station from 1926 to 2019

Rank	/Discharge Qsr (m^3s)	Year
Catastrophically dry	< 2.69	-
Very dry	2.69-5.18	2011,2003
Dry	5.18-9.90	1990,2013,2000,2012,1971,1947,2007,1950,1946
Average wateriness	9.90-18.59	1974,1934,1932,2001,1954,1929,2015,2006,1976,1962, 1942,1926,1967,1933,1960,1931,1998,1972,2010,1978,1 9871969,1997,1968,1963,20116,1986,1948,1965,1957, 2017,1938,1939,2009,2018,1985,2008,1966,1989,1927, 1951,1953,1973,1958,2004,1982,1977,1961,1975,1949, 1984,1943,1935,2002,019,1941,1992,1928,1952,1983, 1930,1979,1945
Watery	18.59-24.00	1940,1970,1999,1964,1944,1980,1959,1956,2005,1936, 1981
Very watery	24.00-28.05	1955,1937,2014
Catastrophically watery	> 28.05	-

CONCLUSION

The paper analyzed recent changes in air temperature and precipitation as well as their impact on the flow rate and water level fluctuations in the Vrbanja River Basin. In order to annul the variation of the annual values for the analyzed parameters, five-year values were taken into account. Accordingly, different time frames (ranging from 4 to 27 years), within which a complete fluctuation occurred, may be singled out for each of the analyzed parameters.

The average annual air temperature trend is positive with a tendency of growth (0.46 ^{o}C per decade). Specific air temperature fluctuations are evident and this trend has intensified over the last 55 years. The seasonal air temperature analysis showed that the warmest month was July (21.4 ^{o}C in average) and the coldest one was January (0.2 ^{o}C). The average seasonal air temperature value of 11.4 ^{o}C makes the spring slightly warmer than the autumn (11.3 ^{o}C).

The precipitation regime has been changing quickly. There are long dry periods on one side and intensive precipitation causing floods on the other side. Furthermore, extreme events and records in regard to other climate parameters have been more pronounced.

Our results show that the trend of changes in the average amount of precipitation is negative, with a tendency of decline (-4.33 mm per decade).

Recent climate change has greatly affected the water level and flow rate in the Vrbanja River Basin. The trend of changes in the average annual water level is negative with a tendency of decline (-0.75 cm per decade). The highest water level was registered in May 2014 (592 cm) during catastrophic local floods. It was in 2011 that the lowest water level was measured (only 38cm). The Vrbanja River and its tributaries are relatively small rivers and the exploitation of the water stream is limited due to changes in hydrological regime. The years 2003 and 2011 were most affected by drought during the analyzed period.

The trend of changes in the average annual water flow during the analyzed period is negative, with a tendency of decline (-3.08 m^3s per decade). The highest water flow rate was registered in May 2014 (843.8 m^3s).

The causes of high water levels and flooding in the Vrbanja watershed are long, heavy rainfalls and sudden snow melting, especially when they combine. There is a strong negative correlation between the water flow and air temperature during a whole year (with a short exception in the winter), but the correlation between the water flow and precipitation is significant and positive.

The Pearson correlation coefficient measured a statistically significant positive correlation between precipitation and water flow (+0.633) and a statistically insignificant negative correlation between air temperature and water flow (-0.295).

The distribution and volume of water in the Vrbanja River Basin largely depend on dry and watery periods. Speaking of ranking years in line with wateriness, 71.6 % of the analyzed years are of the average wateriness.

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SECTION

SOCIO-ECONOMIC GEOGRAPHY

GEOTHERMAL RESOURCES: NEW INSIGHTS FOR SPA TOURISM IN NORTH MACEDONIA

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ABSTRACT

Geothermal energy resources have been used several thousand years ago for many purposes, but mainly for health and wellness treatments. Many hot springs have come and gone over time, yet many are still unrevealed and unused. The aim of the paper is to put some insights into new and less-known geothermal locations dispersed over the territory of North Macedonia, along with their potential for developing new spa tourism resorts. Based on a content analysis of various documents related to geothermal energy, the research applied the expert's judgment and proposed a map presenting new geothermal resources. As such, new potential for more extended spa tourism occurs, which may be successfully implemented for developing modern and attractive tourist locations. Finally, the paper suggests many recommendations for better understanding the complexity of the power that geothermal energy has, but only if been adequately implemented in planning the spa tourism development.

Keywords: Geothermal energy, Tourism development, Spa, Balneotherapy.

INTRODUCTION

Water and Energy are the two main subjects that define the existence, survival, and development of humanity. Wherever is water, there is life, and wherever is water and energy, life expands. Thus, water and energy are always considered key preconditions for life.

Thermal and mineral waters are a special category of groundwater being used several thousand years ago for drinking, bathing, healing, therapy, or religious purposes. Even from the pre-history, people have believed in the curative powers of the water springs in the places in which they naturally occur [11]. Today, both, thermal and mineral waters are used mostly for balneology, water bottling industry, and for geothermal energy, contributing significantly to economic development. Due to fact that this kind of water is heated from the embedded heat within the Earth, they are treated as sources of geothermal energy. It is a fact that many hot springs have come and gone over time, yet many are still unrevealed and unused. As such, they may become new sources for supporting economic development.

Archaeological findings show that mineral and thermal waters have been used for bathing since the Bronze Age (about 12,000–3,000 years BC) [11]. The location of human settlements in the vicinity of hot springs took place in many areas in the world and many periods of human history, mostly because humanity has associated certain mineral and thermal water springs with divine powers of healing. Ancient Greeks developed the school of physiotherapy and balneology based upon geothermal waters and herbs. They

are also the authors of the popular maxim “health from water.” Romans took over this motto, which is currently known as “SPA” – Salud per aquam in Latin comes from the abbreviation for S = Salud, P = per, A = aqua, or “Health through Water.” In Germany, they refer to the “Kur”, which does not mean just a cure, but instead is a series of treatments over time including baths, taking (drinking) water, massage, exercise, mud baths, etc. [7].

Geothermal energy as the primary energy source can be utilized in various ways such as district heating, food production in green-houses, drying agricultural products, etc. This research focuses on using geothermal energy as a resource for thermal and mineral waters for recreational and therapeutic purposes. More precisely, the paper adds to the current state of the art on the positive effects of geothermal energy resources for tourism development, especially spa tourism development. In this line, the study highlights some new and less-known geothermal locations in North Macedonia with excellent potential for developing new balneotherapy and wellness facilities as tourism resorts [4].

The introduction is followed by a background material on geothermal energy and geothermal waters in general, along with some stylized facts for geothermal waters in North Macedonia as a study area. The next section presents the applied methodology, followed by a discussion and conclusion. The study contributes to the current literature on spa tourism and geothermal resources in North Macedonia as already previously discussed [1; 5]

BACKGROUND MATERIAL

Geothermal energy and geothermal waters

Water is a transparent fluid which forms all water-based objects on the Earth such as oceans, rivers, lakes, ice caps, streams, and rains that are essential for life on our planet. About 71% of the Earth’s surface is covered with water, of which about 97% is stored as salt water in oceans, leaving only 2,5% as freshwater stored in glaciers and ice caps, groundwater, and soil moisture. It is almost unbelievable that of such a huge amount of water present on Earth, only a very small percentage (~1%) is available for humans as freshwater for drinking and other purposes like heating, cooling, industry, tourism, and recreation [11] (Figure 1).

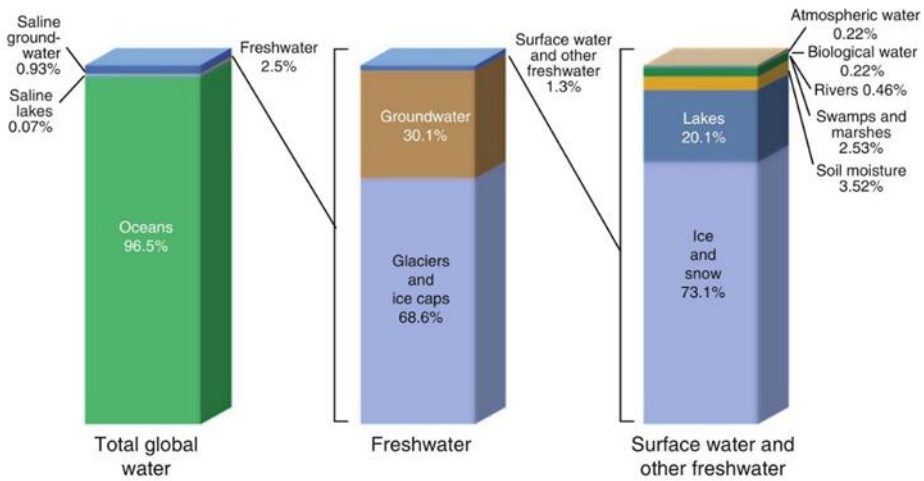

Figure 1: Distribution of Earth’s water
Source: [11].

Speaking of energy, the Sun is the main energy source on Earth, either in its primary form as solar energy, or in its secondary forms as stored energy in the forms of nuclear, chemical, or fossil fuels. Recently, the so-called renewable energy resources such as solar, wind, ocean, biothermal, or geothermal energy gradually replaced the conventional energy resources of fossil type such as coal, naphtha, or natural gas.
Geothermal energy comes deeply hidden from the Earth, and its presence on the surface is quite scattered and uneven. It is sometimes in a form of warm or even hot water streams, steam sources, and sometimes a mixture of steam and water in a form of geysers. Going deeper into the Earth's crust, the temperature of the soil rises resulting in hotter geothermal water reservoirs that could be technically brought up to the earth's surface and further utilized as energy sources (Figure 2).

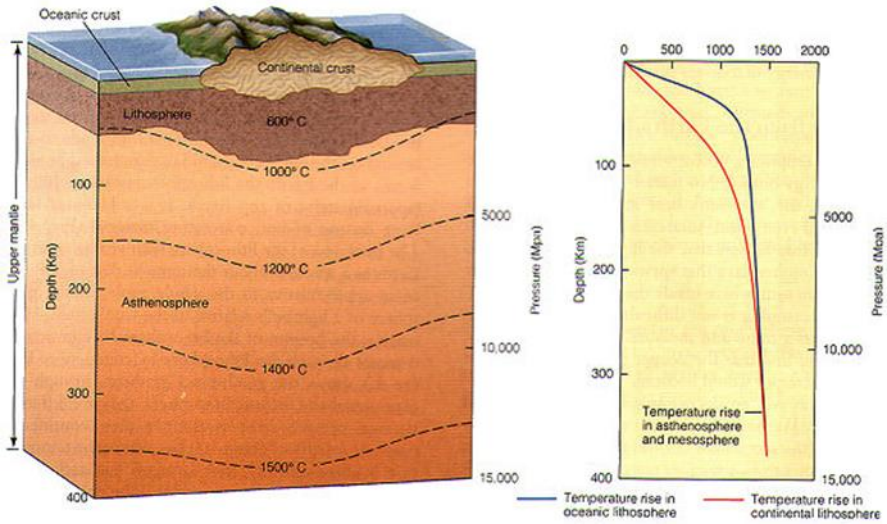

Figure 2: Geothermal temperature gradient
Source: [6].

Initially, only two basic ways of formation and heating of thermal waters are possible: the juvenile (primal or volcanic) and vascular (constantly renewed meteoric or rainwater) [13]. Yet today the origin of thermal and thermo-mineral waters expands and based on the origin, five types of thermal waters are distinguished [16]: juvenile (volcanic), conical (fossil), quarters (young), vascular (wade of water), and mixed waters. Accordingly, their main characteristics, in general, depending on the depth from which they originate, the temperature, the content of minerals, gases, and micro components, related to the physiotherapeutic effect on the body, and the content of physiological groups of bacteria (indigenous microflora).

Study area: North Macedonia

The utilization of (geo)thermal waters in the territory of North Macedonia traces its origin from Roman times. Several locations with thermal waters, mostly in the eastern and northeastern parts of North Macedonia (Figure 3) were well-known and utilized in that period for health treatment of roman soldiers, recreation, and fun for the upper-class Roman citizens. Some locations were continually used as thermal and mineral water facilities for centuries, being famous when North Macedonia was part of the former Yugoslavia (end of 19th and whole 20th century) [9].

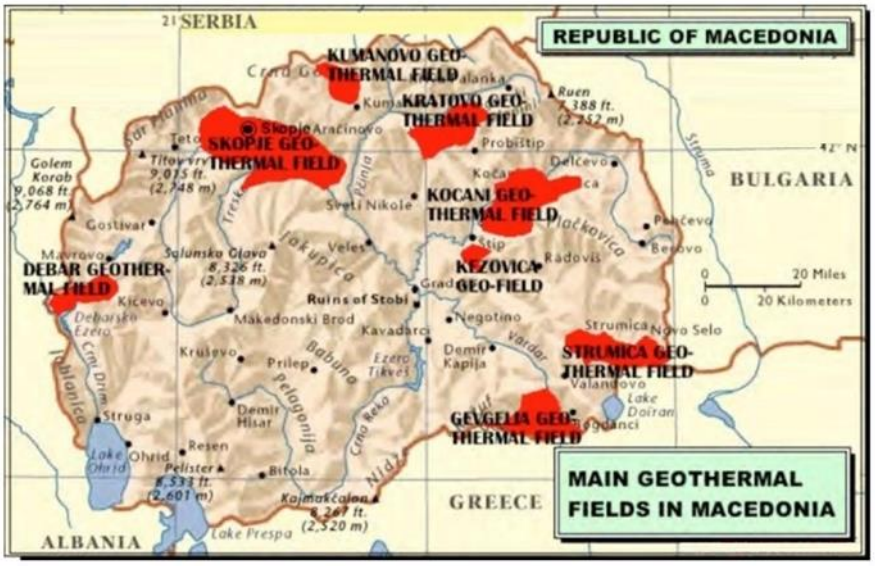

Figure 3: Spatial distribution of major geothermal fields in North Macedonia
Source: [14].

The territory of North Macedonia belongs to the Alpine-Himalayan zone, with subzones without any modern volcanic activity. So far, seven geothermal fields are active with eight spa centers (Table 1). Their spring capacity spreads between 4-100 l/sec with a temperature range between 31-75ºC. The geothermal waters of these fields have a hydrocarbon nature, given their dominant anionic and mixed chemical structure with the equal presence of sodium, calcium, and magnesium. Due to the low temperature of the geothermal waters, their geothermal energy is barely used as a renewable source of energy in the country. For five years from 2001 till 2006, the use of geothermal energy declined from 21 ktoe per year to only 9 ktoe in 2006. According to the Energy Balance for 2015-2019, geothermal energy participated with 2.36% in the national energy balance of renewable energy sources [12]. Thus, of all eight geothermal fields presented in Fig. 3, only the Kočani and partially Gevgelija geothermal fields are currently used as a heat source for the local green-house facilities, apart from modest spa and balneotherapy tourism.

Table 1. Active geothermal locations in North Macedonia

No.	Spa/Geothermal field	Spring	Temp.	Heat Capacity (MWt) (for a different temperature of the thermal water)						
		l/sec	°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C
1	Bansko/Strumica	50	70	11.5	10.5	9.4	8.4	7.3	6.3	5.2
2	Debar Spa/Debar	100	40	10.5	8.4	6.3	4.2	2.1	–	–
3	Katlanovo/Skopje	13	50	1.9	1.6	1.4	1.1	0.8	0.5	0.2
4	Kežovica/Štip	20	60	3.8	3.4	2.9	2.5	2.1	1.4	1.3
5	Kočani Spa/Kočani	300	75	75.4	69.1	62.8	56.5	50.2	44.0	37.7
6	Kosovrasti/Debar	60	48	8.3	7.0	5.8	4.5	3.3	2.0	0.7
7	Kumanovo Spa/Kumanovo	4	31	0.3	0.2	0.1	–	–	–	–
8	Negoska Spa/Gevgelija	80	50	11.7	10.1	5.4	6.7	5.0	3.4	1.7

Source: Modified upon [3, 4] and authors' content analysis

As one can see from Table 1, this low percentage of utilization of geothermal source for electrical energy generation mostly depends on two factors, the lower temperature of the geothermal water which results in poor economic justification, and the needs for

significant investments for deep drilling to achieve geothermal resources with sufficiently high temperature applicable for electricity generation (Table 2). Drilling to such depths needs advanced technology and large investments, resulting in a high price for the generated electricity which could be economically not acceptable for the customers. Considering these relatively low temperatures of geothermal and thermo-mineral waters, they should predominantly be used for balneological purposes by combining the natural-mineral and thermal spring water for treatment and cure of disease.

Table 2. Geothermal energy potential along river Vardar according to the drilling depths

No.	Drilling Depth (km)	Expected temperature (°C)	River Vardar Zone Area = 8680 km^2 10^{21} [J]
1	0 - 3	176	10.4
2	3 - 5	290	12.0
3	5 - 7	406	17.0
4	7 - 10	580	36.9
TOTAL:			76.3

Source: [2].

The principal minerals found in most mineral waters in the Macedonian geothermal fields are sodium, magnesium, calcium, and iron, in combination with the acids to form chlorides, sulfates, sulfides, and carbonates. Other substances occasionally present in sufficient quantity to exert a therapeutic influence are arsenic, lithium, potassium, manganese, bromine, iodine, and some radioactive materials, mostly radium, radon, and uranium [16]. Their different combinations determine possibilities for healing specific diseases or a combination of diseases by using different therapies.

Historically speaking, spa and balneotherapy tourism were relatively well developed in North Macedonia as a part of the former Yugoslavia. In the late 1980s, spa tourism in the country was at the same level as that of the other spa tourism resorts in the former Yugoslavia, such as Prolom, Soko, and Vrnjacka Banja in Serbia, Istrian and Tuhelj Toplice in Croatia or Chatež and Roman Toplice in Slovenia. However, after the dissolution of the former Yugoslavia, North Macedonia as the least developed, had no chance to keep the quality of its spa resorts, so they were left behind with investments and guests. The problem was further enhanced with the wars in the former Yugoslavia during the entire 1990s, thus leaving Macedonian spas without foreign guests and tourists. In that period, Macedonian spa resorts were used only as medical therapeutic facilities for domestic patients. As a result, from that period until today, only a few of them managed to work as spa tourism resorts in a more-or-less acceptable condition. So, Debar Spa, Katlanovska Spa, Kežovica Spa, Bansko Spa, and Negorska Spa are used mostly for medical therapeutic purposes and domestic patients. Most of them have undertaken just minor reconstructions and construction improvements in the furniture design and lodging. Yet, no modern spa and recreation units, indoor and outdoor pools, gym or fitness facilities, massage centers, and additional supplement units are added.

In general, in the last three decades, North Macedonia experienced a period of stagnation of geothermal development and utilization of geothermal energy. This was mostly due to a lack of investments and disputable ownership rights of the geothermal resources. As a result, during that period the use of geothermal energy declined significantly. In the same period, the spa resorts in other Yugoslavian republics, especially Croatia and Slovenia, and in the neighboring countries such as Bulgaria (Bansko, Velingrad, Pavlov Spa, etc.) experienced huge development and gradually became famous and well-established

recreation centers attracting guests from the entire Balkan and wider. According to [8], the hotels with extensive spa facilities on average bring between 23-27% increase in the income per occupied room than the hotels with no spa facility. These figures show that resort spas are not only revenue generators, but also solid contributors to resorts' bottom line, besides other intangible benefits such as creating repeat business, increasing guest satisfaction, and influencing guests' future recreational preferences. Resort/hotel spas possess competitive and operational advantages over stand-alone spas both from a revenue and expense perspective. Hence, available geothermal source should not be treated only as medical therapeutical location, but as viable and profitable tourism and revenue bringing resource.

However, to achieve this and to come to the point that North Macedonian spa resorts could be revenue bringing resources, new potential geothermal sources are investigated along with the fact that the current ones need a large scale of renovation and reconstruction. Having in mind that in 2019, 90% of registered tourists that visit current spas were domestic with an average duration of stay of 8.7 days [12], some substantial increase of revenues can neither be expected nor achieved. This confirms the fact that presently spas in North Macedonia are used only for medical treatments, thus missing the opportunity to develop as complex wellness centers.

METHODOLOGY, DATA AND RESULTS

The study is based on qualitative data obtained by secondary sources. An in-depth review is made of relevant literature addressing the issue of geothermal resources and their usage in tourism development. During the desk research analysis, the focus was on the following research questions (RQ):

RQ1: Which are the new geothermal resources?

RQ2: What is the geothermal energy potential of the less-known geothermal locations dispersed over the territory of North Macedonia?

RQ3: Which measures to recommend for developing new spa tourism resorts in North Macedonia?

Based on the content analysis of various documents with a study area of North Macedonia, the study proposes less-known geothermal fields and geothermal locations (Table 3), which are visually presented in Figure 4

DISCUSSION AND CONCLUSION

Regarding the tourism industry, the biochemical and physical properties of the geothermal and mineral waters are very important. Thus, the minerology of the (geo)thermal waters has crucial value, besides the water temperature, to define their quality and suitability for medical and balneological use. High-quality mineral waters, when analyzed, should contain many chemical substances, although, some of them occur only in very minor quantities.

The most common utilization of thermal and mineral waters is in the specially designed and programed bathtubs under adequate medical control or the open or closed water pools, for swimming or simply relaxation and medical treatments. They are oriented toward the thermal treatment of the whole human body by absorption of the minerals through the body skin, on one side, or for rehabilitation treatments and re-mobilization of moving parts of the human body and skeleton.

The second way to use the thermal and mineral waters is by drinking. Therapeutically, drinking mineral water provides a washing out of the human intestines, which on one side temporary increase in certain body fluids excretions, augmented diuresis, and sweat, and on the other side, warm water is better absorbed by the stomach resulting in higher therapeutic action to the human body than cold water.

The research revealed that spa tourism in North Macedonia may be extended with the new potential that less-known geothermal locations offer. Figure 4 presents a map with visual presentation of 13 newly selected geothermal locations in North Macedonia, based on the experts' judgment of the authors.

Figure 4: Less-known geothermal locations in North Macedonia
Source: Modified upon [15: p. 6]

Based on Figure 4, it is visible that the newly identified geothermal locations are dispersed only on one half of territory of North Macedonia, mainly covering the Skopje region, eastern, central and south part. One geothermal field is very near Skopje (Volkovo No. 13 in Fig. 4), one is near Tetovo (Baniče No. 1 in Fig. 4), one is 40 km from Skopje in Staro Nagoričane (Strnovec No. 10 in Fig. 4), one is in the central part of the country in Veles (Sabota Voda No. 8 in Fig. 4), four are in the eastern part (Dobrevo in Zletovo No. 2, Istibanja in Vinica No. 5, Zdravevci in Kratovo No. 6, and Rakliš in Radoviš, No. 7 in Fig. 4), and the rest of five geothermal locations are dispersed mainly in the south part (Drvoš-Baldovci in Strumica No. 3, Gorničet in Gevgelija, No. 4, Smokvica in Gevgelija No. 9, Toplec in Dojran No. 11, and Topli dol & Mrežičko-R'žanovo near Kavadarci No. 12 in Fig. 4).

Table 3 presents the energy potential of 13 newly identified less-known geothermal locations/fields in North Macedonia. They are of quarters (young) meteoric origin with a spring capacity spreading between 2-120 l/sec and temperature between 24-120ºC. Although the temperatures of the geothermal waters are too low to be considered for electricity generation, the existing geothermal resources have huge potential as thermal heating resources in the agriculture industry for greenhouse heating and agriculture products drying, and in the tourism industry as balneological treatment facilities, and spa and wellness resorts.

Table 3: Energy potential of less-known geothermal locations/fields in North Macedonia

Num	Geothermal location/field	Spring Capa	Temperature	Heat Capacity (MWt) (for a different temperature of the thermal water)						
		l/sec	°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C
1	Baniče – river Pena/Tetovo	10	27-30	–	–	–	–	–	–	–
2	Dobrevo/Zletovo	8	28	0.4	0.3	0.1	–	–	–	–
3	Drvoš-Baldovci/Strumica	5	29	–	–	–	–	–	–	–
4	Gorničet/Gevgelija	5	24	–	–	–	–	–	–	–
5	Istibanja/Vinica	73	65	15.3	13.8	12.2	10.7	9.2	7.8	6.1
6	Zdravevci/Kratovo	20	20-50	2.8	2.4	1.9	1.5	1.1	0.7	0.3
7	Rakliš/Radoviš	2-3	27	0.1	–	–	–	–	–	–
8	Sabota Voda/Veles	3,5-4	90-120	–	–	–	–	–	–	–
9	Smokvica/Gevgelija	120	65	25.1	22.6	20.1	17.6	15.1	12.6	10.0
10	Strnovec/Staro Nagoričane	14,4	39	4.9	3.9	2.9	1.9	1.0	–	–
11	Toplec/Dojran	–	40	–	–	–	–	–	–	–
12	Topli dol & Mrežičko- R'žanovo/ Kavadarci	2	27	0.1	–	–	–	–	–	–
13	Volkovo/Skopje	20	25	0.8	0.4	–	–	–	–	–

Source: Modified upon [3, 4] and authors' content analysis

With financial support and capital investments, modern and attractive spa complexes may be developed. A way out may be detected in foreign investments or public-private partnerships. Having in mind the therapeutic benefit of balneology, the marginalized locations with geothermal potential may gain an added value. As such, besides the "basic spa tourism product" derived from the balneology treatment, a new dimension may be added. Namely, the new spa centers would be in less known locations in North Macedonia (like Vinica (Istibanja), Radoviš (Rakleš), or Zletovo (Dobrevo)), which are rural areas with ambient full of positive energy and good vibrations. This may put a focus on a "new spa tourism product" based on nature and pure environment that may result in a comprehensive satisfaction of tourists and visitors. Regardless of the perception and the image while experiencing individual leisure and recreational tourism services, the health issue is always a top priority.

Furthermore, the paper highlights the less-known geothermal locations which are dispersed over the territory of North Macedonia and draws attention to how to exploit their geothermal potential for developing new spa tourism resorts. Based upon secondary sources, the study adds to the literature on the issue of spa tourism development. It was found that North Macedonia is rich in thermal and thermo-mineral waters with potential for spa tourism development, which currently is at a low level of utilization due to the lack of investments.

Finally, the paper urges tourism policymakers to create new insights and tailor new strategic approaches to increase the number of visits and nights spent in current spas in North Macedonia, but also to promote new balneotherapy and wellness destinations.

Besides balneology as the main applicative form, some further utilization may be included thus supporting local, but also regional economic development. This may include greenhouse heating, plastic houses heating, flower cultivating, fish cultivating, cultivation of medical plants, drying of agricultural products and tobacco, district heating, preparation of sanitary warm water, etc. In cases with a high temperature of the water

sufficient for technical feasibility, power generation may be applicable as well. So, the geothermal resources are a solid base for initiating substantial projects for supporting and enhancing the modest economic development of North Macedonia.

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MODELLING THE EXTENT OF SUSTAINABILITY OF TOURISM DESTINATIONS IN SERBIA

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ABSTRACT

There are different aspects of perceptions of tourism sustainability. Yet, studies are limited in putting the focus on policy enablers' perception. In this line, the policymakers represent those who contribute to manage and control tourism destination development. The aim of the paper is to identify the level of sustainability of tourism destinations in Serbia from a policy perspective (such as governmental bodies, contributors to management strategies, tourist organizations, etc.). By identifying the main tourism impacts from the three-pillar sustainability dimension, the research determines destinations' operating sustainability. Based on a multi-staged methodology, data was collected by using a qualitative method (expert's judgment and content analysis of the existing strategic tourism development documents) and a quantitative method (219 half-structured deep interviews). A model is proposed that posts directions for systematic organization of policymakers to infer conclusions on the current state of well-being of tourism destinations. Such model enables thorough assessment of the progress of sustainability, thus initiating strategic tourism development reforms.

Keywords: Tourism, Sustainability, Policy approach, Perception.

INTRODUCTION

Sustainable development as a concept firstly emerged with concerns related to protection of natural environment [41, 43], and later expanded to socio-economic issues [39, 42]. As such, the concept reflected in a "triple pillar" context understood as a principle to meet human development goals and to sustain natural systems to supply the natural resources while achieving social, environmental, and economic progress [23, 47].

With regards to tourism sustainability, it is a concept vastly debated, but with a consensus that understanding the principles of sustainability is the most essential for sustaining tourism development [18, 31, 33]. So, it encompasses socio-cultural, environmental, and economic tourism impacts as three theoretical pillars. Due to numerous impacts tourism has on destinations, it is important to understanding stakeholders' perception (local communities, tourists, operators, and regulators). By understanding tourism sustainability from different perspectives may assist in minimizing the negative and maximizing the positive tourism effects. Only if all tourism segments unify and work together, sustainability may be achieved [19, 44].

There has been a long debate on tourism sustainability with various discussion on different aspects. Regardless the interpretations, it is concluded that sustainability means a concept that incorporates social, ecological, and economic aspects, with a main concern on their optimization. In this line, United Nations' Agenda 2030 foresees meeting 17 sustainable development goals [38] and understanding principles of sustainability [18, 32, 33].

Some aspects of sustainability have been elaborated long time ago, like the tourism demand aspect as a one-site measurement in terms of controlling sustainability [8, 24], the macro and micro approaches when addressing sustainability of tourism resources [15], even the issues of the inter-generational in favor of intra-generational equity as an essential prerequisite of sustainable tourism [5, 45].

Furthermore, various concepts are argued, and numerous theories are utilized, from the mostly employed Social exchange theory [1], Tourist area life cycle [7], and Irridex model [12], to the new ones, like: Stakeholders theory, which has been extensively debated [9, 10, 16, 25, 46], Dependency theory [20], Place attachment theory [17], Resistance theory [11], and many more [27]. Additionally, many studies include policy enablers' perception [13, 30, 32, 34]. On the other hand, there are negative examples where investments have not sustained and gained sustainability [39, 40].

The paper follows previous findings of the mainstream sustainability pillars to identify tourism impacts, by assessing tourism destinations' operating sustainability from a policy perspective. In this line, the policymakers are those who manage and control tourism destination's development, as tourist organizations, governmental agencies, management bodies, etc. A model is suggested as a framework for strategic tourism development reforms, and it is applied on the case of Serbia. The model posts directions for policymakers to assess the current state of well-being of tourism destinations as well as to direct and monitor policies towards sustainable development.

After the introduction, some stylized facts on Serbia as a study area are presented. The next section presents the applied methodology, followed by discussion and conclusion. The study contributes to the literature review on tourism sustainability in Serbia as already previously discussed [30].

STUDY AREA

The research is applied on Serbia (Figure 1) as a country that practices tourism despite many limitations for prosperous development, as lack of finances and limited investments in tourism, low GDP, etc. Some studies have applied the stakeholders' theory on tourism in Serbia [2, 13], but this research adds by quantifying Serbia's operating sustainability of tourism destination.

Although Serbia has recognized tourism as a priority developmental area with very important task towards the European Union integration [28], there is a shortage of precise priority actions needed to make it more sustainable [22]. The National Tourism Organization is responsible for tourism promotion at the national level and three regional tourism organizations (Vojvodina, West Serbia and Sandžak) at regional level. Furthermore, there are over 130 local tourism organizations at municipal level, over 300 tourist agencies, about 200 hotels and restaurants, and almost 200 licensed tour guides [30].

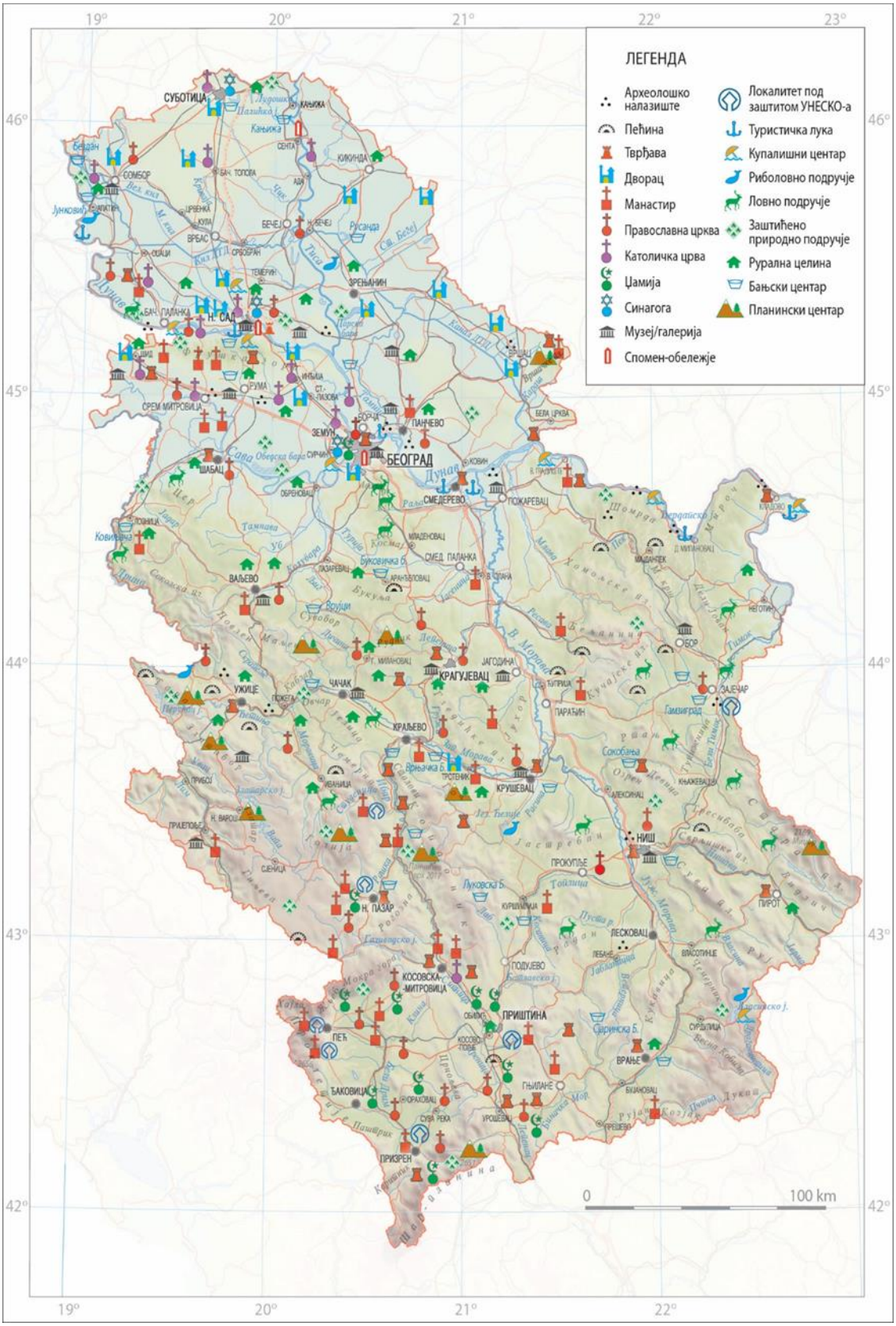

Figure 1. Tourism map of Serbia
Source: [4], author: Milovan Milivojević

The overall sustainability framework is defined within the National Strategy on Sustainable Development [28] and the Strategy of Tourism Development 2016-2025 [29]. Although the concept foresees a balance between the main sustainability pillars (socio-cultural, environmental, and economic), yet, the accent is on issues related to the proper use of natural resources. Additionally, many regional plans, tourism destination master plans, municipal development plans and so forth, further address development of tourism destinations in Serbia. Despite the presence of many documents related to the issue of sustainability, a profound lack of inter-sectoral coordination is noted [22] and a dialog to develop commonly desirable policies [6, 36].

METHODOLOGY

The study applies a multi-stage methodology to understand policy enablers' perception on the operating sustainability of tourism destinations in Serbia.

In the first stage, a qualitative method was applied, when data was collected by expert's judgment and content analysis of the existing strategic tourism development documents [35]. The goal was to identify if the core sustainability issues were properly addressed by the policymakers, and the frequency referenced by the interviewees from the second stage. The main secondary sources were the National Strategy on Sustainable Development [28], the Strategy of Tourism Development [29], regional development plans, tourism destinations' master plans, and municipal tourism development plans.

In the second stage, a quantitative method was applied. Moreover, 219 half-structured deep interviews were conducted during the International Belgrade Tourism Fair in February 2018. Very often, fairs are used in research as gathering point with high frequency [3, 21]. The respondents came from 79 municipalities, covering about 60% of all local tourism organizations in Serbia.

Table 1. Summarized structure of the interview protocol

Section	Aim
Introduction	Explaining the research aim.
Perception	Gathering data (full notes) on 12 sustainable indicators to assess policy enablers' perception on socio-cultural, environmental and economic impacts
Enablers' policy and challenges	Gathering data (full notes) on necessity of reform of tourism development in the destination
Interviewee data*	Gathering demographic and socio-economic data, as well as data on policy level and type of organization

Note:
*The sample consisted of:
- Tourism policy organizations: local 79%, regional 8.4%, national 10.9%, and international 1.7%. -
- Working position: managers 35.3%, and employees 64.7%.
- Type of organization: public 85.6%, and private 14.4%.
- Working at: research centers and universities 4.2%, municipal institutions such as tourist organizations and offices 66.4%, hotels and other establishments 15.1%, and cultural and other associations 14.3%.
- Gender: male 35.6%, and female 64.4%.
- Age: between 36-60 years old 49.2%, 18-45 years 46.6%, and older than 60 years 4.2%.
- Education: university 87.3%, and 12.7% high school.

Besides the three main researchers, additional six students were engaged, forming three groups (a senior and two students) holding an interview between 15-20 min. in the local language. To avoid overlapping of respondents, each group marked the interviewees on a spread-shit and exchange it among each other. The interviews were guided by an

interview protocol, consisting of open-ended questions allowing free discussion with minimum intervention (Table 1). Full notes were taken for a qualitative evaluation on a broad spectrum of policy issues to determine respondents' perspectives on reform challenges of current tourism development. Additionally, respondents were asked to add if any omitted, but relevant aspect of tourism policy reform. Based on the expert's judgment, findings are summarized, and conclusion is done. Beside qualitative perception, respondents gave quantitative evaluation on the three sustainability pillars on the five-point Likert Scale.

Based on the exploratory factor analysis, a structural equation modelling was performed. It presents the relationship between the factors on tourism sustainability impacts in Serbian tourism destinations.

RESULTS

Upon the rate of respondents' level of agreement with sustainability indicators, critical factors affecting operating sustainability of tourism destinations in Serbia are identified (Table 2). The factor analysis is appropriate since the overall Cronbach's alpha (0.83) is much above the suggested limit of 0.6 [26], the Kaiser-Meyer-Olkin value (0.634) is a mediocre [14], and the Bartlett's test ($p < 0.05$) is significant.

Table 2. Tourism sustainability factors of tourism destinations in Serbia.

No	Factor	Item	Loading
1	Socio-cultural environment	- Social equity - Authenticity of the destination - Cultural richness	0.744
2	Services	- Transport services - Communal services	0.807
3	Environmental impacts	- Natural resources - Local community involvement in environmental protection	0.882
4	Economic impacts	- Economic viability - Employment quality - Local prosperity	0.832
5	Policy enablers	- Monitoring sustainability of tourist destination - Managing sustainability of tourist destination	0.900

Note: Extraction method: principal axis factoring. Rotation method: promax with Kaiser normalization

The relationships between the factors of Table 2 are presented in Figure 2. The model has a good fit, since the $\chi 2$ (111.2) is significant, $\chi 2/df$ (2.47) has a value lower than 5, the CFI (0.929) and the IFI (0.931) are above 0.9, the RMSEA (0.063) is slightly over 0.05, and the SRMR (0.552) is well below 0.8. As such, all fit indices are above the cut-points. The model enables direct links with other factors towards policy enablers. Yet, some issues need additional clarification since some relations in the Figure 1 may be easily misinterpreted. It is noticeable that the largest impact has the factor services (transport and communal). It is very likely to expect positive economic effects of transport and communal services, which is not the case.

Herein, the negative correlation is explained by respondents' distribution where substantial number express neutral perceptions on employment quality assessment, vis-à-vis the largest number of negative impressions concerning the local prosperity issues. This is completely understandable, since as the negative perception on environmental

impact grows, the bigger is the influence on the policy enablers to create development policy for preserving and protecting the environment from tourism impacts. The same is the issue with the correlations related to the policy enablers. Namely, there are mostly neutral statements on monitoring and managing sustainability levels, and 38.3% and 38.9% of negative assessment when evaluating monitoring process and the management aspect of sustainability at destinations, respectively. The lowest is the influence of the independent variable socio-cultural environment, even though for foreign tourists, culture development and cultural events are often the most important motives for visiting tourism destination

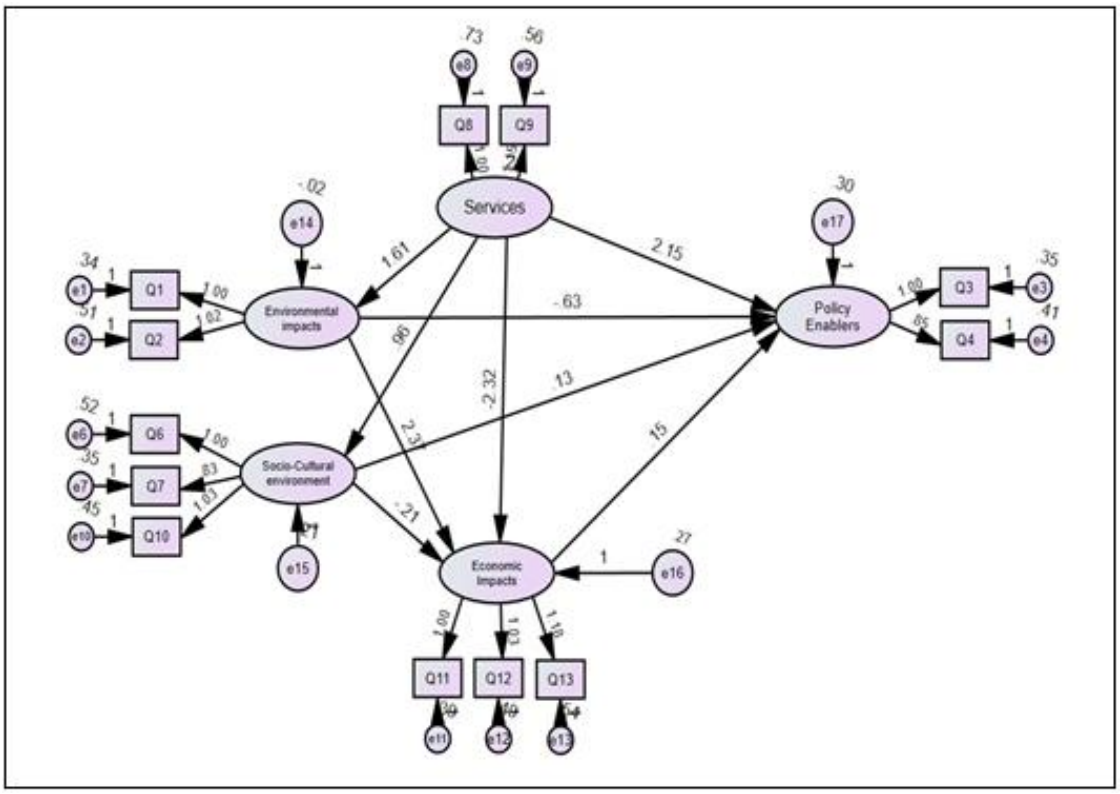

Figure 2. Structural equation model
Source: Authors

DISCUSSION

Based on collected qualitative data and the content analysis of current strategic tourism development documents, along with the expert's judgment, the research found convergences and divergences with respondents' perception. As similarity, it was found the same general perception that tourism in Serbia offers numerous benefits for tourism destinations and consequently should be positively acknowledged. Similarity was also found in the expressions of distress when monitoring tourism product quality.

On the other hand, differences were also noted. The study found that tourism development documents address the broad concerns with no care to achieve sustainability. As such they lack enhancing the local opportunities for the future, which is substantial element of sustainability. This is the main concern of interviewed policymakers.

Furthermore, when assessing tourism factors that affect operating sustainability of Serbian tourism destinations, the study found that the socio-cultural impacts are perceived as the most beneficial by the policy enablers. More precisely, authenticity and uniqueness

of destination are the most relevant for sustainable development. As such, Serbia should be focused on the cultural values which are found to mediate environmental and economic perceptions at a destination level.

Strangely, but the environmental factor was identified with a medium impact. So, the ecological setting in terms of physical integrity, diversity, resource efficiency and the environmental purity, was found to be very sensitive. According to policy enablers, this provokes a need to raise the environmental issue at a higher developmental level to be properly addressed.

Even though economic sustainability in terms of employment, viability and local prosperity is important for tourism destinations, for Serbia, is in the phase of supporting development of infrastructure, product design, and marketing. So, the core concept of wellbeing is missing.

Additionally, the study found that policy makers are seriously concerned with the process of planning sustainable tourism development and urge the need for re-shaping the current strategic tourism documents. An accent is put on responsible controlling and a lack of coordination at all levels of policymaking, particularly in terms of consolidation of different development goals and tourism plans. With no cooperative attitude and marginalized role of the local community, sustainability in tourism development is missed. As such, the main sustainability aspects (socio-cultural, environmental, and economic) despite being extremely relevant for tourism destinations' development, are not operating at optimum level.

CONCLUSION

The study investigated policymakers' perception on the main tourism challenges and shortcomings when addressing the issue of sustainability of Serbian tourism destinations. A model is proposed that posts directions for systematic organization of policymakers to infer conclusions on the current state of well-being of tourism destinations. Such model enables thorough assessment of the progress of sustainability, thus initiating strategic tourism development reforms. The research revealed that policymakers are focused on maintaining several elements of the environmental quality of tourism destinations (as authenticity and ambient), which might be effective only on short-term, unlike sustainability which is a long-term concept. There is a need to re-shift the perception from just ecological concern into much complex issue with a three-dimensional concern. The way out in enhancing current modest tourism sustainable development is detected in re-shaping the strategies into effective ones along with improvements and solid changes in the policy context for embracing the sustainability. At the standing point, tourism destinations in Serbia are rather managed in a maintainable than in a sustainable manner

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THE IMPACT OF THE COVID-19 PANDEMIC ON TOURISM

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ABSTRACT

Specific challenges for overall tourism industry were evident during the SARS outbreak, mainly due to the fact that majority of tourists cancelled or postponed their travels. Accordingly, previous research indicated that understanding the impact of unexpected crises and risks is essential for tourism recovery. The fact that COVID-19 is prone to global expansion increased the fear of travelling, which additionally supported the previously mentioned claim. Uncertainty on whether or not the crisis is over, and whether or not it will repeat anywhere in the world, could affect tourists' and managers' perception of the virus as a serious threat. This research will analyse changes in tourism trends, on global as well as national and local levels in Serbia. Also, through conversations with various stakeholders, their perceptions of the impact of the pandemic on tourism will be determined. The research results will support and provide findings needed for managerial actions aimed at tourism recovery and adjustment to this unique situation.

Keywords: COVID-19, tourism, world, Serbia, Croatia.

INTRODUCTION

In terms of the economy, tourism became one of the world's most growing and dynamic sectors during the previous decades. Importance of this sector is evident, mainly according to the fact that it represents a significant trigger for creating the new job positions, especially for women and young members of the society, as well as for encouraging the economic development and promoting the local culture and products [1]. On the other hand, it is also important to indicate that tourism is a sensitive economic branch, affected by various global crises throughout the recent historical events (Table 1).

Table 1: Tourism and the global crisis - Summary of indicators on the previous crises

Crisis Year	Sept 11th attacks 2001	SARS 2003	Global econ. crisis 2009
World arrivals (% change)	+0.1%	-0.4%	-4.0%
Month o (zero)	Sept. 2001	March 2003	Jan. 2009
N. of months for growth recovery	5	5	10
N. of months for returning to the previous volumes	14	11	19
World receipts (real change, %)	-2.0%	-1.7%	-5.4%
Most impacted region	**Americas**	**Asia Pacific**	**Europe**
Region's arrivals (% change)	**-5.9%**	**-9.4%**	**-5.3%**
N. of months for growth recovery	12	7	14
N. of months for returning to the previous volumes	42	14	29
Region's receipts (real change, %)	-11.1%	-8.1%	-6.7%

Source: [2]

However, neither one of the previously mentioned crisis did not cause such a strong impact on tourism as the last one – COVID-19 pandemic, which suddenly caused a total collapse in this sector, with still unpredictable effects and consequences on the global health, social and economic issues (Figure 1 and 2).

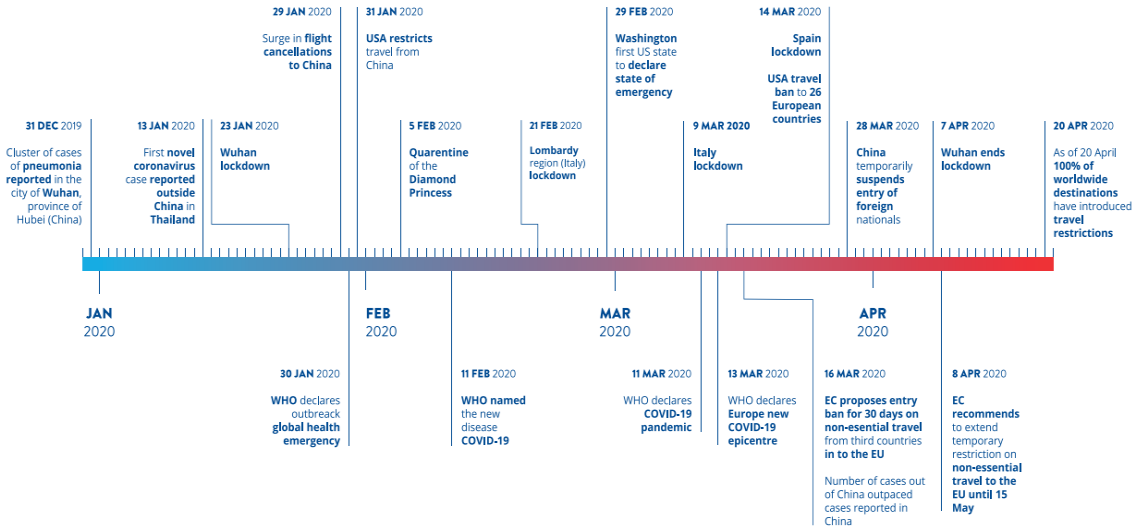


Figure 1: Timeline of important events during the COVID-19 pandemic
Source: [2]

Different organizations, operating in the field of tourism and hospitality, reopened their business units, after needful closure (between March and June 2020). However, reopened business units had to implement a set of health and sanitary measures, that often required changes in terms of allowed number of people in the same place at the same time, cleaning and disinfection measures of public and private areas more often during a day, prohibition of self-service in areas with food, as well as measures related to a mandatory wearing of masks for both, employees on the one hand, and tourists on the other [3]. Immediately became clear that such measures will be required as long as the virus is active (Graph 1).

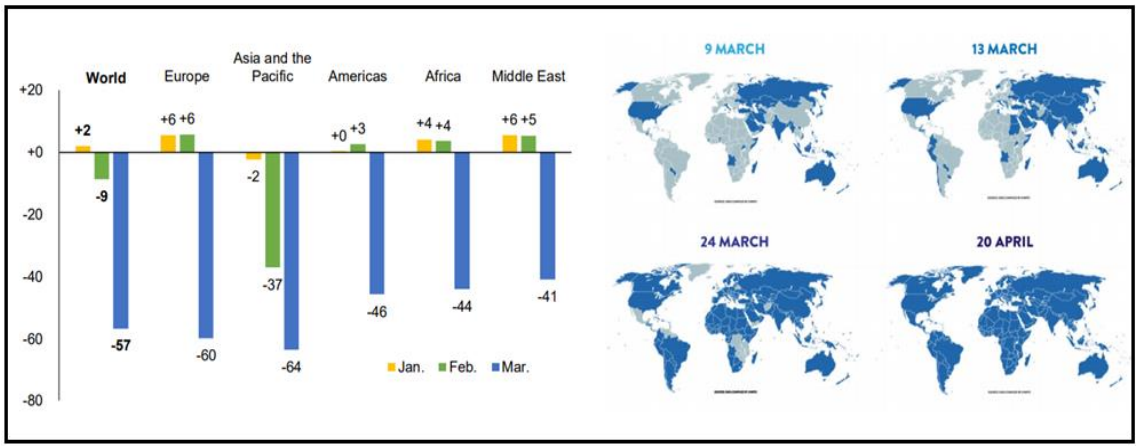
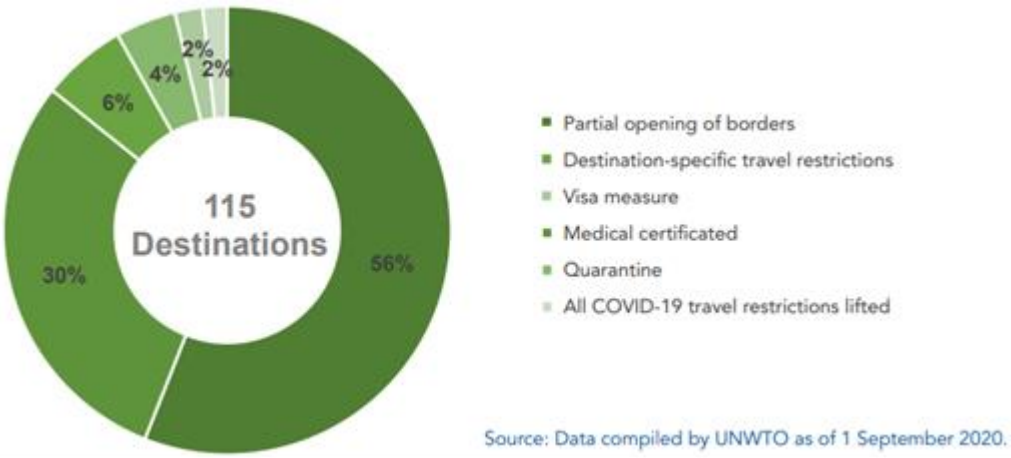


Figure 2: Changes in international tourist arrivals in March 2020 (represented in percentages) – left; Travel restrictions evaluation – right. Source: [2]

Since April 2020, 115 of worldwide destinations responded to the global crisis situation, by introducing the travel restrictions (Figure 1 and 2):

- 97 destinations out of the total 115 destinations worldwide, totally or partially closed their borders for tourists;
- 30% of destinations, which represent 65 destinations out of the total sample, totally or partially suspended their openness to international flights;
- 18% of the worldwide destinations, 39 destinations out of the total sample, implemented the closure of borders for tourists from concrete countries [2].



Graph 1: Type of the travel restrictions during the COVID-19 pandemic Source: [4]

UNWTO indicated that COVID-19 pandemic caused unprecedented health, social and economic emergency condition in global terms. Tourism sector represents one of the most affected sectors, as evidenced by a recorded decrease in international arrivals, as well as by implemented travel restrictions worldwide, which returned indicators of performances for this sector, back to the levels recorded even 30 years ago [5]. Indicators of financial losses in tourism pointed to the fact that international tourism arrivals during the 2020 decreased for almost 1 billion arrivals, while international tourism receipts decreased for 1.1 trillion USD. On the other hand, global GDP, decreased for 2 trillion of USD, which is more than 2% of the global GDP recorded in 2019. It is expected that implementation of the vaccine will progressively lead to returning the travelers' confidence, as well to reduction of established travel restrictions [5], [6].

In a short time, several studies have been conducted on the impact of the pandemic on tourism around the globe [7], [8], [9], [10], [11], [12], [3], [13], [14], [15]. However, it is important to indicate that Spain was in focus of several researches, according to pronounced negative indicators of COVID-19 statistics [13], [14], [16]. Having in mind that numerous countries and regions were also affected, it is important to investigate the possible differences in wide range of other countries. In respect to that, this paper will be focused on researching the impact of the COVID-19 pandemic on tourists' arrivals around the world, as well as on a particular example of tourism in Serbia.

METHODOLOGY

With the purpose of analyzing the impact of the COVID-19 pandemic on global and Serbian tourism market, quantitative and qualitative analysis methods were used in order to evaluate a different kind of data. Structured or semi-structured texts were obtained from the following sources: official documents, websites, survey, interviews.

Our first step was to analyze the changes in demand, in terms of tourism arrivals around the globe (in total and by regions), in Europe, in Croatia, as well as in Serbia, in 2020. Croatia was taken as a case study, because it is a neighbouring country of Serbia, while, at the same time, it represents a country with highly developed tourism. The basic process of data collecting was based on official data (World Tourism Organization, International Labor Organization, Organization for Economic Cooperation and Development, Ministry of Tourism and Sport of the Republic of Croatia, Croatian Bureau of Statistics, Statistical Office of the Republic of Serbia, Ministry of Trade, Tourism, and Telecommunications of Serbia).

Second stage of the research puts a focus on the local people in Serbia in order to investigate their intention to travel or to cancel a previously planned trip. For this purpose, data were collected by a survey research. The research was conducted during the main tourism season in the time of the COVID-19 pandemic crisis 2020 and in the year of preparation of the European Capital of Culture – Novi Sad 2021. Data were gathered from the sample of 142 Tourism and Hospitality management students of the Faculty of Science, University of Novi Sad (Republic of Serbia). However, sixteen participants were excluded because they had more than 5% of missing data, which means that 126 respondents completely filled out the questionnaire. They were both genders, with 60.3% of females and 39.7% of males, aged between 18 and 22 years. It is also important to indicate that Novi Sad was declared the Youth Capital in 2019 and majority of the respondents were involved in accompanied voluntarily activities. Numerous events and other activities that were planned upon the both titles were postponed, canceled, or even realized in the other form.

Data were collected by a questionnaire designed for the purpose of this research. The questionnaire was conducted on students in their classrooms on several occasions during the period from June to October of 2020. Students were previously informed on research objectives and asked to fill out the questionnaire during ten minutes of their class time. The research was anonymous and the respondents were informed on the fact that research results will be used in scientific purpose only.

This construct was measured by the questionnaire UPlanP (Dragin, Majstorović & Janičić, 2020) with 15 initial items (Table 2) and Likert's type rating scale, ranging from 1 to 5, with following meaning: 1 – "There were no activities related to planning the travel", 2 – "I have booked a trip", 3 – "I canceled the reservation", 4 – "I booked a trip again (new)", 5 – "I have canceled each trip".

Table 2: Intention to travel or not: Timeline of important events during the COVID-19 pandemic (critical points for making a travel decision)

Before the first registered case of the corona virus in China
The first case of the corona virus was registered in China
The first case of the corona virus was registered outside the China's borders
The first case of the corona virus was registered in Europe
The first case of the corona virus was registered in Italy
Lockdown in Italy (Lombardy Region)
The first case of the corona virus was registered in Serbia
Number of the corona virus cases increased in Serbia
The first case of the corona virus was registered in my place of living
Quarantine measures have been implemented in Serbia due to the COVID-19 spreading
Number of the corona virus cases decreased in Serbia
Quarantine measures in Serbia have been canceled
Encouraging information might be found in media, e.g. that the virus is weakening due to the favorable weather conditions, as well as due to its mutation
Media published the information regarding the fact that number of infected people is growing again
I found better prices for travel arrangements due to the COVID-19 pandemic

UPlanP by Dragin, Majstorović and Janičić, 2020

During the first phase of the research, three hypotheses were determined:
H1: Number of the travel reservations increased in the later stages of the COVID-19 pandemic, comparing to the starting phase, when the first case of the corona virus was registered in China.
H2: Number of the travel cancelations sharply decreased in the later stages of the COVID-19 pandemic, comparing to the phase when the first case of the corona virus was registered in Serbia.
H3: Publishing of the encouraging information in media, e.g. that the virus is weakening additionally increased the number of travel reservation.
The third stage of the research concerned managers employed in tourism sector in Serbia. For this purpose, interviews were conducted from September 2020 to February 2021. Questions for the interview were also designed for the purpose of this research. The sample included employees from 130 different type organizations that are operating in tourism sector in Serbia, including 15 cities, 5 rural settlements and 4 mountain centers. Total sample gathered employees from 69 travel agencies, 39 accommodation establishments (hotel, motel etc.), 10 museums/galleries and 12 local tourism organizations as well.
The following questions were asked:

- Whether the COVID-19 pandemic affected tourism in your local area?
- Whether the number of tourist arrivals in your business unit has changed due to the COVID-19 pandemic?
- Did you take certain measures to motivate tourists to visit your business unit during the COVID-19 pandemic?
- Are some services/facilities now perceived as more attractive for tourists during their last visit, comparing to their perception of the same services/facilities before the COVID-19 pandemic?
- Did you notice changes in the behavior of tourists who have visited your business unit during the COVID-19 pandemic, comparing to their behavior before the COVID-19 pandemic?
- How should your local community prepare the business activities for the next tourist season?

- In your opinion, what would be the most effective measures of your business unit for the next tourist season due to the COVID-19 pandemic?

RESULTS

UNWTO lunched a tool called Tourism Recovery Tracker. This Tracker indicated results that are not encouraging at all. Comparing to the same month of the previous year in the world / Europe, data indicated the following results

- Short-term rentals (December): -7% / -8%,
- Occupancy rates (December): -14% / -20%,
- Hotel booking (January): -54% / -54%,
- Hotel searchers (January): - 55% / -55%,
- Seat capacity - domestic (December): -61% / -63%,
- Seat capacity - International (December): -73% / -73%,
- International tourist arrivals (December): -74% / -71%,
- Actual air reservations (January): -90% / -93% [6].

Table 3: International tourism arrivals in 2020 (comparing to the same month of the previous year)

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
Africa	0	-1	-36	-90	-90	-91	-89	-85	-84	-83	-82	-80	-70
North Africa	4	3	-57	-97	-99	-98	-93	-89	-88	-90	-91	-85	-78
Sub-Saharan Africa	-1	-4	-26	-86	-85	-85	-84	-83	-82	-79	-78	-78	-64
Americas	0	3	-50	-94	-93	-92	-88	-97	-83	-80	-78	-71	-69
Caribbean	-6	-2	-58	-99	-98	-93	-80	-81	-81	-77	-76	-70	-67
Central America	-3	7	-55	-97	-99	-99	-99	-99	-99	-97	-92	-87	-74
North America	4	4	-45	-91	-90	-90	-87	-86	-79	-76	-72	-64	-67
South America	-5	-3	-59	-99	-100	-99	-98	-98	-98	-95	-95	-91	-73
Asia and Pacific	-9	-54	-82	-98	-99	-98	-95	-95	-96	-96	-95	-95	-84
North-East Asia	-19	-80	-94	-99	-99	-98	-97	-96	-94	-93	-93	-93	-88
Oceania	6	-20	-60	-99	-99	-99	-99	-99	-98	-98	-98	-99	-79
South Asia	-15	-26	-73	-99	-99	-95	-75	-75	-95	-97	-93	-92	-77
South-East Asia	2	-37	-71	-95	-95	-98	-98	-98	-98	-98	-98	-98	-82
Europe	5	2	-61	-98	-96	-88	-71	-67	-72	-77	-87	-85	-71
Central/East Europe	-1	-5	-44	-98	-97	-91	-77	-77	-79	-81	-83	-80	-72
Northern Europe	5	4	-57	-97	-96	-93	-83	-79	-82	-84	-91	-93	-75
Southern/Med. Eur.	6	1	-69	-97	-96	-89	-73	-66	-69	-73	-86	-83	-72
Western Europe	8	6	-64	-98	-96	-83	-60	-58	-67	-79	-91	-88	-67
Middle East	6	-1	-68	-99	-99	-99	-94	-93	-91	-88	-87	-90	-76
Middle East	6	-1	-68	-99	-99	-99	-94	-93	-91	-88	-87	-90	-76
World	-1	-16	-64	-97	-96	-91	-80	-77	-79	-83	-88	-85	-74

Sources: [6]

Destinations that are mainly focused on international tourism, especially those oriented towards business and events as the main aspects of their selective types of tourism, were mainly affected, while situation in destinations that are located in coastal and rural areas,

for example, showed better results, comparing to the city destinations [17]. It is important to indicate that several large are a seven showed some signs of recovery in the last few months [5] (Table 3 and 4).

Expectations related to tourism recovery are indicating to the fact that domestic tourism will faster gain better results, comparing to the international tourism [1]. In that manner, domestic tourism will continue to grow in several large markets, including China and Russia, where domestic air travel demands even returned to the levels registered before the occurrence of the COVID-19 pandemic [5]. However, recovery of domestic tourism in other (smaller) markets could not be considered as a compensation for a decrease in international demand [5].

Table 4: International tourism arrivals in 2020 (comparing to the same month of the previous year). Top 10 destinations, world and Serbia

Destinations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
China	-18	-92	-94	-99	-98	-97	-94	-92	-91	-92	-91		-89
France													
Germany	2	1	-71	-97	-95	-83	-62	-60	-63	-77	-92		-69
Italy	4	-8	-83	-90	-84	-72	-55	-45	-47	-66			-63
Mexico	9	12	-34	-79	-74	-75	-67	-62	-40	-44	-46		-52
Spain	-1	1	-64	-100	-100	-98	-75	-76	-87	-87	-90		-78
Thailand	2	-43	-76	-100	-100	-100	-100	-100	-100	-100	-100	-100	-83
Turkey	16	4	-68	-99	-99	-96	-86	-71	-59	-59	-61		-73
UK	7	6	-54	-97	-96	-95							-82
USA	0	-1	-49	-96	-96	-95	-93	-91	-91	-89	85		-77
World	-1	-16	-64	-97	-96	-91	-80	-77	-79	-83	-88	-85	-74
Serbia	28	19	-58	-96	-94	-85	-85	-84	-76	-66	-68	-76	-68
Croatia	6	5	-77	-100	-96	-73	-48	-48	-78	-83	-78	-83	-64

Sources: [6], [18], [19]

Analysis of official data pointed out that tourist arrivals in Croatia suddenly decreased in 2020, as a consequence of the COVID-19 pandemic (Tables 4 and 5). Comparing to 2019, data showed the following results:

- The most affected months were April and May [1] (Table 4), the same as around the globe (Table 3 and 4). Equal situation is with overnight stays.
- Decrease in tourist arrivals in Croatia in 2020 (Table 5): 55.3% (23.7% of domestic, 58.0% of foreign tourists);
- Decrease in tourist overnight stays in Croatia in 2020 (Table 5): 64.2% (34.2% of domestic, 68.0% of foreign tourists

[1] The first case of the COVID-19 in Croatia was registered on February 25, 2020 [20].

Table 5: Tourists arrivals and overnight stays: domestic and foreign - annual data

Year	Tourists arrivals						Participation in the total number of arrivals in Croatia (in %)	
	Total	**Index***	**Domestic**	**Index***	**Foreign**	**Index***	**Domestic**	**Foreign**
2016	15,463,160	107,8	1,748,590	105,3	13,714,570	108,1	11.3	88.7
2017	17,430,580	112,7	1,837,681	105,1	15.592,899	113,7	10.5	89.5
2018	18,666,000	107,1	2,021,000	110,0	16,645,000	106,7	10.8	89.2
2019	19,566,146	104,8	2,212,658	109,5	17,353,488	104,3	11.3	88.7
2020	7,001,128	35,8	1,455,849	65,8	5,545,279	32,0	20.8	79.2
Year	**Tourists overnight stays**						**Participation in the total number of overnight stays in Croatia (in %)**	
	Total	**Index***	**Domestic**	**Index***	**Foreign**	**Index***	**Domestic**	**Foreign**
2016	77,918,855	108.8	5,819,465	101.3	72,099,390	109.5	7.5	92.5
2017	86,200,261	110.6	5,978,264	102.7	80,221,997	111.3	6.9	93.1
2018	89,651,000	104.0	6,476,000	108.3	83,175,000	103.7	7.2	92.8
2019	91,242,931	101.8	7,095,300	109.6	84,147,631	101.2	7.8	92.2
2020	40,794,455	44.7	5,415,391	76.3	35,379,064	42.0	13.3	86.7

indices (2019=100)
Source: [19]

The average length of tourist stay in Croatia in 2020 was 5.83 days (domestic: 3.72, foreign: 6.28 days). In the year before 2019, the average length of stay of tourists in Croatia was smaller, 4.7. In the last five years (since 2015) the number of tourist arrivals and tourist overnight stays were the lowest in 2020, but the average length of tourist stay in 2020 was the longest. The COVID-19 pandemic had a negative impact on the number of tourist arrivals and overnight stays, but tourists who decided to travel stayed longer in the destination. All counties in Croatia recorded significantly decrease in the number of tourist arrivals and overnight stays. The most significant decrease was recorded in coastal counties because these counties recorded the biggest number of arrivals and overnight stays before the COVID-19 pandemic. Because of that, the COVID-19 pandemic had the most negative impact on the coastal counties (Dubrovačko-Neretvanska County achieved 79.66% less of tourist arrivals, Istarska County 61.26%, Zadarska county 54.35%, Primorsko-Goranska County 55.38%). City of Zagreb County, where the capital of Croatia is situated, achieved 76.45% less of tourist arrivals, so it might be assumed that tourists preferred destinations in the nature that have smaller number of tourists because of the COVID-19 pandemic [19].

Official data further pointed out that tourist arrivals in Serbia also decreased suddenly in 2020, as a consequence of the COVID-19 pandemic (Tables 4 and 6). Compared to 2019, Statistical Office of the Republic of Serbia showed the following results:

- The most affected months were April and May [2] (Table 6), the same as around the globe (Table 3 and 4). Equal situation is with overnight stays.
- Decrease in tourist arrivals in Serbia (Table 6): 50.7% (25.4% of domestic, 75.9% of foreign tourists);

[2] The first case of the COVID-19 in Serbia was registered on March 6, 2020 [22].

- Decrease in tourist overnight stays in Serbia (Table 6): 38.4% (18.6% of domestic, 68.5% of foreign tourists) [21].

Table 6: Tourists arrivals and overnight stays: domestic and foreign - annual data.

Year	Tourists arrivals						Participation in the total number of arrivals in Serbia (in %)	
	Total	**Index***	**Domestic**	**Index***	**Foreign**	**Index***	**Domestic**	**Foreign**
2016	2,753,591	113.0	1,472,165	112.8	1,281,426	113.2	53.5	46.5
2017	3,085,866	112.1	1,588,693	107.9	1,497,173	116.8	51.5	48.5
2018	3,430,522	111.2	1,720,008	108.3	1,710,514	114.2	50.1	49.9
2019	3,689,983	107.6	1,843,432	107.2	1,846,551	108.0	49.9	50.1
2020	1,820,021	49.3	1,374,310	74.6	445,711	24.1	**75.5**	**24.5**
Year	**Tourists overnight stays**						**Participation in the total number of overnight stays in Serbia (in %)**	
	Total	**Index***	**Domestic**	**Index***	**Foreign**	**Index***	**Domestic**	**Foreign**
2016	7,533,739	113.3	4,794,741	113.0	2,738,998	113.7	63.6	36.4
2017	8,325,144	110.5	5,150,017	107.4	3,175,127	115.9	61.9	38.1
2018	9,336,103	112.1	5,678,235	110.3	3,657,868	115.2	60.8	39.2
2019	10,073,299	107.9	6,062,921	106.8	4,010,378	109.6	60.2	39.8
2020	6,201,290	61.6	4,936,732	81.4	1,264,558	31.5	79.6	**20.4**

*indices (2010=100)

The average length of tourist's stay in Serbia in 2020 was 3.41 days (domestic: 3.60, foreign: 2.84 days). In the years before, the average length of stay of tourists in Serbia was less than 2.8 days [21]. The reason for that might be found in the forms of tourism, i.e. types of tourist destinations that became the leading ones in 2020 due to the COVID-19 pandemic. The specificity of the pandemic put in the foreground the stay of tourists in a non-urban environment, so that vacation in rural households, combined with various forms of active stay in nature, was the dominant choice of domestic guests. Thus, the smallest decrease in the number of tourist arrivals in Serbia in 2020 was recorded within spa and mountain tourist destinations for both, domestic and foreign tourists. Observed by the total number of tourist arrivals, as well as in relation to 2019, in spa destinations there was a decrease of 22% in 2020, while recorded decrease in the mountain destination was 17.8% [21]. Also, in 2020 several spa places recorded over the 100% of the total tourist arrivals of the previous year. This was the case with Banja Vrdnik, Sokobanja and Ribarska Banja. Some mountains recorded over 100% of the total tourist arrivals of the previous year as well: Stara planina and Divčibare.

In Belgrade, the capital city of Serbia, number of tourist arrivals in 2020 represents only 26% of the turnover in the previous year, while this indicator amounts 34.7% for Novi Sad [21]. It can be assumed that people preferred staying in nature, where they still feel safer in changed conditions, caused by the pandemic. In this regard, it must be added that quarantine measures were strongly implemented in Serbia during April and May 2020 and that people were eager to take some outdoors activities.

During the summer, new conditions abroad, such as lockdown and restrictive measures for entering the other countries, led to development of domestic tourism. In August 2020,

there were 25.3% more arrivals of domestic guests in Serbia, comparing to August 2019, while in September there were 8.9% more domestic guests comparing to the previous September. Similar situation is repeated during the winter season 2020 [21]. For 2021, it is already evident that a large number of people from Serbia will rather choose shorter and weekend trips in the country. Thus, during the first 1.5 months of 2021, all 100,000 planned vouchers for subsidized vacations in Serbia were distributed for this year [23], [24].

Intentions of the local people in Serbia to travel during the COVID/19 pandemic

In order to provide more information regarding the tendencies in the intention of Serbian population to travel in 2020, the survey research was conducted. For the purpose of this research, critical points, or more precisely the important events during the COVID-19 pandemic, were defined, as part of the timeline. The research results suggest the following. Before the occurrence of the COVID-19 pandemic in China, majority of the respondents still did not have plans for their travelling (58.5%). Similar situation was recorded upon sharing the information regarding the fact that people in China are infected by the COVID-19 virus, as well as on spreading the virus out of the borders of China (55.5%). Percentage of the respondents who did not have plans for their travelling slightly decreased in the following period, or more precisely during the period when the virus occurred in Europe (49.3%), Italy (49.3%) and Serbia (46.4%).

On the other hand, number of people who indicated that they already made a reservation of the travel significantly decreased chronologically. More precisely, the highest percentage of those who already made a reservation of their travel was recorded before the occurrence of the COVID-19 pandemic in China (26.8%), as well as upon sharing the information on infected people in China (27.1%). After that and upon spread of the virus to countries that are territorially closer, percentage of the respondents that already made a reservation of the travel significantly decreased, especially upon its occurrence in Serbia (7.2%).

Actions, such as cancellation of reservations, significantly increased in line with chronological development of the virus spreading, from 4.9% of such actions before the occurrence of the CORONA-19 virus in China, to 18.1% upon the occurrence of the virus in Serbia. Besides concrete reservations, the research results also indicated that there is an increase in the number of people who cancelled each of their planned trips. Recorded percentage of the respondents who undertook this action increased from 7% before the occurrence of the virus in China to even 27.2%, when the quarantine measures were implemented in Serbia. It is important to indicate that number of respondents who even made a new reservation increased from the period of occurrence of the virus in line with its spreading, from 2.8% before its occurrence in China to even 11% upon its occurrence in Italy. Percentage of such actions was slightly lower upon its occurrence in Serbia, but still higher, comparing to the first phases of the pandemic, mainly on the basis of the fact that respondents made reservations for spending their holidays in Serbia.

Respondents who made their new reservation after the phase in which the first case of the COVID-19 virus was registered planned to visit Greece, Montenegro, Turkey and Tara Mountain in Serbia. It was only possible to visit the last two mentioned destinations, having in mind that boundaries of Greece and Montenegro were closed for tourists from Serbia in the main tourism season and even later (Montenegro opened the boundaries with accompanying measures, while borders of Greece are still closed). It is also important to emphasize that majority of the respondents who made a new reservation upon the

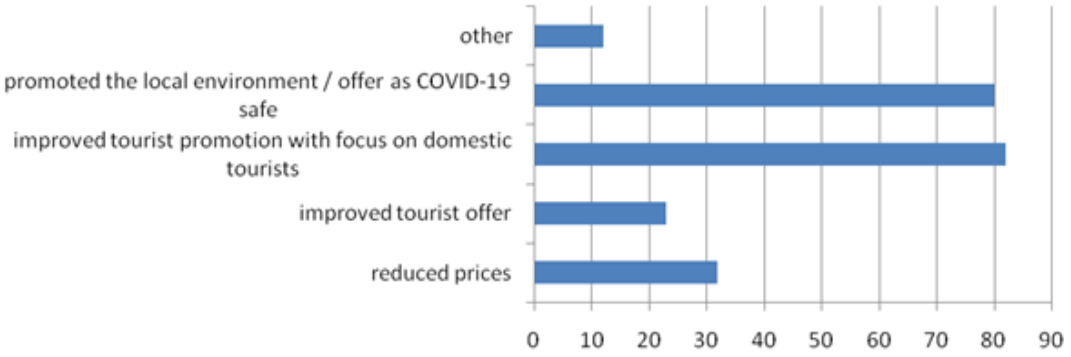
occurrence of the COVID-19 in Italy planned to travel with the close family members, with friends or their partner. On the other hand, only few (three) respondents indicated that they planned to travel with the group of tourists, while one respondent wanted to travel alone. Similar situation was recorded after the phase in which the first case of the COVID-19 was registered in Serbia: they were thinking on visiting Greece, Montenegro, Turkey and Tara Mountain in Serbia as well. Similar situation also was registered in the case of the respondents' plans with whom they want to travel, as in the case when the virus was registered in Italy.

Regarding the last hypothesis, the research results indicated that number of new reservations slightly increased after publishing the encouraging information in media regarding the overall situation with the COVID-19 virus. In such circumstances, percentage of new reservations amounts 11% and it increased for 3.5% comparing to the previous phase, while, at the same time, number of cancelled reservations decreased from 23.3% to 19.9%, also after publishing the positive information in media.

Finally, according to the research results, 8.8% of the respondents indicated that they already made a reservation before finding a favourable price for travel arrangements due to the circumstances caused by the COVID-19 pandemic, while even 21.3% of them pointed out that they booked a new trip due to the better prices set by the tourism offer.

Attitudes of the managers employed in tourism sector in Serbia regarding tourism business during the COVID-19 pandemic

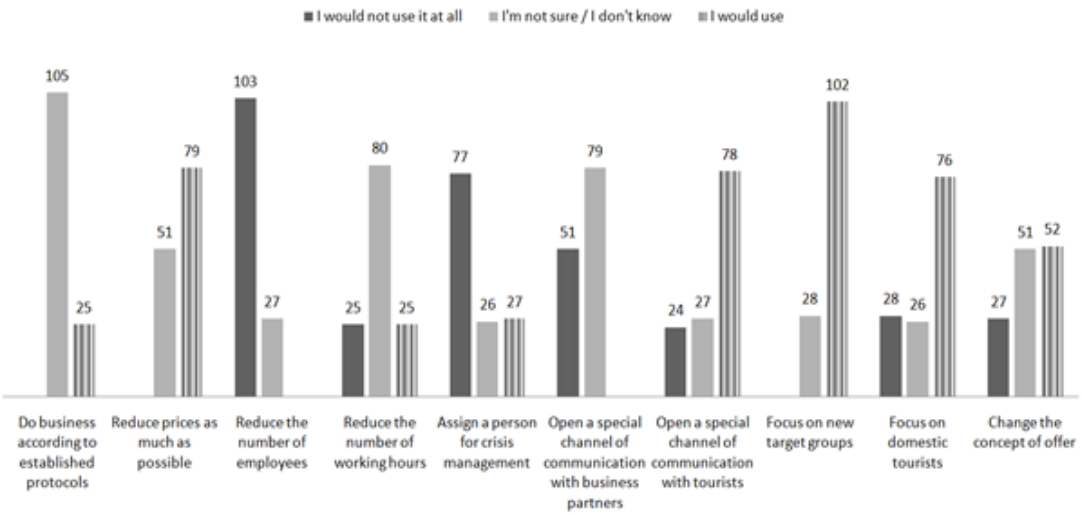
In order to research indicators of tourism business in Serbia during the COVID-19 conditions in more details, interviews with managers from tourism sector were also conducted. Attitudes of all respondents showed that the COVID-19 pandemic affected tourism in their local area. They mainly answered that number of domestic and foreign tourist arrivals decreased in 2020. However, 9.2% of them said that recorded number of domestic tourists even increased (mostly within rural areas). Majority of the respondents (82.3%) implemented certain measures to motivate tourists to come to their local area during the COVID-19 pandemic (Graph 2).



Graph 2: Measures implemented by tourism sector in order to motivate tourists to visit the local destination during the COVID-19 pandemic (in %)

Further intention was to investigate if there are some changes manifested by tourists regarding specific services and facilities demand. Managers from tourism sector pointed out that nowadays tourists are seeking for the outdoor activities more than before the COVID-19 pandemic. Respondents (73% of them) also noticed some changes in tourist behavior: caution and fear are manifested; tourists are seeking to visit as isolated places

in the area as possible; tourists are mostly staying shorter in a common indoor facility (such as restaurant, bar etc.).
Respondents also indicated their attitudes on the manner in which their business unit should prepare their operations for the next tourist season. Even 20.8% of the respondents still do not have opinion regarding this issue. Minority of them (34.6%) gave concrete answers, such as: adequate protection measures should be provided (set by national institutions); adding new, primary outdoor activities/facilities; communication with demand should be improved (in order to emphasize their safety during the visit). The rest of them said something like „The pandemic must be stopped or we will have to learn to live with it".



Graph 3: Effective measures for the next tourist season

Finally, respondents were offered the list of the measures that their business unit could undertake. The answers were quite different (Graph 3).

DISCUSSION AND CONCLUSIONS

This paper analyzes the influence of the COVID-19 pandemic to tourism and accompanying changes it caused for operating in this business sector, in global and national terms, during the 2020. Some patterns of tourist behavior during the crisis have also been observed.
(I) There search results indicated the following facts:

- Tourism sector is very sensitive to global crises, which is evident in the case of the last one, related to the COVID-19 virus. According the findings of the study conducted by Uğur and Akbıyık [15], numerous people around the globe canceled or delayed their travel, almost the same day upon the publication of the news regarding the occurrence and later the spread of the virus, which was followed by discussions regarding the issues of travel assurance.
- Changes in tourist arrivals in 2020 are huge, especially in terms of international tourist arrivals per year/per month. Considering the top 10 tourist destinations, in Croatia and Serbia, as well as worldwide, the most critical months were April and May.
- Destinations around the world that are focused on international tourism, especially those oriented towards business and events, were mainly affected. Unlike cities, rural and coastal areas showed more favorable results [17]. The same situation is in Serbia

within spa and mountain tourist destinations with recorded decrease in the number of tourist arrivals for both, domestic and foreign tourists, much smaller comparing to cities. In Croatia, COVID-19 pandemic has much more negative impact on developed destinations, in terms of tourism, with the most negative impact on the coastal counties as well as the City of Zagreb County.

- Domestic tourism industries are also affected by different quarantine measures [1]. However, domestic tourism in 2020 gained better results, comparing to international ones. Such trend was also manifested in Serbia. The much smaller decrease in domestic tourist arrivals/overnight stays, comparing to data registered for the foreign ones should not be surprising, considering the fact that people might feel safer by staying at a destination in the home country than abroad. In the home country, most of the people are provided with the necessary health services, while the traffic connection with the home place is easier. Accordingly, the recommendation for summer 2020, given by the COVID-19 crisis national body of Serbia, was for all to stay in the country [22]. Thus, during 2020, 300,000 tourist vouchers were distributed, which is the largest number distributed during one year. The most popular tourist destinations in 2020 were Vrnjačka, Ribarska, Gornja Trepča, Prolom, Koviljača, Sijarinska, Sokobanja and Vrujci spa, as well as mountains Zlatibor, Kopaonik, Tara and Divčibare [21].

(II) The next phase of the research was focused on defining the indicators in order to detect the impact of the COVID-19 pandemic on tourism in Serbia, or more precisely on the respondents' intention to travel, or its absence. It might be said that there is a tourist behavior pattern that is following concrete moments on the COVID-19 timeline. Authors defined some events during the COVID-19 pandemic as critical points for making a travel decision. The research results suggested the following:

- Number of people who decided to travel increased chronologically. This finding is in line with general preferences of tourists from Serbia in relation to the time of the year when they make a decision to travel in the main tourist season. In the past decades, they started with such reservations in February. Number of the travel reservations usually continues to grow in months before the summer season, as well as throughout the whole tourist season. In the last few years, the first critical point for showing the intention to travel, by making the reservation for summer trip, is November (during the big discounts for "Black Friday"). The next critical point, with recorded increase in travel reservations, is during the Belgrade Tourism Fair (in February).
- Furthermore, results of the research also pointed to the fact that number of people who indicated that they already made a travel reservation significantly decreased chronologically (from critical point defined as "The first case of the corona virus was registered in China" to critical point defined as "The first case of the corona virus was registered in Serbia"). This finding is in a complete contradiction with tourists' tendencies in the years before the appearance of the COVID-19 virus and the overall global pandemic.
- Actions, such as cancellation of reservations, significantly increased in line with chronological development of the virus spreading, which was expected, given the overall situation related to development of the COVID-19 pandemic.
- Finally, it is important to indicate that number of the respondents who even made a new reservation increased from the period of occurrence of the virus in line with its spreading. It might be supposed that their observation of the pandemic is optimistic, as well as that they expect the end of the crisis in a close future. These respondents

are even ready to choose the other, safer destination in terms of the COVID-19 pandemic, according to their point of view. It is also important to bear in mind that numerous people established the habit of making a reservation for travel, even in times of the global health and economic crisis.

All three hypotheses, H1-H3, are confirmed, having in mind that, according to the research results, number of travel reservations increased in the later stages of the COVID-19, if we compare this number with statistical indicators registered in the starting phase of the virus occurrence in China. Besides that, the research results also pointed out that number of travel cancelations sharply decreased in the later stages of the COVID-19 pandemic, comparing this number with statistical data from the phase in which the first case of the COVID-19 virus was registered in Serbia. Finally, publishing of the encouraging information in media additionally increased the number of travel reservation, which confirmed the last hypothesis of this research.

To summarize this, there is a pattern of tourist behavior that has been observed according to certain moments in development of the COVID-19 pandemic, which have been identified crucial for travel cancellation.

(III) Another intention was to research the manner in which the managers in tourism sector in Serbia perceive the effects of the COVID-19 pandemic on tourism, particularly from the perspective of their local area or according to their business unit. The research results indicated the following facts:

- All respondents think that the COVID-19 pandemic affected tourism in their local area by decreasing the number of tourist arrivals, both domestic and foreign ones.
- Majority of the respondents implemented certain measures to motivate tourists to come to their local area during the COVID-19 pandemic. They put special attention to the measures oriented towards domestic tourists. They also put effort on promotional activities in order to emphasize the safety of their local area/business unit in new circumstances.
- The expectation was to see more proactive managers when they were asked about plans for the next season, especially having in mind that their jobs have been jeopardized by the pandemic. The research results showed that every fifth respondent did not have an opinion on that issue at all. Every third respondent gave a concrete answer. And finally, almost half of the respondents showed that they will wait for these problems to be solved by the state, vaccines, etc.
- On the other hand, measures for the next season (from the offered list), that respondents found (a) as important, are the following ones: Focusing on new target groups; Opening a special communication channel with tourists; Focusing on domestic tourist; Reducing the prices as much as possible. Similar findings were obtained in the study, conducted by Sánchez-Cañizares et al. [13]. According to their findings, tourists are not ready to pay extra for specific service or product, no matter the fact that increase of the price occurred as a consequence of measures for mitigating the risk related to the pandemic. Furthermore, in the same research, scholars indicated that further marketing activities should be oriented towards specifying the fact that the price of tourism services and products would not increase, by conducting the measures for providing the tourists' safety.
- Measures that respondents found (b) as non-effective are the following ones: Reducing the number of employees; Assigning a person for the crisis management.
- Measures that respondents are not sure about their effectiveness (c) are the following ones: Doing business according to established protocols; Reducing the number of

working hours; Opening a special communication channel with their business partners.

Contribution to the theory and practice

The research results of this study are clearly indicating the effects of the pandemic on tourist traffic in 2020, on global and national level. The paper also highlights the forms of tourism, i.e. types of destinations, which will be more or less affected by the mentioned crisis. According to that, authors pointed to the fact that domestic tourism in Serbia might be in significant increase in the next period. Such results could serve as a starting point in defining directions of development of local communities, small and medium enterprises and, finally, the national strategy for tourism development in Serbia.

Besides that, authors developed the set of indicators (defined as critical points) in order to analyse the impact of the COVID-19 pandemic on tourism in Serbia, in relation to the respondents' intention to travel, or to cancel their bookings. In respect to that, experts in the field of tourism will be able to develop appropriate marketing strategy, by considering the indicators that mostly affect tourists' intention to travel. Results of this research might be of use to tourism-based managers and to all other stakeholders involved (state, destination management - national, regional, local). Furthermore, results could find practical implications by the managers from the other sectors that have also been affected by the pandemic. Finally, measures that business unit could undertake to minimize the challenges and risks throughout the COVID-19 pandemic or another crisis, can be useful for building the further strategy of business development.

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THE ROLE OF THE MINERAL WATER FOR THE DEVELOPMENT OF THE DEVIN, BULGARIA STUDY AREA AS A TOURIST DESTINATION

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ABSTRACT

The hectic daily life, the stress at work, the noise in the urban environment, the polluted air of the megacities and other harmful factors accompanying the civilized world are some of the main reasons for reduction the immunity and health status of the population. The introduction of new technologies related to all-day work in front of computer monitors dooms workers to permanent immobilization, unlocking a chain of health problems. These problems include overweight, a significant increase in the number of diabetes mellitus among adults and children, continuous rejuvenation of hypertension, cardiovascular and cerebrovascular accidents. There is more and more talk about "burn out" – a syndrome associated with excessive mental exhaustion. The listed factors lead to an increase in the morbidity of the population.

The solution to some of the questions is in the skillful use of natural healing factors in balneo-climatic and climatic health resorts for the healing of the human body. In recent years, there is a "boom" in the spa and wellness areas in the tourism industry. These areas include the use of climatic factors in combination with hydro, balneo and peloid therapies for the prevention and prophylaxis of chronic diseases, in combination with training in healthy eating. This complex must include programs with a specific motor regime, consistent with the health status of the tourists.

Nowadays, the goal is to return the mankind to the natural healing factors that have been used since ancient times to the present day to heal the body. The issue of taking a person out of the everyday tense and stressful environment, containing various harmful substances, and sending the humans to a calm, ecologically clean and healthy environment is becoming more and more topical. This can be achieved by actively targeting the climatic and spa resorts with specific climatic characteristics – a high percentage of sunshine; low to missing fogs; air rich in light negative ions and phytoncides; natural thermal mineral waters, successfully applied for drinking, external, inhalation and other types of balneotherapy, etc.

Spa treatment affects the human body for a period of 3 to 6 months. The annual conduct of complex climate and balneotherapy in some chronic diseases of the internal organs, leads to dilution of their exacerbations and, accordingly, to a reduction of hospitalizations of patients.

The key to overcoming the above problems is in the rational use of natural healing factors for health prevention and prevention of chronic diseases. The goal is to create a better health culture for exercise, nutrition, alternating active work and rest.

Keywords: Balneology, Mineral water, Climatotherapy, Hydrotherapy, SPA and Wellness

INTRODUCTION

The importance of health is the most important think of the tourism, as the recreation and development of the physical and mental strength of tourists is the main goal for them to undertake a tourist trip. That is why for the tourist himself too often the priority is the health significance, which affects him directly and personally. In turn, the health significance is divided into healing (known since the ancient times) and prophylactic (typical of most modern types of tourism). A healing effect is when it comes to the treatment of already manifested diseases and complaints, and a prophylactic one – when the attention is focused on achieving a general healing effect or the prevention of certain diseases. The global trend is to increase the relative share of prevention at the expense of treatment. This is primarily due to the increased health culture and the creation of lasting health habits in the population and society as a whole. Usually the healing and prophylactic significance of tourism is associated with a certain type of it – balneotherapy or balneological tourism, based primarily on the presence of mineral waters, healing mud, lye and others [1].

At the end of the 16th century, the interest in the healing effect of the mineral waters was revived, which grew into a boom in the development of the resort business near the healing mineral springs in the 19th century. As Slaveykov [2] points out, at the beginning of the 21st century, tourism is already a mass phenomenon, and the tourism business is developing rapidly, because in many countries huge investments are directed to it.

The balneo-sanatorium business in Bulgaria arose and developed on the basis of mineral waters. The treatment with the use of mineral waters in our lands has an ancient and rich history.

In recent decades, the need for spa treatment and prevention worldwide is growing. As a result of the changed structure of morbidity and frequency of some socially significant diseases, due to overexertion and nervous fatigue, more and more importance is given to the application of resort factors. Modern pharmacological agents cannot always restore the altered reactivity of the human body and normalize a number of regulatory mechanisms altered by the modern way of life.

The increase of these diseases, which are beneficially affected by the action of the balneo-climatic factors, with which both primary and secondary prophylaxis is carried out, forms a great potential for the search for balneo-sanatorium treatment.

The analysis of the health and demographic condition of the population and the forecasts for the coming years give grounds to expect an increase in the health needs of the citizens due to the aging population and the wide spread of chronic diseases requiring an expanded volume of diagnostic, treatment and rehabilitation procedures. The negative trends are the result of insufficiently effective promotion and prevention activities. [3]

The municipality of Devin, that is part of this analysis, has prospects to take its rightful place on the tourist map of Europe, with the emphasis on offering spa tourism.

DEVIN, BULGARIA

The Municipality of Devin represents 17.83% of the territory of the District of Smolyan (Fig. 1). The population is 12,097 inhabitants, of which 6,527 live in the town of Devin (54%). The town of Devin is located 710 meters above sea level in the Rhodope Mountains and it combines diverse terrain, picturesque nature, mild climate and the presence of mineral springs in small. Devin is situated 220 km away from Sofia, 45 km from Smolyan and 35 km from the mountain ski tourist resort "Pamporovo".

Figure 1. The municipality of Devin on the map of Bulgaria

There are many and diverse natural resources situated on the territory of the municipality of Devin. Many of them are not popularized and accessible for mass tourism. The relief of the municipality of Devin is typically mountainous and has the characteristic features of this part of the Rhodopes – very steep and even inaccessible slopes, deep ravines, and the ridges – sloping to steep. There is a huge difference in altitude – from 420 m below the sea level of Vacha Dam to 2,091 m on Golyam Persenk Peak. The diverse rock composition has led to the formation of a number of natural phenomena: deep gorges, caves, rock formations and others. Given the horizontal and vertical division and easy possibility of mountain ridges, as well as the presence of numerous natural landmarks, the area is suitable for practicing route-cognitive and sports tourism - orienteering, mountain biking, motocross and more. Devin's climate is transitional-continental, lowland, tempered by its southern geographical location in the country.

The average annual air temperature is 10.5°C, with an average January – minus 1.5°C, and in July – 19°C. Summer is warm but not hot, winter is mild as spring occurs on March 25, and warm and sunny autumn lasts until November 10. The clouds are moderate; the fog is light and the duration of sunshine in the Rhodopes and in particular in Devin is nearly 260 days a year.

The average annual rainfall is 687 mm, and the snow cover lasts for an average of 55 days during the cold season. These favorable climatic indicators, the clean mountain air, the possibility for daily stay in the higher surroundings provide conditions for fruitful climatotherapy and prevention, for complete recreation and for complex conducting of highly effective balneo-climatotherapy.

Tourist attractions are very important for the sustainable development of any destination, because they give a final end to the stay of tourists. According to Kotler [4] customers are currently in a situation where they have to choose between different experiences and not between different product characteristics. Butler [5] has the opinion that tourist attractions are not endless and eternal, but should be considered and treated as a limited and possibly non-renewable resource. Then they could be more carefully protected and preserved. Due to the many mineral springs, on the territory of the municipality of Devin

there are several outdoor pools: "Struilitsa", "Orpheus" and water park "Persenk", and a municipal swimming pool from 2020. Another main attraction for mass tourism is the Devil's Throat Cave.

Anthropogenic resources on the territory of the municipality of Devin are a big problem because most of the existing ones have not been turned into assets for tourism, in fact they are not included in the tourist offer, and most of them are in poor condition and need urgent measures for storage and conservation.

Human resources are also a major obstacle to tourism development. The growing need for qualified specialists for the development of the sector requires the conduct of specialized studies and targeted efforts for the development of human capital. On the one hand, this will lead to an increase in the quality of the offered tourist product and growth in the sector, and on the other hand – it could become a prerequisite for limiting the migration of young and qualified staff from the territory of the municipality of Devin. Migration is one of the reasons for the deteriorating age structure of the population in the municipality.

The municipality of Devin still does not have a tourist information center, although according to the number of overnights [6], Devin municipality is a tourist developed municipality.

According to Marinov et al. [7], tourism can be one of the main factors for economic growth.

THE MINRAL WATER AND THE TOURISM IN DEVIN

The municipality of Devin is a real treasure trove of water resources. It is full of karst springs, rivers and dams, but its great wealth are mineral springs with temperatures between 16ºC and 76ºC. Here are the healing Bedenski bani near the village of Beden. The water is hot, with a temperature of 74-76ºC, with a significant flow rate, low mineralized, hydrocarbonate-sulphate-sodium, silicon, moderately fluorine, with pH 6.9 and is suitable for external balneotherapy. In the town of Devin there is a large spring with soft mineral water with excellent table properties, well known abroad, and in the village of Mihalkovo is a unique deposit with naturally carbonated healing water, suitable for the treatment of people with cardiovascular disease. The two localities in Nastan district remain unused for the time being.

History

The history of the development of the Devin’s region as a treatment center, using its mineral waters can be traced back to the first century AD, thus marking the beginning of the 20th century history of today's Bedenski Bani. Evidence of the exploitation of all thermal and other healing springs in the Devin region has been found during the period of Roman rule (I-IV century) [8]. In 1923, a large building was built in Bedenski Bani, which serves for the treatment of patients. 12,000 people a year passed through the bath for bathing. In the same year, the head of the Sanitary Resort Department, Dr. Kochankov, stated: “…there are no conditions for the development of a resort on the spot (Bedenski Bani). It turned out to be much more expedient to transfer the water to Devin, and open resorts there, for the purpose to develop a project and to determine the terrain… ” [9]

The development of the resort

The modern development of the balneotherapy business in the municipality of Devin can be noted since 1969, when the construction of a heating pipeline from Bedenski Bani to

Devin, a hot water tank in the town, a balneotherapy clinic and a hotel in the town of Devin began. The claims of the local people about the healing properties of the Beden mineral springs for the treatment of diseases of the musculoskeletal system, chronic skin diseases, urogenital, gynecological and other diseases have been confirmed by scientific research. It is realized that it is difficult to deploy a good spa treatment at the place of the spring, "mainly due to lack of appropriate living conditions" and therefore it was decided as a place for future development of the spa business in the municipality to be in the city, "where there is and can to create far more favorable conditions".

Calculations have been made by specialists regarding the temperature of the water, which at the springs is 76°C, for each kilometer it drops by 1°C or a general drop of 11-12°C. This cooling does not pose any danger to its healing properties. At the first stage there were built a polyclinic and a hygienic bath, and during the second stage it was planned to have a sanatorium with 300 beds. In addition to a polyclinic and a hygienic bath, paraffin treatment, physiotherapy, electrotherapy, gyms and others have been built in the rehabilitation unit. [10]

The water from Bedenski Bani is characterized as hyperthermal – hydrocarbonate-sulfate-sodium-calcium with free carbon dioxide content. It is used by drinking and bathing to treat diseases of the musculoskeletal system, stomach, gynecological diseases and more. It is planned that the town of Devin will develop as an integral part of the high-mountain resort-tourist complex "Orpheus" with balneological treatment. "The main thing will be the development of the resort business, which will make it a real pearl in this beautiful mountain." [11]

In 1972 the construction of the spa began, together with other important for the development of the economy, construction, education, resort and spa work in the town of Devin. The fact that "Devin ranks second in the country in terms of mineral water availability after Velingrad" gives hope. For the needs of the spa in the city, a series of drillings for mineral water have been carried out, and from one of them (B3) the water has been brought with a heat pipe and with it the procedures in the pool and for extension have been fed. Thus, the spa is supplied with two types of mineral water - from Bedenski Bani and from the Devin wells, which has a different composition for the pool, baths, showers and a modern drinking fountain.

A thermal reservoir was built and a heat pipeline was laid through the city to the spa. The spa itself is well furnished and equipped with modern equipment for those times, treatment rooms and procedures have been opened. At the same time, the construction of the Grebenets Hotel, a hotel complex, an extensive restaurant, a tavern and meeting rooms was completed. The spa and the hotel were officially opened on September 6, 1974. The opening of the two sites - the hotel and the spa, attracted the attention of the organizers of spa treatment and tourism and in the spring of 1975 a group of citizens of the Republic of Finland arrived for treatment and rest. Their shifts continue until late autumn. [12]

In 1979, the development of Devin as a center for international tourism was determined. Its balneotherapy and climatic features make it suitable for the treatment of diseases of the musculoskeletal, nervous, digestive and urinary systems. The conditions in Devin are suitable for primary and secondary balneoprophylaxis in all cases, requiring general strengthening of the organism and recovery after suffering from the mentioned diseases. [13]

The sanatorium had 30 beds and the boarding beds reached up to 100. There was a restaurant with 100 seats for the patients in the sanatorium and in the boarding house. The spa had a swimming pool (where the water temperature was 37°C), two changing rooms

and showers. Bathing for women and men took place in shifts. There were 10 baths for women and 10 for men, where the water temperature was 37-40°C. The spa was opened all year round. In addition to the Bulgarian citizens, about 300 foreign citizens, mainly Finns, spent their holidays in the hotel "Grebenets" of Balkantourist (with 160 beds, with a restaurant and a bar). 14- and 21-day treatment shifts were organized for foreign guests. In order to develop the resort, it was planned to build a hotel-restaurant of "Balkantourist" with 400 beds, connected to the spa (started but unfinished. Nowadays it is part of the spa complex "Orpheus"); the expansion of the resort boarding house to 400-500 beds, a heating pipeline was built (800-1000 m) for additional supply with mineral water, mainly from borehole № 3; construction of an outdoor mineral pool and a site for motor, air and solar procedures.

Treatment at this time was carried out by a good medical team. There were experienced nurses and rehabilitators. The treatment were carried out in well-equipped rooms, through electrotherapy, paraffin treatment, massages and water treatment with procedures in baths, extension and swimming in the pool with warm mineral water. There was a beautifully decorated mineral drinking water fountain for the treatment of intra-abdominal diseases. Good opportunities have been created for examinations, services and treatment of the population of the city and the municipality, the people who came and need treatment from the interior of the country.

Nowadays, the continuation of the traditions is the SPA COMPLEX "ORPHEUS", which is located in its own park in the center of Devin. June 18, 2005 is the official opening of the complex. Even with the major renovation of the complex, an accessible architecture for people with reduced mobility is provided. Much attention is paid to the construction of infrastructure to support the work of the rehabilitation and rehabilitation program. SPA COMPLEX "ORPHEUS" consists of 2 sites: the 5-star SPA hotel "Orpheus" and "Specialized Hospital for Rehabilitation – Orpheus". The main activity is providing services for Bulgarian and foreign clients and patients. The complex itself has 210 rooms. "SHR – Orpheus" has issued a Permit for medical activities by the Minister of Health with subject of activity: Implementation of specialized hospital care including diagnosis and treatment of persons in need of physical therapy, motor and mental therapy, spa, climate - and thalassotherapy, as well as other medical activities duly authorized by the competent authorities.

There are 92 accommodation places with 1748 beds (Table 1) on the territory of the municipality Devin. 9 accommodation places (9.8%) with 771 beds (44.1%) of these are supplied with healing mineral water. These are mostly the hotels that provide the majority of employment in the municipality (Only Orpheus realized 53% of all overnight stays for 2019), which means that mineral water has a great importance for the development of the municipality as an attractive tourist destination.

Table 1 Accommodation places in the municipality of Devin – total and with mineral water, up to date for 27 September 2020

Total accommodation places in Devin municipality		
Category	Number of objects	Number of beds
1*	10	180
2*	58	581
3*	19	325
4*	3	250
5*	2	412
Total	92	1748

Accommodation places within mineral water in Devin municipality		
Category	Number of objects	Number of beds
1*	0	0
2*	0	0
3*	4	109
4*	3	250
5*	2	412
Total	9	771

For the purposes of this analysis there are summarized data on tourist demand in the municipality of Devin by the National Statistical Institute of Bulgaria (Table. 2).

Table 2 Main indicators of tourist demand in the period 2007-2019

	Overnights			**Tourists**			**Income from overnight stays - in thousants leva**		
Year	**Total**	**Bulgarians**	**Foreigners**	**Total**	**Bulgarians**	**Foreigners**	**Total**	**Bulgarians**	**Foreigners**
2007	60 084	51 274	8 810	26 985	23 730	3 255	3 823	3 202	621
2008	47 722	39 305	8 417	20 415	17 857	2 558	2 280	1 817	463
2009	45 154	39 389	5 765	19 451	17 217	2 234	2 101	1 747	354
2010	37 417	32 241	5 176	17 953	15 918	2 035	1 797	1 456	341
2011	62 141	53 807	8 334	28 066	25 597	2 469	2 307	1 981	326
2012	55 143	47 624	7 519	25 248	22 359	2 889	2 243	1 937	306
2013	59 559	52 470	7 089	27 022	24 203	2 819	2 696	2 346	350
2014	66 495	58 798	7 697	31 564	28 181	3 383	3 011	2 631	380
2015	70 412	62 042	8 370	35 035	30 920	4 115	3 017	2 574	443
2016	94 600	82 803	11 797	47 066	42 096	4 970	3 683	3 149	534
2017	89 993	78 273	11 720	45 441	40 846	4 595	3 685	3 115	570
2018	92 276	81 039	11 237	46 026	41 137	4 889	3 969	3 438	531
2019	111 670	97 915	13 755	53 241	46 723	6 518	5 136	4 454	681
2019-2018	21.0%	20.8%	22.4%	15.7%	13.6%	33.3%	29.4%	29.6%	28.4%
2019-2007	85.9%	91.0%	56.1%	97.3%	96.9%	100.2%	34.3%	39.1%	9.7%

For 2019 the realized overnights in the municipality of Devin represent 13.92% of the total for Smolyan district and 0.41% of the total for the country of Bulgaria, as the overnight stays are 17.08% of the total for Smolyan district and 0.65% of the total for the country. In the local market, the municipality of Devin realized 15.08% of the overnight stays and 17.19% of the persons for Smolyan district and respectively 1.01% of the overnight stays and 1.13% of the persons for the country. A total of 111,670 overnight stays were reported, 87.7% of which (97,915) were from Bulgarians. 53,241 people spent the night, of which 87.8% (46,726) were Bulgarians.

In terms of attracting foreign tourists, the municipality of Devin is far from the average for the country, where 64.4% of all overnight stays are from foreigners, but it is close to the average for the district, where 80.9% of overnight stays are from Bulgarians. According to these indicators, the tendency of tourism in Smolyan district to have a greater weight on the domestic market than on the foreign market is strengthened.

CONCLUSION

Nowadays, the goal of the tourism business should be the returning of the people to the natural healing factors that have been used since ancient times to the present day to heal the body. The issue of taking a person out of the everyday tense and stressful environment, containing various harmful substances, and sending him to a calm, ecologically clean and healthy environment is becoming more and more topical. This can be achieved by actively targeting the climatic and spa resorts with specific climatic characteristics – a high percentage of sunshine; low to missing fogs; air rich in light negative ions and phytoncides; natural thermal mineral waters, successfully applied for drinking, external, inhalation and other types of balneotherapy.

Tourism in the municipality of Devin has not yet reached its full potential, despite the existing prerequisites for its development such as natural resources, cultural heritage and built tourist infrastructure. Devin has a great past as a tourist destination, but at the moment there is still a lot of work to be done to establish it on the national and international map.

Attracting foreign tourists is extremely important for the stability of the sector – foreign tourists spend more money during the accommodation, food and additional activities, but have higher requirements for cleanliness, quality of service and quality of services offered in general. These are aspects that must be paid attention by all participants in the production of the tourist service.

The data must invariably be used in order to bring tourism back to its roots – balneotherapy. The crisis caused by the corona virus COVID-19 only reinforces the trend that people will increasingly look for destinations that, in addition to safety, offer real benefits for body and soul.

COVID-19 will certainly cause many problems for some, but it will also be a great chance for others. It remains to be seen to what extent measures to limit the spread of the virus have harmed tourism globally, nationally and locally. Only those who adapt quickly to the changing environment and are willing to cooperate at different levels will be successful.

Certainly the municipality of Devin will be among the winning destinations, mostly because of the great conditions and individual benefits it can offer to tourists!

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PERMANENT MEDICAL CENTERS – PREMISES FOR INCREASING ACCESSIBILITY TO HEALTH SERVICES IN RURAL COMMUNITIES (IASI COUNTY)

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ABSTRACT

In Romania, rural areas are deficient in terms of health coverage compared to urban areas, which directly affects the health status of the rural population and indirectly the social, economic and sustainable development situation of the country. The decentralized Romanian health system is part of the Eastern European countries' patterns, facing worrying problems which require real and rapid solutions to reform and modernize the health system.The purpose of this work is to analyze the accessibility of the rural population in Iasi county to primary medical care through permanent centers, medical units, which operate outside the normal working hours of individual medical offices and are served by family doctors, who are mainly providing treatment of minor emergencies. From a methodological point of view, the study is based on descriptive and comparative analysis of general data provided by the National Institute of Statistics and secondary data obtained from doctors' questionnaires from 14 permanent centers in rural Iasi County. The centers provide information about the annual number of patients, the age and the predominant sex, the medical services most often performed, the diseases that patients suffer from most often, the way in which the SARS-CoV-2 pandemic 19 influenced the number of interventions etc. The final results will outline the importance of permanent centers in rural areas, the accessibility of the population to urban centers of emergency mayors, the population they serve and their efficiency within the Ministry of Health. The European Union through cohesion policy and non-reimbursable European funds supports health policies in our country to ensure better quality emergency health care in rural Romania as well.

Keywords: Health services, accessibility, rural areas, public health policies

INTRODUCTION

The state of health of a population directly influences the quality of life of the individual and of society as a whole. The World Health Organization, the United Nations or the European Union are just a few of the major organizations that recognize the right to health as a fundamental human right, with everyone having the right to access preventive healthcare, Specialized medical care, and a high level of human health protection (Charter of Fundamental Rights of the European Union, Article 35 – Health protection).

In 1978, in the International Conference on primary Health Care, Alma-ATA, USSR, 6-12 September, the Alma ATA Declaration was signed, which laid the foundations for medical care worldwide, being the first time in history that the countries of the world take on the unanimous responsibility for ensuring equitable access to health services, including services for the prevention and treatment of non-communicable and infectious diseases or mother and child health. Although efforts by all countries have been significant, progress in the coming years has further exacerbated inequalities, with a large part of the world's population not having access to basic primary care, mother or child care [1].

The United Nations (from 2015) approved by 2030 a comprehensive framework of action comprising several sustainable development objectives, including ensuring a healthy life and promoting well-being for all at all ages. This objective concerns public health policies focusing on the reduction of infectious diseases (HIV/AIDS, tuberculosis, hepatitis), non-communicable diseases and mental health, abuse of prohibited substances, tobacco control, access to vaccines and medicines, health financing and labor-related issues in this area. The state of health of the population is influenced by both genetic factors, environmental factors, economic or socio-cultural factors and access to health services, determined in particular by the convergence of supply and demand for healthcare.

There are significant differences worldwide between the urban population, with easy access to emergency and specialized medical services, and the rural population, which has access to primary care at most. The World Health Organization considers primary assistance „includes physical, mental and social well-being and it is people-centred rather than disease-centred (PHC is a whole-of-society approach that includes health promotion, disease prevention, treatment, rehabilitation and palliative care) and comprises three components: meeting people's health needs throughout their lives; addressing the broader determinants of health through multisectoral policy and action; and empowering individuals, families and communities to take charge of their own health [2]. There are views that „primary health care combines accessibility to the health care system; accountability to offercare that meets comprehensive health needs; coordinated and integrated care that involves illness prevention, focused care, and the treatment of chronic illness and mental health issues; and the creation of enduring relationships among providers, patients, and the broader community"[3].

In Europa „although varying greatly from country to country, rural–urban differences may be seen in areas including, but not limited to, the following: presence of qualified health care workers, distance to major hospitals, access to specialized services, access to health promotion and prevention activities, availability of pharmacies and essential medicines, financial barriers to health services, effectiveness of emergency care services, quality of the infrastructure, including equipment conditions in hospitals and demands on health workers"[4]. In Romania, rural-urban disparities are increasing, on the one hand because of the lack of medical infrastructure, with the population having no access to primary medical services (mainly provided by permanent medical centers, dispensaries, family doctors' offices or even pharmacies), on the other hand, because of the lack of a qualified human resource, there are no policies to attract doctors to rural areas, which are often disadvantaged or an aging population for which palliative care is essential. In our country primary care, especially in rural areas, is provided by permanent medical centers, where the continuity of primary care on-call is ensured for patients in the area rounded to the center, on duty.

The research area of the study is the Iasi county, located in the North-East region of Romania, a major medical and university center.

H1: The work of permanent centers is essential in rural areas as it ensures that basic medical services are accessible to the public, including the treatment of minor emergencies.
H2: Permanent centers are a viable long-term solution for overloading urban emergency medical services.

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

From a methodological point of view, in this study, we intend to analyse the importance of permanent centers in Iasi county in terms of the accessibility of the rural population to the primary medical services provided by the family doctors. We will analyse the evolution of the medical staff in Iasi county and the accessibility of the rural population to permanent centers. We will use both objective/quantitative (analysis of the statistical data provided by the National Institute of Statistics) and subjective/qualitative research methods using the questionnaire method. Thus we will implement a questionnaire to be addressed to the on-call doctors at the 14 permanent centers in the rural areas of Iasi county with which we will find out information on the annual number of patients, the age of patients, the diseases prevailing in the local Community, the most frequently performed medical services, the way in which the SARS-Cov2 pandemic led to increased or decreased interventions, etc. We will also analyse information on the geographical distance traveled by patients to receive primary care services, the distribution of opportunities to access healthcare in the territory, identifying rural areas with special features in terms of clearly unequal access to healthcare facilities.
As regards the means and method of work, the study was conceived as a field survey (opinion), using the questionnaire as the main working tool, with several types of questions (open, closed, with only one choice of answer, etc.), sent between October 2020 and February 2021 both on place and through the telephone interview. Geographically, accessibility to health services is directly influenced by time-related accessibility (expressed in the real physical time patients can access the necessary health services, the optimal level being 30 minutes) and spatial accessibility, which represents "the proximity of healthcare providers to the population served, which can be quantified by the distance the patient has to travel to the healthcare facility in which the medical services he needs and he/she requires are provided [5]. A special feature is that the anisotropic characteristics of the area studied and the ability of the population to take advantage of the medical services in the proximity directly influence the quality and quantity of the services provided [6].

RESULTS

In our country permanent centers have been set up to serve primary medical services in particular small urban areas or rural areas in order to relieve congestion at hospital emergency facilities, financed by the national Single Health Insurance Fund. The family doctors' offices are working, with extended operating hours, between 15:00- 8:00 on working days and on a permanent weekend. According to the legislation governing their operation, medical services provided in permanent centers include: Medical care in acute diseases and medical-surgical emergencies, within the limits of the competence of the family doctor and technical possibilities, referral to other specialties for admission, administration of the medication required for emergency treatment, the issue of a medical certificate for the patient, with which he will present himself the next day to his family

doctor for prescription. Before the accession of our country to the European Union, between 2003-2007 we can notice that about half of the family doctors in Iasi county are professionals in Iasi city, a medical and university center much more bidder than the small towns or rural areas of the county, which lacks on medical infrastructure. After 2008, the rural-urban inequalities are further accentuated, more than 60% of the doctors in the county practicing in Iasi municipality (in 2010 - 468 out of 611, in 2011 - 586 out of 786), after 2011 the number of doctors in Iasi municipality will decrease steadily, Reaching even less than 30%, (2015- 135 out of 472, 2017- 174 out of 506), against the background of a general decrease in the number of family doctors in Iasi county (786 doctors) after 2011, the number of doctors in Iasi municipality will decrease steadily, reaching even lower rates than 30%, (2015- 135 out of 472, 2017- 174 out of 506), against the background of a general decrease in the number of family doctors in Iasi county (786 family doctors in 2011, (441) in 2018, with a slight increase in 2019 to 549 (see Fig. 1).

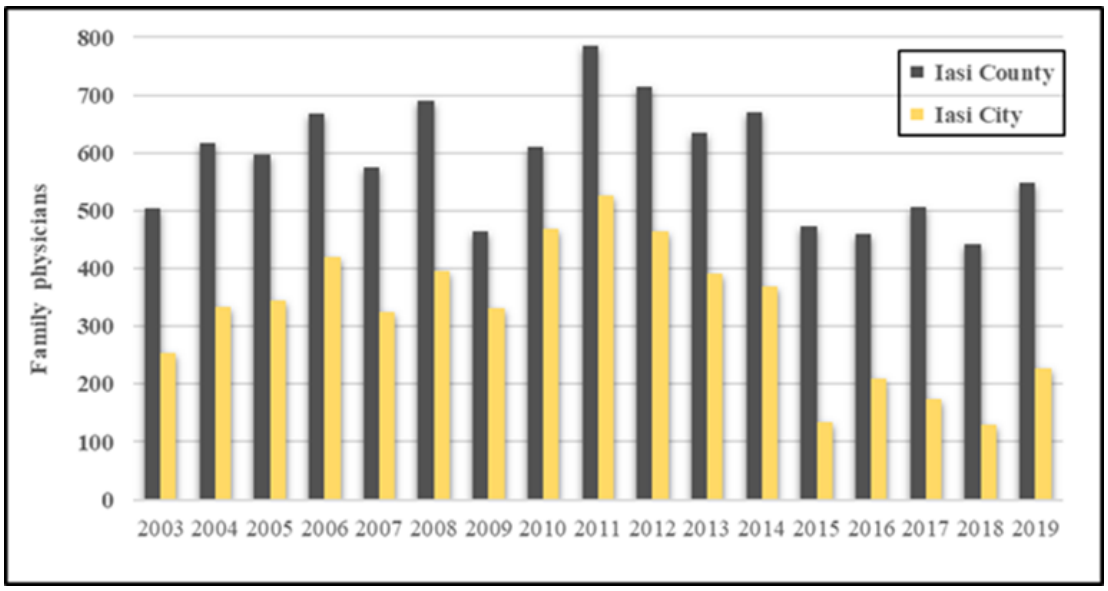

Figure 1. Evolution of the number of family doctors in Iasi county and municipality (2003-2019)
Source: National Institute of Statistics, Bucharest, 2003-2019

This aspect was most likely directly influenced by several factors: Due to the lack of human resources (After accession to the European Union, a large number of doctors have migrated to developed countries in Western Europe because they offer both real support for professional development through access to modern medical equipment and a significantly higher remuneration [7]), placement of medical schools in urban areas only (In the United States of America, attempts were made to attract family doctors through medical practice in rural areas and financial incentives), the geographical isolation of rural communities and the limitation of socio-economic resources (specific to rural communities around the world [8]), few opportunities for professional and personal development, including limitations for families of doctors, long distances to urban centers [9],access to education, food, cultural or religious goods or services have been identified as influential factors [10].

We also mention that there is an increasing number of family doctors every year at national level, with few resident doctors opting to specialize in this field. At the level of Iasi county from 2008 to 2019, 19 permanent centers were set up: 5 in the urban environment: Pascani (See fig. 2), Podu Iloaei and 3 in the municipality of Iasi and 14

centers in rural areas: Belcesti, Bivolari, Deleni, Ciurea, Ciortesti (See fig. 3), Focuri, Mircesti, Movileni, Plugari, Pocreaca-Schitul Duca, Prisacani, Vladeni, Voinesti, Victoria. We have taken into account, in the analysis of accessibility and urban centers, which also serve the population in rural areas around the world, but for the purpose of the survey we only asked the on-call doctors from the 14 rural permanent centers.

Figure 2. Medical permanence center in urban area ((Pascani city)

Figure 3. Medical permanence center in rural area (Ciortesti village)

The analysis of the questionnaire addressed to family doctors shows that in almost all permanent centers the annual number of patients is over 1100, with the exception of the center in Movileni (around 500 patients annually) and the fire and Prisacani centers (between 800-1100). As regards the age and gender of patients, it is generally targeted at all age groups and both sexes, with slight particularities in the Plugari (35-39/ over 65 years old, prevalent female), Bivoli (50-64/ over 65 years old), seals (35-49 years old), Voinesti (under 18 years old, predominantly female) or Ciortesti (under 18/35-49, predominantly male). We can note that vulnerable groups of people (children and the elderly) are generally more frequently targeted at permanent centers, but in the case of minor emergencies and the working population (employees, co-insured persons or disadvantaged persons). Most patients in these centers suffer mainly from cardiovascular and respiratory diseases. The most common medical services are: consultations for acute respiratory and digestive disorders, trauma, injectable treatment and perfusions, dressings, treatment of febrile syndrome, treatments for polyarthrosis pain or other disorders of the skeletal system, regular consultations for children, treatment of renal and biliary colic, allergies and stings of insects (bees, ticks) or animal bites.

To the question “What kind of equipment would be useful in the activity of permanent centers to increase the addressability and efficiency of services in rural areas?”, Some doctors stated that they currently have the necessary medical infrastructure (some equipment purchased from own funds): Ciortești, Vladeni, Victoria, Mircești, Belcesti, Focuri), in the case of some centers it would be important for a more correct diagnosis and equipment that is not in the obligatory grid of the permanence centers but which in some situations would ensure a higher addressability among vulnerable people and a significant relief of urban emergency departments: imaging equipment (Plugari), electrocardiograph (Ciurea, Deleni), otoscope, sphygmomanometers, defibrillator, aerosol device, secretion aspirator, oxygen (Deleni), biochemistry, ion analyzers (Bivolari, Movileni) or protective equipment, disinfectant, consumables and medicines pan half of Sars-Covid 19 generating a higher consumption of these equipments (Pocreaca, Voinești). At the end of February 2020, the first patient infected with the Sars-

Covid virus19 was confirmed in our country, and since March 2020, important measures have been taken to limit the movement of people. Despite all these efforts, the number of infections increased quite a lot in the summer months, culminating in the autumn months with thousands of infected and hundreds of deaths daily. This situation has further accentuated the rural-urban gaps in our country, the urban medical services being much more difficult to reach the rural population. In the case of permanent centers there are three different situations: centers that have felt the effects of the coronavirus pandemic by increasing the number of patients (Plugari, Pocreaca, Mircești, Victoria) or the number of phone calls in the context of providing consultations and treatment via mobile telephony (Ciurea), centers in which the number of patients decreased significantly during the pandemic, and as a result of restrictions imposed by the authorities (Deleni, Movileni) and centers that were not directly influenced by the effects of the pandemic (Belcești, Focuri, Prisacani, etc.). With the help of the ArcGis program (Network Analyst function) we made a map of the accessibility of the population of Iași county to the permanence centers (taking into account the optimal distance of 30 minutes relative to the road network and the maximum speed limit allowed in traffic).

We can see that there are several areas of influence: the western area served fairly judiciously by Pascani and Mircești permanent center, the northern area provided by 3 permanent centers (Deleni, Plugari and Bivolari), the central-eastern area served by the centers (Vlădeni, Movileni, Victoria, Focuri, Belcești and Podu Iloaei) and the south-eastern area of 3 other permanence centers (Pocreaca, Ciortești, Prisacani), (See fig. 4).

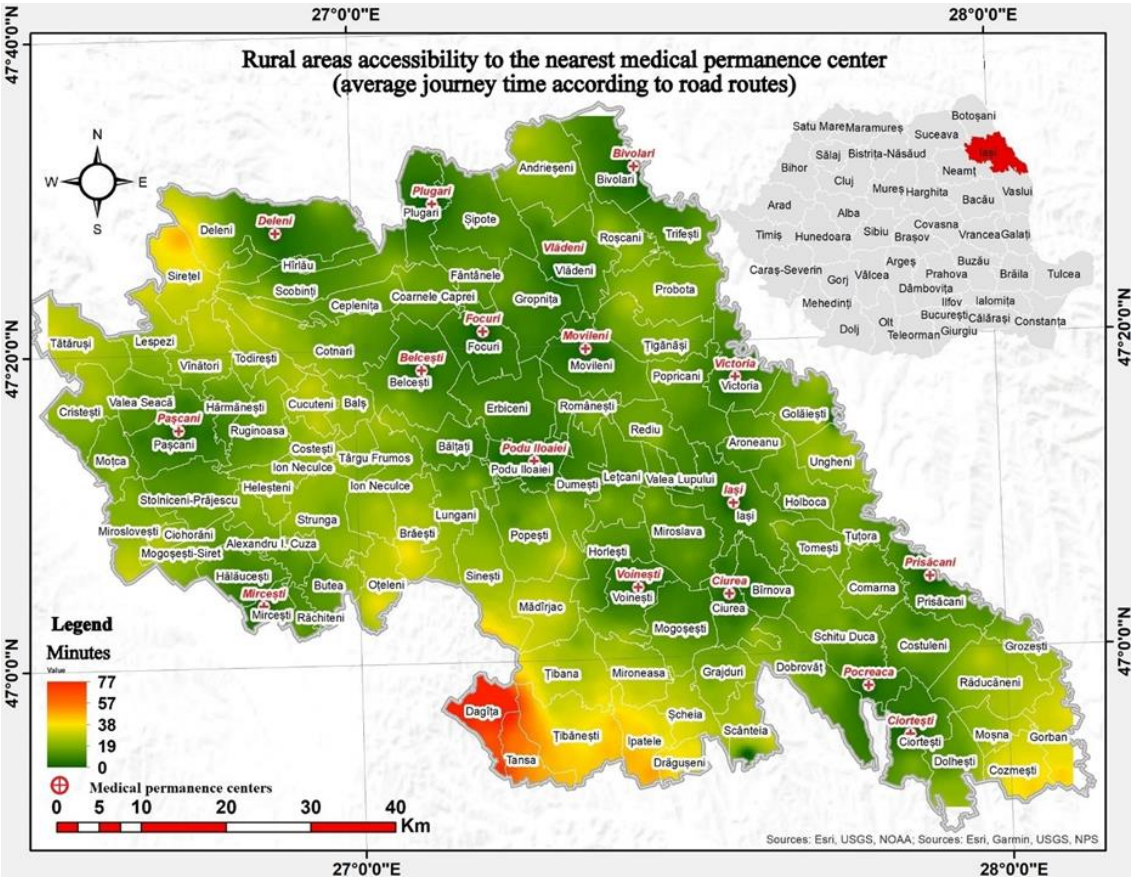

Figure 4. Rural areas accessibility to the nearest medical permanence center in Iasi County

A lower accessibility to the medical services offered by the permanent centers in the rural area seems to have the population from the peripheral communes near Vaslui county: Gorban, Cozmesti, Mosna, Draguseni, Ipatele, near Neamț county: Oțeleni, Braești or from the neighborhood (Sirețel, Deleni). The communes of Dagita, Tansa or Țibanești stand out with the lowest accessibility, the closest permanence center to them being the center from Voinești. The doctor on duty here mentioned to us that he often has to provide medicines at the center because most of the time patients do not have the opportunity to buy any medicines (they do not have a pharmacy nearby) and often come back. with more severe forms of the reported diseases because they do not have access to the prescribed medication. In the urban area of Iași, the metropolitan area of the municipality and the intermediate spaces Iași-Targu Frumos there is a high accessibility and an excellent coverage [6].

CONCLUSION

Primary health care is very important in rural areas because it is the patient's first contact with the health system and is often influenced by a number of factors: difficult geographical access, poor road/rail network, lack of transportation in common or even low standard of living and social status (in the case of Dagita, Madarjac, Țibana and Țibanesti communes important contribution of the Roma community) [11]. As a direct consequence, low accessibility to medical services often leads to postponement of medical care and often to aggravation of pre-existing diseases or late diagnosis, thus increasing the cost of medical interventions and often to premature mortality. As we could see, the permanent centers in the rural area of Iași county serve an important number of patients and also offer the chance for primary health care to the population at a considerable distance from the city of Iași, even if their distribution is somewhat uneven in the territory. This article only partially analyzes the accessibility of the rural population to the permanence centers, a complete analysis also requiring the analysis of the distance from the hospital-type medical centers, the share of young / elderly population, infant mortality, presence / absence of drinking water distribution networks, presence / absence vulnerable communities (Roma), the unemployment rate and the share of the employed population, the degree of education of the population, etc., and last but not least the questioning of the population regarding the degree of addressability and equity among permanent medical centers in rural areas.

Both at county and national level, political support for a series of initiatives to boost the provision of a better-prepared and supported health workforce in rural communities would be essential for sustaining rural health and rural education, very poorly developed in our country [12].

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POST-SOCIALIST URBAN TRANSITIONS AND TRANSFORMATIONS, THE CASE OF THE CITY OF INĐIJA, SERBIA

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ABSTRACT

The cities and their centers, as the most relevant indicators of events and conditions in the society, during the transition period suffered a significant identity crisis, which followed not only as a result of new cultural and ethical patterns of living and participating in the use of the urban environment, but as a result of numerous conflicts and manipulation of public space. Significant social, cultural and spatial changes have taken place in this settlement, and on this occasion the emphasis will be on spatial transformations. Over the last few years, Inđija has been developed and built at high speed. Foreign investors, attracted by the good location of the settlement, invest in this town and many factories are being opened. Industrial zones are being upgraded and industry is being developed. The city increasingly supports culture and education. Spatial transformations have affected both the central parts of the city and the urban periphery. There was a transformation of residential into a commercial space, but also the construction of new, modern business premises. Single-family housing units in central parts of the city are increasingly being replaced by collective housing facilities, while at the same time the number of single-family housing units is being increased on the outskirts of the city.

Keywords: post-socialist transition, urban challenges, transformation, Inđija, Serbia

INTRODUCTION

The most influential and well-known international academic debate on cities in socialist countries emerged in 1980, and this is strongly linked to the French and Hamilton's publication Socialist City: Spatial Structures and Urban Policies [1], and with a large number of scientific articles written by scholars from Central, Eastern and Western Europe [2-14].

In European socialist countries, much has been written about the principles that should trace socialist urbanism and architecture, especially in specialized journals and publications, and many ideas have been adopted from Soviet literature and practice [15]. Here, a socialist city, often opposed to or compared to the capitalist pendant and capitalist urban development, is defined as the rule. This is not, however, a mandatory conception for academic papers written by urban geographers and sociologists.

For example, Hahn and Kahl [16] described socialist cities as cities with particular patterns of functional and class differentiation, corresponding to the historical situation and the past. Matějů [17] used the socialist city category in his analysis of the socio-

spatial structure of Prague. He understood that the structure of a socialist city should reflect new "socio-economic conditions" and a "socialist way of life," and that it should be different from the previous, pre-socialist period [17].

Western authors also tried to study cities in the Soviet Union and in the socialist countries of the time. During the 1950s and 1960s, they first wrote about the "Soviet city," which depicts typical features of cities in the Soviet Union, often reflecting on the consequences of socialist planning principles [18-19]. In later works about European socialist countries, the term "Socialist city" appeared, and the category "Soviet city" or "Soviet socialist city" continued to exist [20]. Thus, for example, Fisher [21] wrote about the theories and principles of planning in a socialist city, as well as their actual implementation and results in the field.

After 1989, attention turned to the analysis of post-socialist cities, showing in particular the processes of rapid change. The socialist era began to be seen primarily as an important episode in history, which established the particularities of these cities in the form of a slow-abandoning heritage. Some conceptualizations of socialist cities have continued in the scientific literature. Smith [22] reiterated the question of the existence of a socialist city as an essential alternative to a capitalist city, and considered the features of the spatial structure that actually call for a comparison of the socialist city with those of Western Europe and North America: general physical organization, socio-economic differentiation, and ethnic segregation. Haussermann [23] explained the characteristics of a socialist city by comparing it to a capitalist one. Other authors have suggested spreadsheets of characteristics of socialist cities [24], their spatial characteristics [25], or models of investment patterns [26], which are then compared not with the capitalist city but with the post-socialist urban changes.

From global perspective, international, national, and local policies since the beginning of the last decade of the twentieth century, as well as the path of dependence based on the communist past, have exerted a tremendous influence on post-communist urban development. Such circumstances have led to an extremely high rate of reform in many areas: privatization of social housing, property restitution, commercialization of city centers, decentralization of housing and retail space under new market conditions, and reforms in public infrastructure investments [27].

Notwithstanding the differences of urban context in countries in transition, one common characteristic is quite easy to spot. The post-communist tradition, over the past twenty years, has had a profound impact on the lives of over 400 million inhabitants of the Balkans, Eastern Europe and the former Soviet Union (Albania, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Montenegro, Czech Republic, Estonia, Georgia, Croatia, Armenia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Hungary, Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Serbia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan). The fact that two-thirds of the population of these countries live in cities justifies the accentuated treatment of cities as major drivers of economic growth during the communist period.

During the early 1990s, many countries in the region experienced a steep decline in living standard, with unemployment rising to as much as a quarter of the population, with expansion and inflation reaching three-digit values. The removal of the state government in almost all communist countries was accompanied, necessarily, by emergency conditions with strong security measures. Restarting the economy posed a huge challenge given the difficult legacy of outdated and inefficient industrial enterprises. The position of residents visibly aggravated by the erosion of personal purchasing power has led to the

collapse of domestic demand, which in turn has led to a sharp decline in investment activities [27].

The implementation of reforms in the 1990s showed significant differences between countries in the region. This result can be explained by the different ways they developed historically. The disintegration of the Soviet Union as a country under the strongest centralized communist influence caused greater challenges and demands for its newly created states than in the countries of Central and Eastern Europe [28], which had a relatively greater degree of economic independence during the communist period, greater potential and a willingness to experiment with marketing-oriented reforms. Countries such as the SFRY and Hungary began their free-market attempts in the 1970s, which continued into the 1980s. However, the progress of some countries in the region has been slowed by the explosion of ethnic wars and conflicts. This has also happened in Serbia, where after the breakup of the old regimes, internal national consolidation and interstate cooperation in these subregions were prevented, and this type of cooperation is actually one of the important factors and bases for a new economic regeneration and speedy recovery [29].

The level of foreign investment received by post-communist countries since the beginning of the transition process has further widened the gap between them. With foreign investment, variations in the pace of economic recovery are closely related to the different historical legacies of the countries. Countries that are both spatially and traditionally closer to a prosperous European Union have benefited significantly from their neighbors, not only in the post-communist years, but throughout modern history. The links that they have made with them through trade and cultural exchange for centuries have been further strengthened since 1989. The experience of transition has shown that the greatest progress has been made by those countries in which state institutions have become directly involved in planning and coordinating the development of global competition in order to attract new foreign investment [27].

As the city is one of the most important spatial pillars of globalization, its consequences have manifested themselves very quickly. Globally, there has been a process in which major cities and large metropolitan areas have drawn secondary and tertiary cities towards themselves in the urban hierarchy, resulting in a slower pace of economic restructuring in smaller cities, towns and villages in transition. This particularly affected all the communist cities, which were planned as centers of certain industries and, on the basis of that production, were the leading centers of their region. With the shutting down of these industrial plants, these lower-level settlements inevitably struggle to find their market opportunities, the so-called niches, in the global investment competition. In such a situation, these settlements faced a future dependence on the financial initiative and, as a rescue solution, they received financial support from the European Union, in the form of various funds.

As a result of external and internal economic, political and cultural factors, a process of urban space restructuring has also taken place. These processes have led to a great number of negative, but also to a number of positive shifts. One of the most significant achievements of the transition period is the sudden increase in the rate of property owners among the population. This process was used as a "shock absorber" to reduce the negative social impacts of the transition period. On the plus side, after two decades of housing reform, residents were offered a greater variety of housing options, including multi-storey buildings, self-contained flats, row houses, and single villas on parcels in suburban neighborhoods, which particularly suited the more affluent sections of society. In this

way, the new housing construction clearly oriented the directions of future development of residential zones and enabled the release of more commercial space in urban centers [30].

Similar processes have affected the non-residential part of the real estate market. In this case too, affluent firms were given the opportunity to choose from a variety of locations, from commercial office spaces and outlets in exclusive city centers, to suburban businesses and retail shopping parks on the outskirts. At the same time, entrepreneurs from the lower classes were given shelves for outdoor trade and redesigned basements and garages.

In addition, there was a significant decline in public service delivery, as construction and reconstruction of public infrastructure and utilities remained on hold for some other better times. Secondly, the privatization process should not only be about taking over the leadership of the economy and the housing sector, but should also be interspersed with the public sector at all levels, which included aggressively appropriating public space for a wide range of private needs and satisfying the appetite of numerous private interests. Erasing the open spaces, small urban parks and large green pieces of urban infrastructure from the face of urban landscape on a daily basis have become a hallmark of spatial changes in the post-communist period. The public interest, as a category that strives for the quality-of-life conditions of citizens, has been made available to the market as the main regulator of change. Privatization became the leitmotif of the transition period. Also, aggressive takeover of public space (streets, squares) by allocating oversized areas for parking of citizens' private vehicles has led to further degradation of functional use of urban space, especially in the central urban area, which often left city centers isolated from their users [30].

Undoubtedly, urban restructuring has been imposed as an inevitable step towards the goal of achieving a modern democratic order, but its consequences have left a clear mark on the spatial potential of most cities, which in the coming period will need to invest a lot of knowledge and money to return to the real and a sustainable path.

The socialist socio-economic system has failed to create a post-industrial city. Namely, since the 1970s, there has been a restructuring of economic and social life in major urban centers in developed societies due to the emergence of post-industrial society. The post-industrial city is characterized by de-industrialization, changes in production structure, labor market and professional structure. The secondary sector is declining, the tertiary and, in particular, the quaternary sector is growing rapidly. There is a shift from production of goods to the development of the service sector. These changes in the economy have also brought about changes in the nature of the need for real estate, the increasing demand for the office space, space for shops, hotels, light industry, storage, and more [31].

Has the post-socialist transformation had spatial consequences? An increase in the level of urbanization could be expected due to the restructuring of the economy and a decrease in the rural population. Socio-political differentiation has gradually led to socio-spatial segregation, through the process of suburbanization, the relocation of middle and upper classes to the outskirts of the city, or the process of gentrification, urban redevelopment of inner urban areas, into which members of higher social groups move in with the displacement of their previous poor inhabitants.

The consequence of socialist urban policy, on the one hand, was the homogenization of the city's socio-ecological structure, and on the other, the underutilization of space in prestigious places in the inner city. Commercial space is part of a "built environment"

that clearly shows the difference in land use in a socialist and capitalist city. The central parts of large capitalist cities are highly commercialized and housing functions very limited, while socialist cities are characterized by a lower level of business and retail space and a higher share of downtown housing. Differences are also evident in the suburbs of these cities. In general, retail was underdeveloped during socialism, with existing stores located in the city center, while in the suburbs the development of retail stores lagged behind in housing construction [31].

The redistribution of the existing commercial space took place in the first years of transition, and there was a transformation of the residential space into a commercial one. The general lack of commercial space, especially high quality one, led to the construction of new commercial buildings. Initially, business premises were the ones most often built, but later retail and storage facilities and light industry started being built as well. Demand first came from start-ups, in the mid-1990s, existing companies expanded, and then sought a much larger space with good traffic links, which could also be outside central areas, thus beginning the process of suburbanization of commercial content.

The retail sector has undergone radical changes in its spatial structure in the 1990s. Lower order sales e.g., vegetable and grocery stores have been squeezed out of the center, with exclusive shops, which can pay a high rent, opening in their place. The result of this is the city center becoming a specialized shopping area. The novelty is the emergence of street commerce among residential blocks and along major streets. For many citizens of the post-socialist city, their experience of capitalism is linked to street sales and the informal economy [32].

Opening borders has led to a sharp rise in trade in post-socialist cities. EU Countries or candidates for admission to the EU and EU bordering countries are trying to institutionalize the exchange more and more. The successful privatization of retail in these countries has suppressed street commerce, thus it plays a small role. In countries with major economic problems, it continues to be a substitute for the failing retail sector. The highlight of the development of the retail sector is the construction of large shopping centers, the entry of international retail chains into post-socialist countries [31].

GEOGRAPHICAL POSITION OF THE RESEARCH AREA

The Municipality of Inđija is located in the northeast of Srem District. It covers the area of 386 km². The geographical location of Inđija is favourable, both from natural and anthropogeographic point of view. Natural factors contribute to the favourable location, as the settlement was erected on the woodland plateau and in the valley of the Inđija stream.

Anthropogeographic factors contribute mostly for traffic reasons. The city was built next to the roads connecting Novi Sad and Belgrade (highway and railway). It is 35 km away from Novi Sad and 40 km from Belgrade (Figure 1). The gravitational pull is felt from both cities. Belgrade's influence was strengthened after the construction of the Novi Sad-Belgrade highway. Administratively, it represents the central settlement of the Municipality and is connected with all municipality’s settlements by local roads.

Inđija is the only urban settlement in the territory of the Municipality. The altitude of the city is 113 m. The coordinates of Inđija are 45˚ 03' northern latitude and 20˚ 05' eastern longitude.

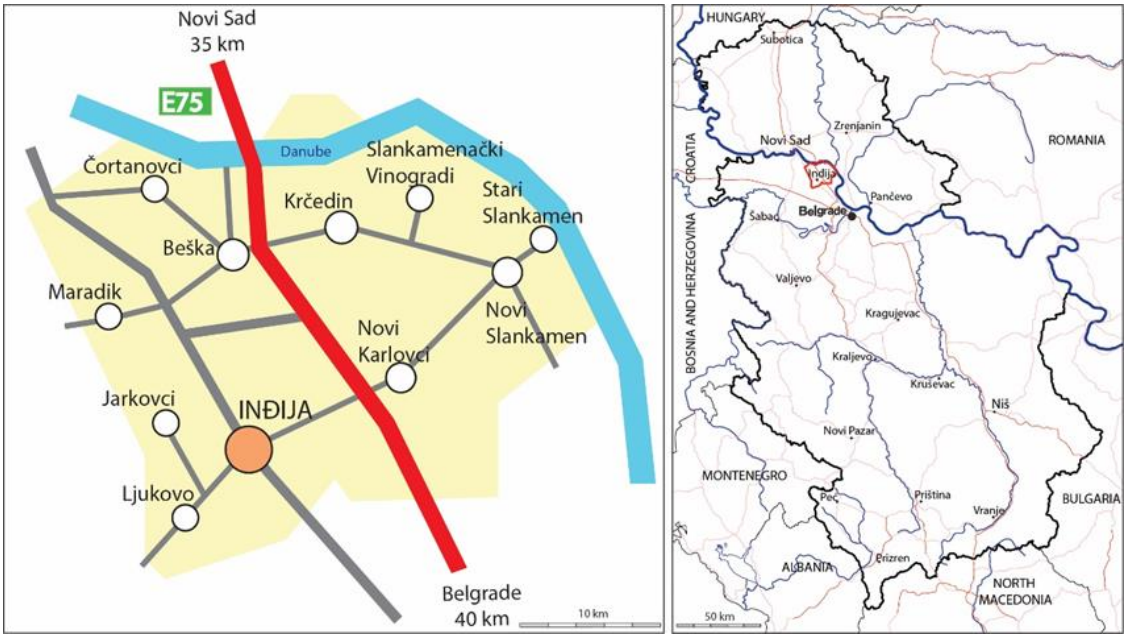

Figure 1: Geographical position of the research area.
Source: author's processing

SPATIAL TRANSFORMATIONS OF INĐIJA DURING THE TRANSITION PERIOD

The gravitational influences of Novi Sad and Belgrade are strongly felt in the area of Inđija. Inđija took advantage of these circumstances, so that, above all, craft and trade functions are represented here, which are largely in the service of the economies of these cities. All other city functions are represented as average for central places [33].

Over the last few years, Inđija has been developed and built at high speed. Foreign investors, attracted by the good location of the settlement, invest in this town and many factories are now being opened. Industrial zones are being upgraded and industry is being developed. The town increasingly supports culture and education. The reconstruction of the road network, the elimination of water supply problems, the development of agriculture, etc., are underway.

In the process of transition, the structure of economic entities in the economy of Inđija has significantly changed both in terms of activities and number and size of the business societies. Traditional activities, which were the bearers of economic activities until the year 2000, practically ceased to exist during this process (textile industry, leather processing, furniture production, production of rubber profiles, etc.) or survived only in the field of entrepreneurial economy.

With a new, strong investment cycle in Inđija factories have been opened, mainly by foreign investors, in completely new industries, such as cigarette production, auto parts manufacturing, meat processing, production of LPG equipment, battery recycling, production of brand new materials for the construction industry, new service activities, as well as the construction of facilities in the area of trade - new types of shopping and business centers with facilities that significantly improve the living conditions of all citizens of Inđija.

Today, the economy of Inđjija is dominated by small and medium-sized enterprises, which are much more flexible when it comes to meeting the challenges of a market economy, which has made the effects of the global economic crisis reflecting on their

business operations to be minimal. There are over 2,000 businesses - over 1,500 entrepreneurs and about 600 companies. They are mostly greenfield investments, while there are also brownfield investments.

The largest investor in the municipality of Inđija is the Danish Grundfos, a pump and compressor production company, with an investment value of €50 million, followed by the Fashion Park Outlet Center of the British company Black Oak Developments (initial investment of €25 million). €21 million investments were made by Metal Cinkara from Slovenia and Energoselen, a modern Category 1 animal waste processing plant owned by Greenworx Holding (51%), Saffelberg Investments (37%) and Ecotech Solutions (12%) [34].

Also, worth mentioning here is the arrival of the Indian company Embassy Group, which has built the first phase of an IT facility, Park IT, in Inđija, with an initial investment value of €15 million. There are also "Thyssen Krupp" from Germany (12 million euros), "Terraproduction" from Serbia (11 million euros), while 8 million investments are made by "Henkel" from Germany and "Farmina Pet Foods" from Italy. Another Italian company for the production of concrete products intended for construction, which has been operating successfully since 2010, is Martini gradnja, whose investment amounted to 6 million euros [34].

The German company "IGB Automotive" which deals with the production of electronic and electrical equipment for motor vehicles, has the greatest number of employees. In 2007, the company's investment amounted to €11 million. Since then, this investor has built and enlarged its own production facilities and today has over 1,200 employees, 90% of which are women [34].

One of the latest investments in the series is made by the Indonesian company Indoadriatic Industry engaged in the production of noodles under the license of "Indofood". The value of this investment is €11 million [34].

Inđija has two fully functional, communally equipped industrial zones, which place Inđija at the very top of the Serbian offer in terms of potential and attractiveness for investing. Most of the new facilities are located in the northeastern industrial zone.

The formation of industrial zones enabled the construction of new capacities, as well as the possibility of permanent dislocation of all production capacities from the central and residential part of the settlement, which is primarily reflected in the quality of the environment in the settlement, as well as the quality of working and production conditions. In this way, industrial zones are clearly differentiated, being the most striking spatial transformations that Inđija experienced (and still experiences) during the period of transition. The northeastern and southeastern suburbs are now made up of factory complexes, which are clear benchmarks in the area, giving these parts of the town a specific character and a distinctive external physiognomy of the settlement.

One of the features of the transition period is the construction of out-of-town shopping centers. Such facilities include outlet centers, often designed as small towns. Designed as places to sell wardrobes from previous seasons, with constant sales, with accompanying leisure and recreation facilities, and counting on longer visitor retention, outlet malls should not compete with downtown shopping malls. Fashion Park Outlet Center Inđija is the first shopping destination of its kind in Serbia. The first outlet center in Serbia is the BlackOak Developments project. The Fashion Park Outlet Center in Inđija is an integral part of the planned Retail Park, a 60-hectare complex that will consist of a hotel, an aqua park and a logistics center [35]. This complex has a very good traffic position because it is located in the northeastern industrial zone, next to the E-75 route, easily accessible for

the residents of Belgrade and Novi Sad, as well as buyers from other parts of Serbia.In addition to the visible transformations of the urban periphery in the form of industrial zones, changes have taken place in the central parts of Inđija since the 1990s.
At the beginning of the transition period, the growth of the tertiary and quaternary sectors was noticeable. The service sector needed office space, shops, warehouses, light industry facilities. As a result of the rapid demand for new office space, a transformation of residential areas into commercial ones occurred. Such transformations are most visible in the central streets of Inđija – Kralja Petra I Karađorđevića Street, Novosadska Street, Vojvode Stepe Street and Cara Dusana Street.

Figure 2. Examples of converting a residential area into a commercial one in King Peter Street. Source: author's archive

Figure 3. Examples of converting a residential area into a commercial one in King Peter Street. Source: author's archive

The lack of high-quality commercial area has influenced the construction of new office buildings. One of the first buildings erected is Sloboda Mall in the center of Indjija. Today it houses numerous banks, insurance companies, shops, cafes.
Apart from that, buildings have been built in central city streets, especially since 2000, combining work and housing functions. Most often, these are multi-family residential buildings, up to five floors high, the lower floors of which house banks, shops, bakeries and various other facilities.

Figure 4. New construction in central parts of the city. Source: author's archive.

Figure 5. New construction in central parts of the city/ Source: author's archive

The pinnacle of development of the retail sector in postsocialist cities is the construction of large shopping centers. One good example of a more recent date is the Tradeunique City Shopping Center, built on the corner between Vojvode Stepe and Dušan Jerković Streets. The complex covers an area of 50,000 m2, including a megamarket, boutiques, cafes, administrative and commercial premises, underground garage [36].

Figure 6: TQ City Mall. Source: author's archive

This property is located in the middle of Vojvode Stepe Street, which is the main promenade in the city. Together with the numerous service facilities located in this street (the section between Sloboda Mall and TQ City Mall), the city center was differentiated as an area designed mainly for shopping. In addition, post-socialist cities are characterized by street trade along major roads and blocks, as well as the arrival of the international sales chains. Objects of this kind can be found in the center of the city or in the driveways. Mixed-goods retail outlets are usually located near the city center (Fig. 15), while warehouses, building material shops, furniture and car salons are most often located along the access roads, starting the process of suburbanisation of commercial contents.

Figure 7: Idea megamarket on the road to Novi Sad. Source: author's archive.

Today, residential areas also represent very intensive construction areas. These are mostly collective housing buildings that are inserted between individual dwelling houses. It is a recognizable, contemporary type of construction, which is characteristic of all Serbian cities today. Often these are buildings that are being built in the shortest period of time, with minimal investment and numerous construction and infrastructure failures. Their aesthetics is often the subject of much discussion. All of this distorts the identity of this small town in Vojvodina, which was characterized by German houses of richly decorated facades.

Figure 8: Contemporary construction in the central part of the city.
Source: author's archive

When it comes to the housing area far from the city center, one can distinguish two zones. The first zone is the Šangaj settlement in the western part of the city, and the second zone is the Boško Buha settlement in the northern part of the city. These are also two zones in which Inđija is expanding its urban area. The Šangaj settlement is being more intensively built with the arrival of refugees from war-stricken areas of the SFRY during the 1990s. The houses are very spacious and richly decorated. In the northern part of the city, in the Boško Buha settlement, behind the city cemetery, identical houses can be seen.
Another feature of the transition period is the process of suburbanization. Although one cannot speak of the forms of suburbanization that have been achieved in the American suburbs, certain forms of spatial transformation are also evident in the suburbs of Inđija. Namely, at the entrance to Inđija from the direction of Novi Sad, the construction of magnificent houses and villas of interesting architectural solutions, with spacious and beautifully landscaped courtyards, can be seen lately. It can be concluded that the owners come from the wealthy class.

CONCLUSION

The urban core of Inđija dates from the end of the 19th and the beginning of the 20th centuries, from the period of industrial development and the settlement of German people. After 1945, garden areas disappeared. They were replaced by new homes in new streets, garages, and craft workshops. After World War II, the first multi-family residential buildings in Inđija were built, in today's block no. 63 and along the main town road. Settlements were being expanded and new single-family housing zones were being formed as well as industrial zones. Also, new business and public facilities were being built. Since 1990, construction of office buildings and multi-family residential buildings has been intensified.
Over the last few years, Inđija has been developed and built at high speed. Foreign investors, attracted by the good location of the settlement, invest in this town and many factories are being opened. Industrial zones are being upgraded and industry is being developed. The city increasingly supports culture and education. Inđija is one of the most developed municipalities in Serbia today, much invested in.
Spatial transformations have affected both the central parts of the city and the urban periphery. There was a transformation of residential into a commercial space, but also the

construction of new, modern business premises. Single-family housing units in central parts of the city are increasingly being replaced by collective housing facilities, while at the same time the number of single-family housing units is being increased on the outskirts of the city.

The geo-traffic position of Inđija has exceptional benefits and a positive impact on its future urban development. The municipality of Inđija is located in the area of influence of the capital, Belgrade, as well as the macro-regional center of Novi Sad, which will continue to have an impact on its development. The available potentials for the development of the city of Inđija are the following: geo-traffic position, connectivity with the region and cities, market, facilities and investments, developed services and economy, built infrastructure, available industrial complexes and zones, natural resources, human resources and institutions.

Along with the assumptions of further development, problems and limitations for further urban development of Inđija also arise. These problems relate to the review of the boundary of the construction zone of the settlement, i.e., the reduction of agricultural land in favor of construction land. The goal of industrial development is, in addition to the more dynamic development of existing industrial capacities, the development of new innovative high-tech activities (industrial-technological park), which will take advantage of the strategically important position of the municipality of Inđija while attracting investors, in accordance with environmental protection.

Assuming that a certain area for future housing construction will be provided in the existing housing zones, the reconstruction of the existing housing stock and construction of a new one should also provide large areas for new housing constructions. Due to all this, new spatial transformations can be expected in a town which, unlike most towns in Serbia, is intensively developing.

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ANALYSIS OF THE ELECTORAL RESULTS FROM THE ROMANIAN LEGISLATIVE ELECTIONS IN 2020

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ABSTRACT

Electoral periods have always been a challenge for representative parties to gain new supporters, but also to get closer to the population, and the context of the Coronavirus pandemic has been a barrier to traditional election campaigns, requiring their relocation to the online environment. The main target of the online campaigns was the young population, while the street election campaigns wanted to convince the majority of the adult population, who do not spend much of their time in the online field. The central objective of the study was to identify voting trends at the national level, but also at the regional level. The secondary objective of the study was to identify the influence of national minorities in the Romanian legislative elections, based on a significant population of ethnic Hungarians in certain counties. The aim of the study was to provide a point of support for electoral statistics and to be translocated to cartographic materials, to facilitate their understanding. The results of the study certify that there is a regionalization of the electoral results, with small exceptions, and the party representing the ethnic Hungarians won detachedly in the counties where they are the majority.

Keywords: electoral geography, election campaign, online, political parties, social media

INTRODUCTION

Politics is an extremely important challenge since ancient times for people who are involved in the political act, but also for people who have the responsibility to choose the representatives of this political class, and will have extremely relevant implications from an economic and social point of view, politics is often characterized as a mirror of a society [1][2][3][5][6]. Due to the complexity of the political act, it often manages to remove the population from exercising the right to vote, the common mentality being directed towards an overwhelming distrust in what could change the voting results, but the representatives of political parties manage to create extremely complex plans to create possible political niches, based on an extremely well-analyzed national territorial reality [8]. The creation of political niches could not be achieved without knowing the territorial reality at local, regional and national level, through the complex and dynamic nature of the target population, election campaigns must be well managed and directed to increase the political potential in that area. Thus, the research wants to identify and analyze which are the dominant niches of the political parties that have managed to gain trust at the local

level (by counties), but also at the regional level (in the social and cultural regions of Romania) [4][7][11]. Cultural diversity at the national level contributes to the differentiated development of the state, from an economic, social and cultural point of view, which introduces into discussion the need for a sectional analysis of the human component, especially in political processes [9][10][12]. Due to the fact that Romania represented a border point between the communist space and the western space, there are territorial differences in the political mentality of the people, observing a character of direction towards liberalism and central policies for the western population, a majority direction towards social democratic ideology in areas with a low economic and educational level, but also a gradual increase in the level of trust in the Social Democratic Party, which takes place on the west - east axis [13].

Figure 1. Regional map of Romania

METHODOLOGY

The research proposes to analyze the existing cultural and social differences on the territory of the state, these taking place on the basis of extremely complex factors, including proximity to different ideological areas, educational and economic level, but also the general mentality and attitude. of the population towards the political process. These cannot be analyzed without the existence of pre-existing regions, such as Romania, which has eight different regions, from a social and cultural point of view, namely Banat, Crișana, Dobrogea, Maramureș, Moldova, Muntenia, Oltenia and Transylvania (Figure 1). The research was developed based on data provided by the Central Electoral Bureau, the authority that administers citizens' votes and provides final results in the electoral process, provided in the form of data tables, transformed into cartographic materials (for each region) using inkScape 0.91 software.

RESULTS AND DISCUSSIONS

The Banat region is characterized by a trend of acceptance towards the liberal or central part of the political scene, through the residents' preferences towards the PNL and

USRPlus parties, obtaining scores of over 29% in both component counties. Due to the high degree of development, from an economic and educational point of view, the Banat region proposes a promotion of free political principles at local and regional level. The aggressive political promotion carried out by the liberal parties in this region of the country is based on a historical foundation based on the desire for freedom, but also on removing the communist historical premises from regional and national level, this region being the beginning of the communism fall since 1989. (Figure 2).

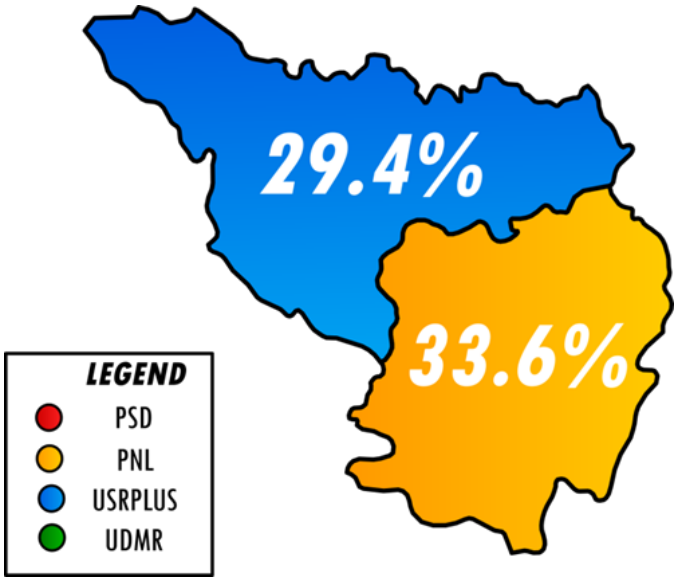

Figure 2. Electoral results of the legislative elections - Banat (2020)

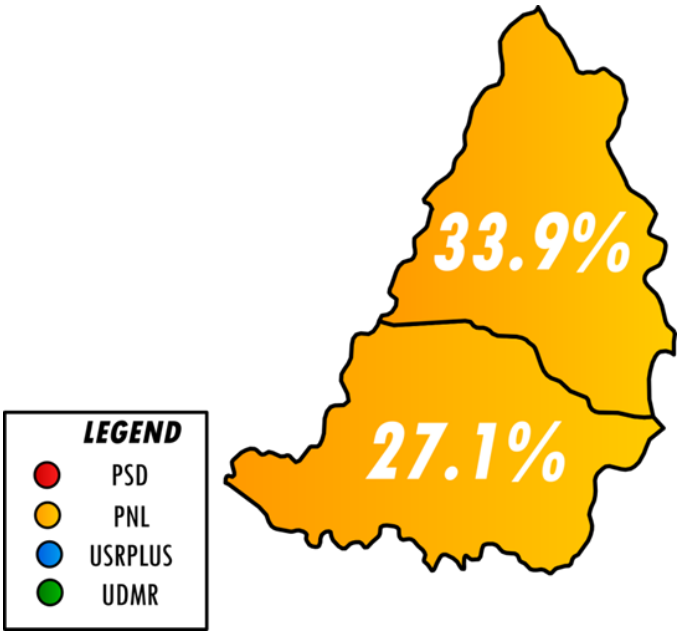

Figure 3. Electoral results of the legislative elections - Crișana (2020).

Together with the Banat region, the Crișana region manages to create a longitudinal strip of liberal and central influence in western Romania, based on a cultural rapprochement between the two regions of Romania, but also on an extremely beneficial collaboration in all possible sectors. History is also decisive in the case of this region, as the proximity to a non-communist area allowed exchanges of information, ideologies and cultural

exchanges during the Romanian communist period, which facilitated the fixation of the concept of economic, social and cultural freedom in mentality. of residents in this region. Also, from a historical point of view, the area was an important point in the Austro-Hungarian Empire, which contributed to the creation of specific features that are visible today (Figure 3). All the regions (Banat, Crișana, Maramureș, Transylvania) that were components of this old empire are today poles of a liberal policy, in a process of interpenetration with the parties representative for the old Hungarian communities in the country (UDMR).

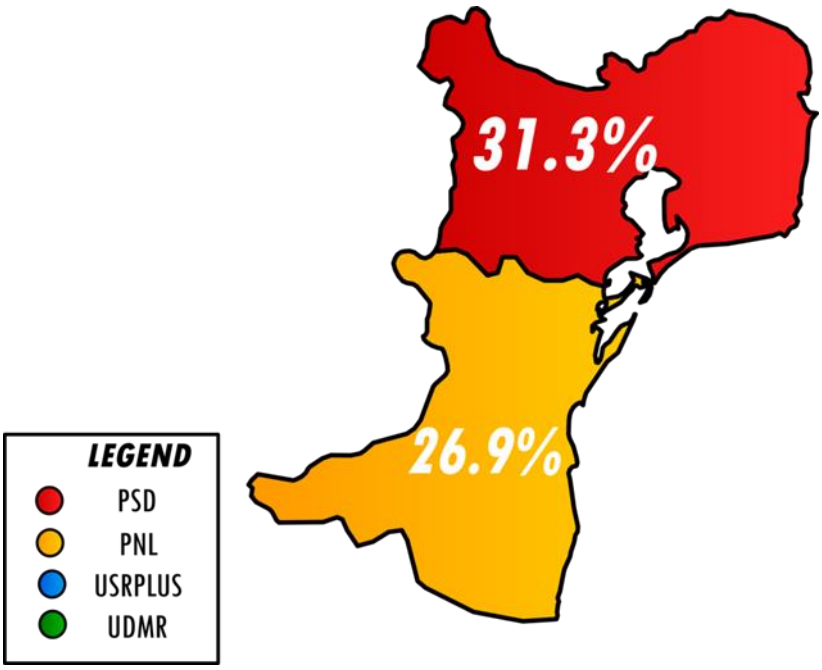

Figure 4. Electoral results of the legislative elections - Dobrogea (2020).

The Dobrogea region has always represented an extremely relevant space for the leaders of the political parties, by opening a multitude of development possibilities in the coastal area, especially in the naval area or in the port area of Constanta. The component counties are in a complete antithesis, through an increased restrictivity of the Tulcea area, and an extremely vast possibility of expansion for Constanta county, which led to a digression of political forces towards the second county, which has a mentality. more open to liberalism, opting for the main right-wing option, namely the National Liberal Party, in contrast to the option of Tulcea County to the Social-Democratic Party, illustrating the differences in mentality between the two administrative areas. (Figure 4)

The Maramureș region is a northern continuation of the liberal band in western Romania, continuing through Crișana and Banat, thus offering a western border with right-wing political ideology, with the exception of Satu Mare county, where the Hungarian predominance of the population is felt in the elections electoral. 37.9% of the voting population trusts the representative party of the Hungarian community (UDMR). The differences between Satu Mare and Maramureș counties are produced due to the fact that the Hungarian predominance is found only in the first, through direct contact with the Hungarian state, while Maramureș has direct contact with the Ukrainian state. (Figure 5).

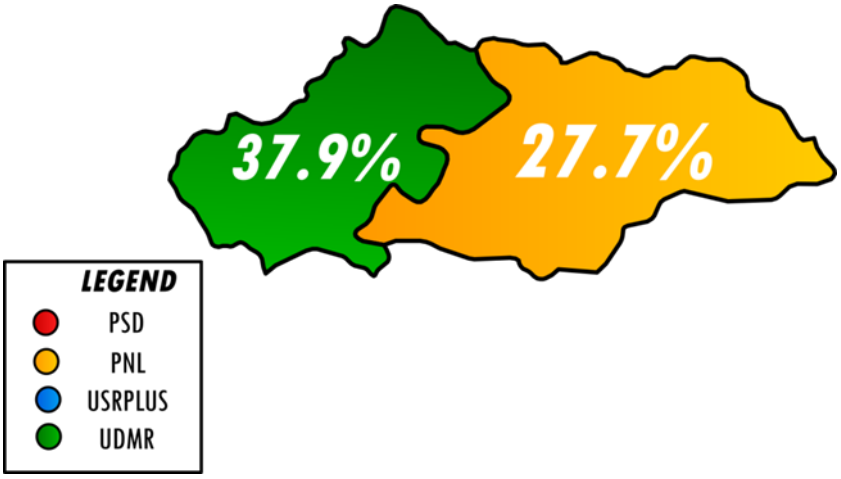

Figure 5. Electoral results of the legislative elections - Maramureș (2020)

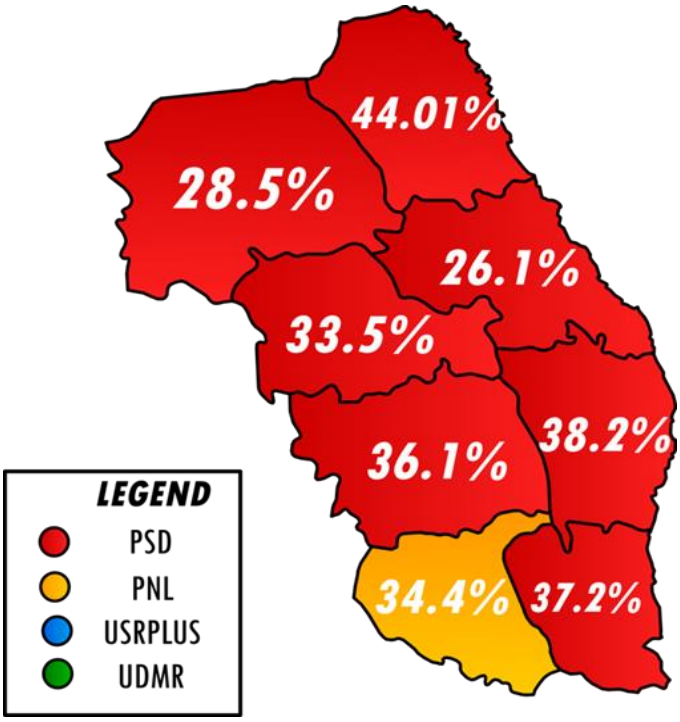

Figure 6. Electoral results of the legislative elections - Moldova (2020)

Moldova presents a resurgence of political ideology in the Social Democratic Party, offering the confidence of seven out of eight counties in the region, with the exception of Vrancea County, which has a dominance of liberal doctrine. The local differences are visible, despite the victory of the counties by the Social Democratic Party, the scores vary between 26 - 44%, which betrays the presence of a different trust at regional level. Proximity to the USSR (during the communist period) developed a mentality towards socialism, then adapting to the concept of social democracy, further gaining the trust of residents in the region of Moldova (Figure 6).

Muntenia is one of the largest regions of Romania, and through the vast territorial expansion is introduced into discussion the need to section the economy based on existing resources. Despite an almost exclusively agricultural profile, the southern area benefits from its location in the Danube meadow, which facilitates the development of this important economic sector for the entire state, thus offering political potential. From an

economic point of view, the area also has vast potential for shipyards and the industrial sector, thus providing premises regarding the sectors in which the population operates, the necessary level of education for performance in these sectors, but also the differentiated political mentality. with the western area, in view of the fact that the border continues with a partner communist area. Thus, at territorial level we distinguish a dominance of the social-democratic ideology, through the PSD representative, who manages to obtain eight out of ten counties of Muntenia, with weights of over 32% for each, except Giurgiu and Ilfov counties, aimed at the liberal profile. The city of Bucharest was won by the representatives of the USRPlus party, a party with a central, pro-European and anti-corruption ideology, thus illustrating the fact that the national administration is not in line with the level expected by the inhabitants of the capital. (Figure 7).

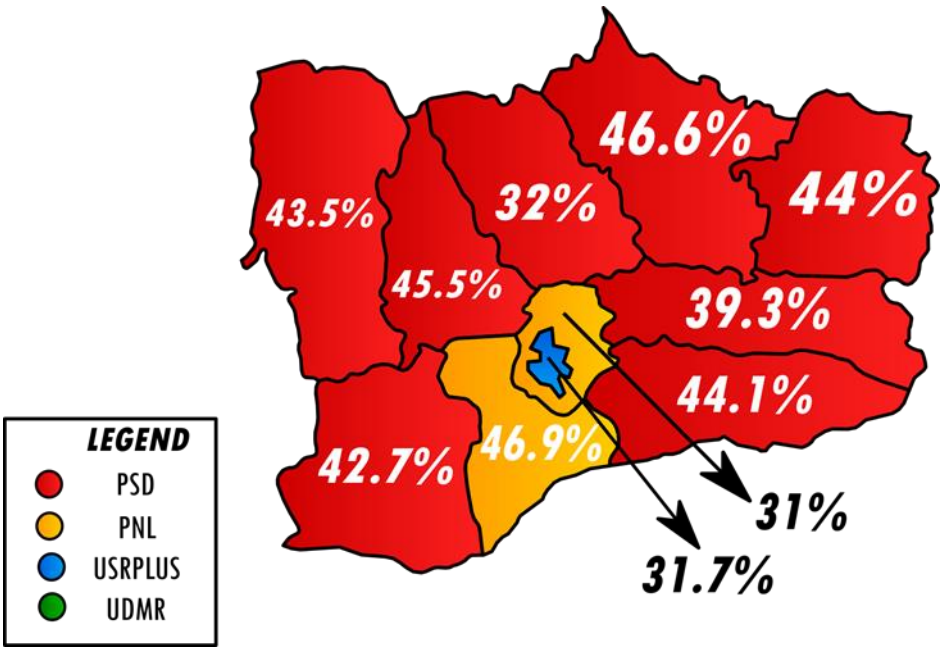

Figure 7. Electoral results of the legislative elections - Muntenia (2020).

Oltenia is the only one of the Romanian regions that presents a predominant ideology for the entire territorial reality, the social democracy thus managing to obtain here an extremely beneficial pole for dissolving the existing political niches, thus providing the necessary to win the political race with right-wing political opponents. Confidence in the social-democratic ideology is extremely visible, with weights of over 39% for all the analyzed counties, obtaining a maximum score of over 58% in Olt county (Figure 8).

The confidence of the Oltenia population continues in Transylvania, in a single county, namely Hunedoara county, the Social Democratic Party obtaining the trust of over 39% of the voting population, unlike the Transylvanian trends, trusting the center and right parties, but and in the parties representative of the Hungarian population. The counties of Mures, Covasna and Harghita are known for a majority dominance of the Hungarian population, proclaiming their area as the Szekler Land, thus offering the minimum necessary for the UDMR party to enter the Romanian Parliament and to be involved in national decisions. USRPlus earns the trust of the people of Brasov, with a share of 27%, a small share compared to the neighboring counties, but sufficient to obtain dominance. The liberal zone of Transylvania is composed of the counties of Salaj, Bistrita, Cluj-Napoca, Alba and Sibiu, counties in which the National Liberal Party obtains the trust of

over 27% of the voting population, reaching the maximum point in Sibiu (41.7%), through increased trust in the relationship between the president and the National Liberal Party, as the president Klaus Iohannis is the former mayor of Sibiu. (Figure 9)

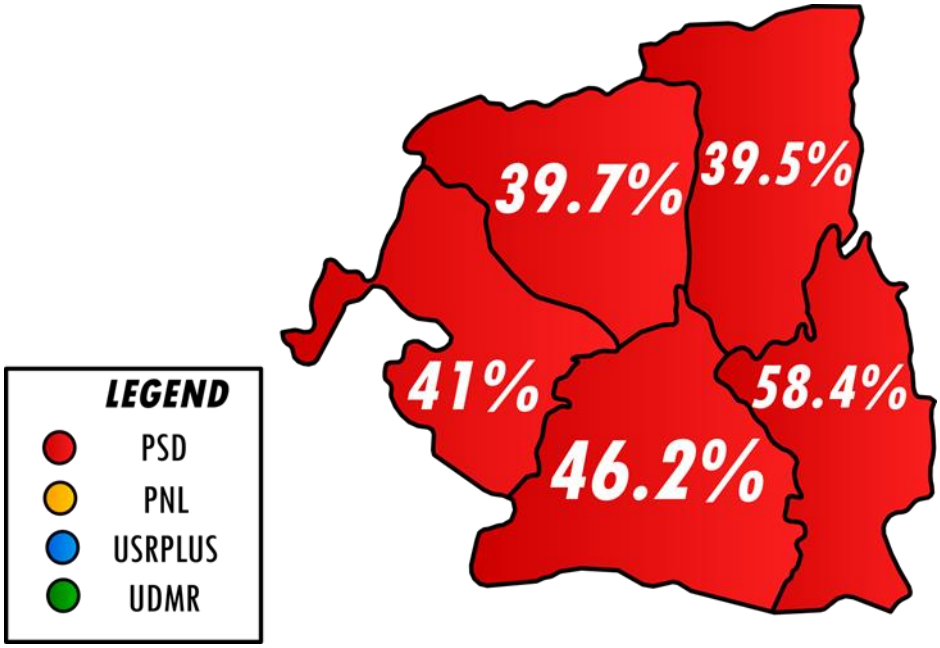

Figure 8. Electoral results of the legislative elections - Oltenia (2020).

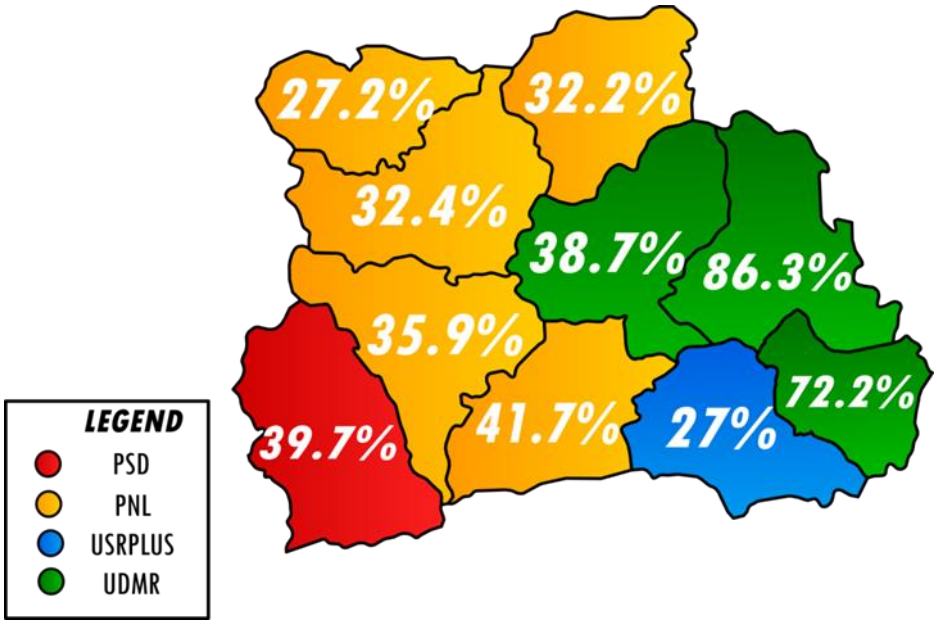

Figure 9. Electoral results of the legislative elections - Transilvania (2020)

CONCLUSIONS

The research managed to meet the main objectives and to identify the main areas of interest for important political parties, identifying a dominance of liberal doctrine in western Romania, especially in the regions of Banat, Crișana, Maramureș or Transylvania, but also an extremely intense influence. of the Social Democratic Party in Muntenia and Moldova. Also, the secondary objectives were met, by illustrating the

relevance that the Hungarian communities have on the national political decision, UDMR benefiting from important gains in Satu Mare, Mures, Covasna and Harghita counties, already known for the ancient ethnic mix with the local population.

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ATTITUDES TOWARDS MARRIAGE AND THE DESIRED NUMBER OF CHILDREN IN NORTH MACEDONIA

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ABSTRACT

This time of social change that we all live in, goes along with the population natural change as well. The vital statistics data regularly published by the State Statistical Office are really good pointers to the changes that have taken place in the marital and reproductive behavior of the population in the country. They are also the basis for calculating the main population indicators and indexes. Unfortunately, they don`t provide data related to the attitudes towards marriage and the desired number of children, family planning, the reasons that have caused these changes nor analysis of the changes that occurred as a result of the few population policy measures implemented so far.
The study in the paper is based on the analyzes of the results from the conducted anonymous survey "Attitudes towards marriage and the desired number of children", with more than 3,000 respondents of reproductive age in North Macedonia, i.e. women aged 15-49, and men aged 15-64.
The results from the survey showed significant differences between the answers of women and men, and they also differed depending on the age of the respondents.
Therefore, the study recommends several effective institutional strategies and population policy measures in order to overcome the challenges related to population natural change and to reduce the contemporary regional differences in population development.

Keywords: attitudes, marriage, children, survey, North Macedonia

INTRODUCTION

Attitudes towards marriage and divorce are of interest to demographers, geographers, and the general public as they greatly influence the family formation, family composition, and fertility [7]. Marriage (partnership) and family (parenthood) are very important life goals that are at the level of preferred values and life practices [2]. Namely, analyzing marital behavior is approached in terms of its importance for fertility, bearing in mind that marriage is a framework in which population reproduction most often occurs [6].
The changes in marital behavior do not occur in isolation. They are closely related to the socio-economic changes and are in line with the characteristics of modern society, such as the process of urbanization, the long-term educational process, the increased opportunities in the consumer society, the emancipation of women, the aspiration for personal success, individualization, etc. The main reasons that conditioned these changes in the number of marriages are in the sphere of socio-economic conditions, pronounced differences in the population gender and age structure at the regional and local level, migration, social and political changes, state stability, transition process, and more [8].
The administrative data sources are usually limited because they only consist data that citizens are required to provide to state institutions. Therefore, it was necessary for these

data to be upgraded with empirical research using survey technique, with a questionnaire as an instrument, as could be analyzed the population opinions and attitudes. The structure of every attitude can be explained and understood with three aspects: the one that involves a person's feelings or emotions, the second aspect is behavioral and includes the way people act or behave, and the third one involves person's belief or knowledge [10], [14]. The opinions and attitudes are facts and data which processed and analyzed can represent important scientific conclusions. Therefore, it was conducted this empirical research which resulted in an extensive fund of information.

METHODOLOGY AND LITERATURE REVIEW

Demographic data, i.e. population data have multiple meanings. They are used to analyze and display certain conditions, monitor changes and regularities of development. In that sense, they have a scientific meaning, but they are also applicable. Without this data, serious population research cannot be realized, but they are also a basis on which complementary methods can be applied.

Choosing an adequate method in the research process in any scientific discipline is a very important and complex task. Usually, for a more detailed and complete study of the population, for a serious perception of the situation and clarification of everything that happens within a particular population are used empirical researches. In order to directly, objectively, and practically obtain information and data on what is the subject of research, and which further will contribute to a more detailed acquaintance with the studied phenomena and processes are used these types of researches. It is a special chain link in the complex process of analyzing the population, which often appears as a starting point or a complement to the theoretical research of the population. In fact, through their organization and implementation, in-depth research of the population is carried out. They can be defined in different ways, but, most often, they are seen as well-organized activities through which information and population data are collected, which are further the basis for additional and thorough researches.

The phenomenon we want to know or to research is called the population, and the part we study is called a sample. For the sample to be representative, it should poses features similar to the basic set or it should be the basic set shown on a smaller scale. The sampling method is based on the examination of a relatively small number of randomly selected persons, in order to obtain information on the observed mark of the entire population [13].

Due to the fact that the purpose of the empirical research is to directly, objectively, and practically collect data and information, a survey was conducted, online and in the field. The online survey was conducted using the Google Docs forms tool. Using this tool, the questionnaires were answered online and the results were available at any time, even before the survey was completed. The random sampling approach was used for the survey, and the survey, which lasted several months, ended in February 2019.

Although the field survey is a relatively longer and more expensive method of research, it is still one of the most valuable and accurate ways to gain insight into the surveyed population. The field survey for the needs of this research was conducted by distributing questionnaires to randomly selected respondents, but also to students from 4 high schools in 4 urban municipalities in different parts of the country (Kisela Voda, Chair, Kumanovo, and Kichevo), as well as students from the Ss. Cyril and Methodius University in Skopje, Faculty of Natural Sciences and Mathematics.

From the total number of respondents included in the survey, due to incomplete questionnaires and due to inappropriate age (age outside the fertility period), their number

was reduced to 3,170 responses. They belong to different age groups of the fertile period in a person's life, i.e. between 15 and 49 years of age for women and 15 to 64 for men.
The survey was conducted on the basis of a previously prepared questionnaire consisting of 26 questions, of which 18 were closed and 8 were the open type of questions. Two of the questions were Likert scale [3] type of questions, with an agreement scale of five-points used to measure respondents' attitude towards marriage and having a child. The answer to 25 questions was mandatory, while in one of the questions the respondents had the option to choose whether to answer or not. The questions were divided into three sections:

- The first section referred to the attitudes of the respondents towards marriage and marital behavior (11 questions);
- The second section was composed of questions about the attitudes towards the reproductive behavior and family planning (8 questions);
- While the third section was composed of personal questions for the respondent such as gender, age, ethnicity, education, activity, and place of residence (7 questions).

The respondents have different levels of education and different marital status, in order to get a more realistic picture of the opinions and attitudes of the population when it comes to marriage and fertility. Anyhow, the main target group was the opinion and attitude regarding this particular issue of the population with higher educational level, which is people with a college, master or Ph.D. degree, due to the fact that this kind of data is not available elsewhere.
In order to analyze the population, it is more than necessary to make statistical data processing. The analyzes were conducted using Microsoft office excel 2013, to create tables and figures based on the survey data, and the goal was to obtain an overview of the given problem.Fertility and marriage in North Macedonia have been the subject of research in numerous scientific papers in the field of geography. But, this paper and the one about the reproductive behavior of the Roma female population by Apostolovska Toshevski et al. [1], in 2018, are the first attempts of making scientific geography papers related to attitudes toward marital and reproductive behavior of the population where the main data sources are those obtained from such field empirical researches.

RESULTS AND DISCUSSION

The vital statistics data regularly published by the State Statistical Office are really good indicators of the changes that have taken place within the marital and reproductive behavior of the population. Namely, those data can help in following the number of marriages and divorces, as well as the number of newborn children over the years. However, these data do not provide information related to family planning or analysis of the effect of the population policy measures. We obtained that information from the respondents' answers.

Respondents' attitudes towards marriage and marital behavior

Attitudes towards marriage, among other things, are closely related to the marital status of the respondents, their age, their level of education, and the conditions in which they live. In this survey, most of the respondents answered that they are married, followed by the number of those who answered that they are not married, i.e. they are single or unmarried.

[3] https://www.questionpro.com/article/likert-scale-survey-questions.html

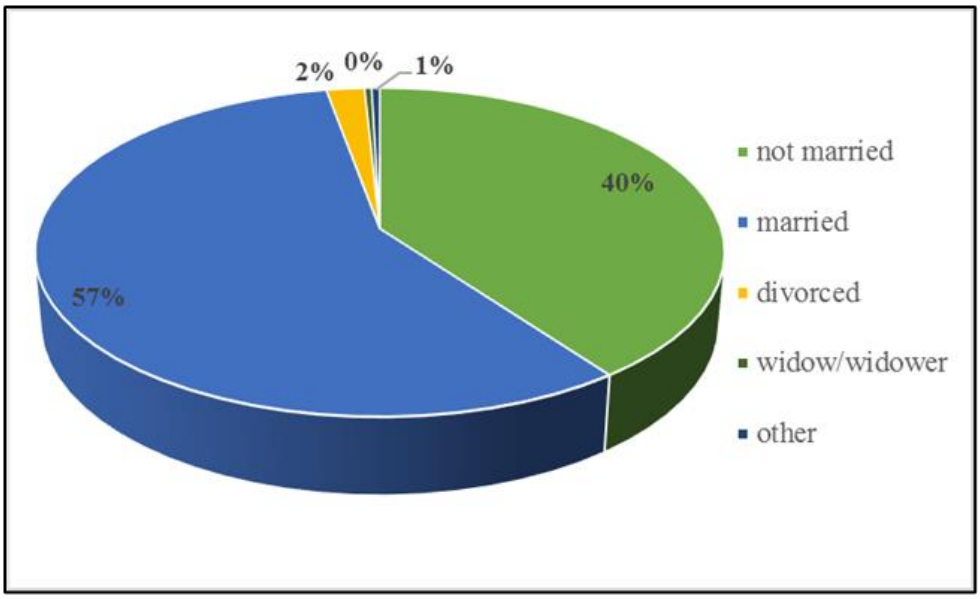

Figure 1. Respondents' marital status

From the answers analysis done by respondent's gender, we could see that most of the surveyed women had the status of married (69.4%), while men were mostly single (74.8%).

In addition to the gender analyses, the respondents were also divided according to their age, i.e. young people up to 29 years of age, and persons of 30 years and older. Of the total number of young people 62.7% were unmarried, while in the group of older respondents', this percentage was only 12.9%. Even 82.3% of the respondents older than 30 answered that they were married.

When asked about the age of getting married for the first time, there were numerous answers ranging from the age of 16 to 45, but the average age at which the respondents got married is 25.8 years. For women, this age is slightly below the average, i.e. 25.4 years, while for men the average age was close to 28 years. People who were married and belong to the group of young population, on average, got married at the age of 23.1, while people over 30, on average, got married at the age of 27. A wide range of answers were given to the question regarding the length of the marriage. There could be found answers that the marriage lasted from a few months to a maximum of 32 years (on average 5.5 years out of the total number of answers given as numbers), but most respondents answered that their first marriage still lasts.

Even 95.5% of the respondents who were married, said that the marital union they were in at the moment, was their first. Re-married for a second time were 2.4% respondents, while only 0.1% were in a marriage union which at the time of conducting the survey was their third. At the time of the survey, married for the first time were 95.8% women, and 92.7% of men. Only 2.3% of the surveyed women and 3.9% of the surveyed men were in a second marriage. One woman and one man answered that the marital union in which they are currently in, is their third. Even 97.3% of young people were married for the first time, while the percentage of people over 30 who were in their first marital union was 94.6%.

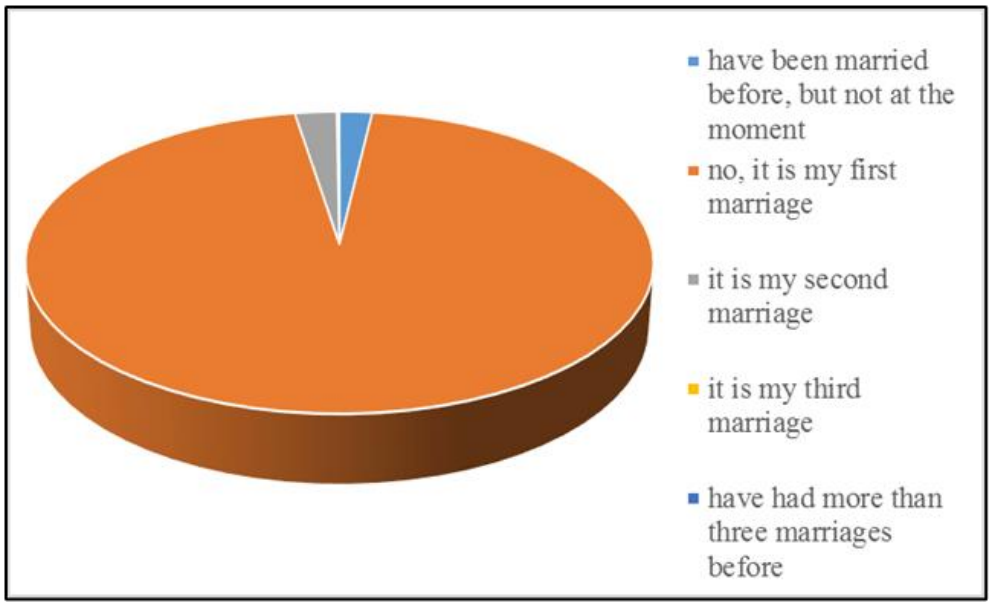

Figure 2. Answers to the question: Have you been married before or is this your first marriage?

The period of life in which most men and women enter into marriage is determined by the characteristics of the global social system, family, and marriage [12], [4]. Because the age of marriage is one of the most important determinants of reproductive behavior, the best years for marriage are those in which there are maximum biological prerequisites to achieve the greatest reproduction. However, with changing lifestyles in today's, modern societies, the process of individuation and adopted system of values, the attitudes of individuals to marriage as an institution, and the "perfect time" for getting married have significantly changed [4].

The answers about the ideal age at which a man and a woman should get married are quite different, but on average, respondents believe that a woman should get married before the age of 26, while the ideal age for a man to get married is considered as the age of 28. Women's attitudes are quite different from those of men, especially about the age of marriage for men. Thus, women think that it is best to get married at the age of 25.9 years for a woman and 28.3 years for a man, while men think that a woman should get married at the age of 25.3 years, while a man at the age of 27.2 years. The answers of respondents no older than 29 differ from those older than 30. Namely, those who belong to the category of the young population believe that a woman should get married at the age of 25.3 and a man should get married at the age of 27.4, while others think that they should get married at a slightly older age, i.e. 26.3 years for women and 28.9 years for men.

When asked if they plan to get married, most of the respondents who were not married answered that they plan to get married (32.6%), 4.7% of the respondents answered that they will not get married, while 8.5 % answered that they haven’t thought about it yet.

Most surveyed women were married (63.6%), a quarter said they want to get married, while only 4.4% did not want to get married. The others replied that they had not yet thought about it. Nearly a quarter of surveyed men were married, and more than half wanted to get married at some point. Approximately one-half of young people under the age of 29 who were unmarried said they would like to do it in the future.

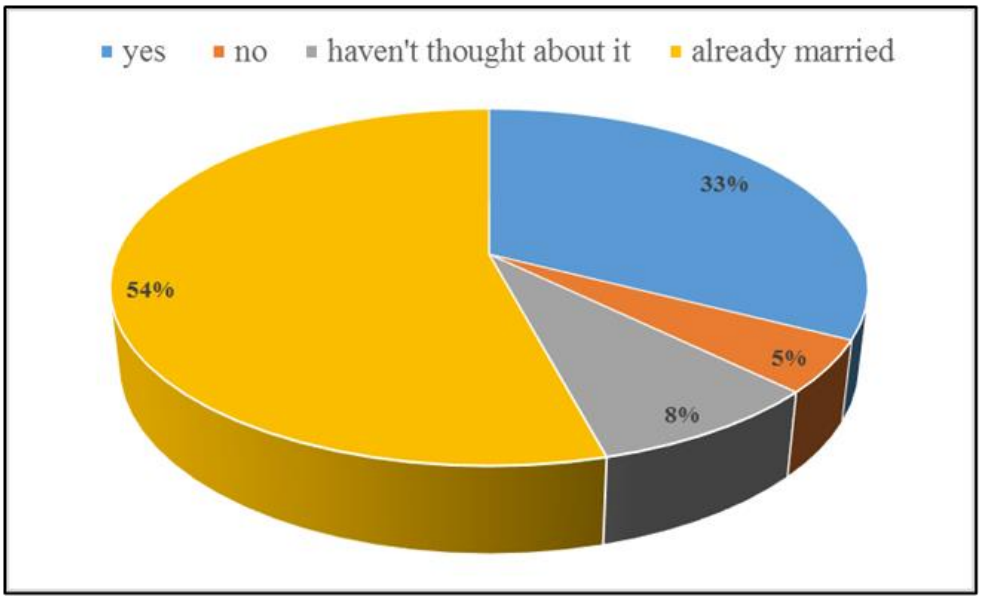

Figure 3. Answers to the question: If you are not married, are you planning to get married?

Most of the respondents, (54%) answered that they would decide to live with their partner before marriage, 13% were already living, and 14.4% would probably decide not to do it. More than half of the surveyed women and men answered that they would live, or lived with their partner before marriage, and over 50% of the respondents of both age categories gave the same answer.

The share of surveyed females who already lived in cohabitation with their partner before marriage was higher than the share of men, that is, 14.5% versus 7.9%. Just over 12% of respondents under the age of 29 answered that they already live with their partners, compared to 14% of people over the age of 30.

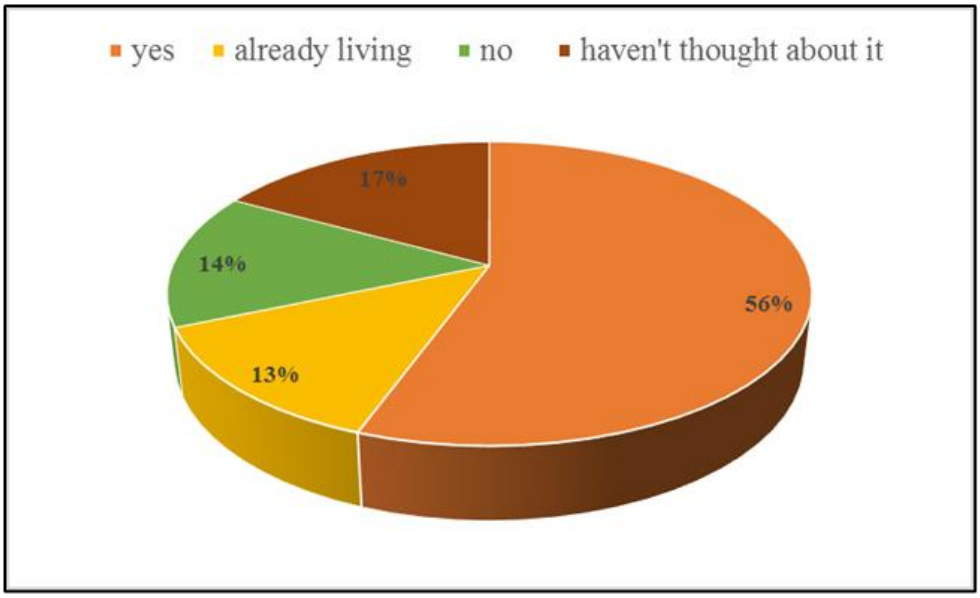

Figure 4. Answers to the question: Would you decide to live (or already live) with your partner before getting married?

Such changes are due to changes in society, new views and perceptions of lifestyle, the higher level of education of women, the desire for personal success, and women's

involvement in the labor market that creates greater independence. In particular, if in the past, women got married because they did not have their own income or place of residence and were mostly dependent on their husbands, this is less and less the case in recent years. Questions about respondents' attitudes on the decision to marry a person who has been previously married depend on whether or not the person has children from that marriage. According to their answers, it can be noticed that a much larger number of respondents would marry a person who was previously married, but would not decide to take such a step if the person has children from that marriage. Thus, in the first case ”yes” was the answer of 26.4% of respondents, while in the second case, the percentage dropped to 19.1%. ”No” was the answer of 17.9% of the respondents for the first case scenario, and even 28.1% for the second case. Such values show that our society is beginning to accept the demographic trends that are present in developed European countries and the United States, but it seems that a longer period of time should pass before these behaviors are fully accepted.

About a quarter of surveyed women would marry men that have been married before, even if they have children. Men, unlike women, answered that they would marry a woman who had been married before (31%), but a much smaller share answered that they would decide to enter such a union if the woman had children from a previous marriage (19.8%). The different attitudes of men and women on this issue are really highlighted.

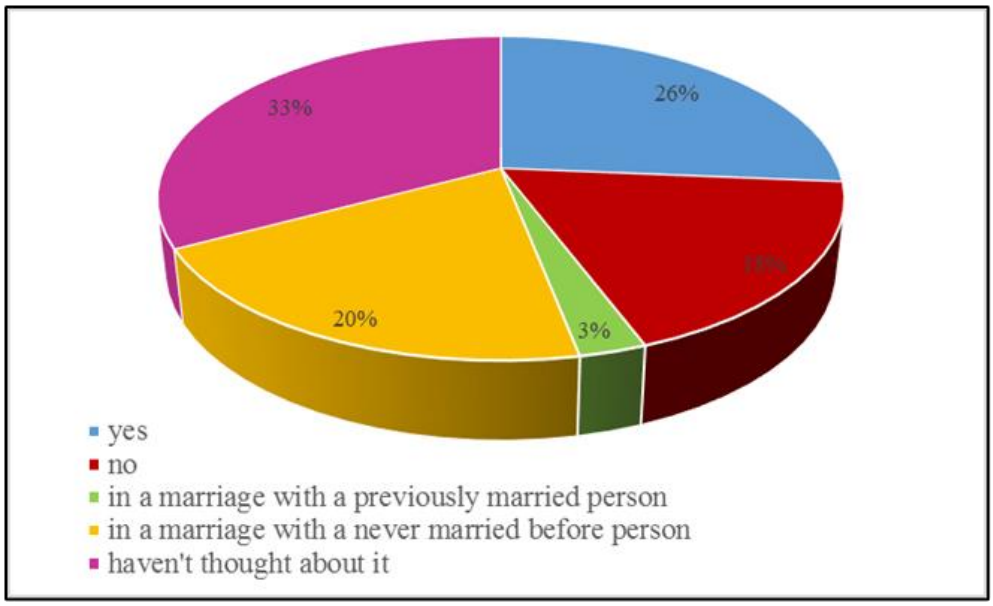

Figure 5. Answers to the question: If you were not previously married, would you decide to marry someone who was previously married (divorced; widow/widower)?

Almost one-quarter of young people answered that they would not marry a person who was previously married, and more than a third would not do so with a partner who was previously married and has children from that marriage. Just over 30% of people over the age of 30 answered that they would marry a person who has been married previously, and only a quarter of these respondents would marry a partner who has children.

Different factors have different influences on the decision if, whether, or when would people get married. Therefore, it was used a Linkert scale type of question, where several factors were listed and scaled answers were offered from 1 to 5, i.e. from completely unimportant to very important, (1 - completely unimportant; 2 - mostly unimportant; 3 -

neither important nor unimportant; 4 - partially important; 5 - very important). The average rating for each of these factors is represented in table 1.

Table 1. Average rating of the importance of each of the listed factors for the decision to get married

Question	Average rating				
	Total	Women	Men	29 years and younger	30 years and older
Suitable partner	4.7	4.7	4.6	4.7	4.7
Unplanned pregnancy	3.0	3.0	3.1	3.2	2.9
Fear of being/living alone	1.9	1.9	2.1	1.9	1.9
My personal economic status	2.5	2.3	3.0	2.6	2.3
The economic status of the potential partner	2.4	2.4	2.6	2.5	2.3
The financial situation	2.8	2.6	3.2	2.9	2.6
Work engagement (career building)	2.8	2.7	3.2	3.0	2.6
Resolved/unresolved housing issue	3.0	2.9	3.3	3.0	2.9
Government measures (Buy a house, buy an apartment; Buy a house for people younger than 35 years)	1.8	1.7	2.0	1.9	1.7

Source: author's calculations using survey data.

According to respondents, undoubtedly, the most important factor for the decision of getting married or not is finding a suitable partner. Then comes the unplanned pregnancy as a factor and the housing issue. The least important to the respondents are the measures as part of the Governmental program with an average score of 1.8.

This fact is only a confirmation that young people decide to live in cohabitations and probably get married only when they want to have children, or the children are on the way [15], i.e., even in cases when the first child is conceived when the couple is unmarried, birth takes place within a marital union, because marriage is still being the most desirable, appropriate context for giving birth and raising a child [5].

Different factors are priorities for women and men. Women gave higher marks than men only for choosing a partner, while men give more importance to the economic status, finances, and housing. This indicates that in our country, despite all the social changes and changes in marital behavior, the traditional belief that the man is the one who should provide the home and the one that should take care of the family is still present. However, assessments of the importance of these factors among young people show that changes in attitudes and opinions do occur, as they give less importance to these factors compared to people aged 30 and over.

Respondents' attitude towards reproductive behavior and family planning

In a previously conducted survey about the family size, most respondents said two children was an ideal number. However, it seems that the ideal family size in most European countries is becoming smaller [16]. This was confirmed by the answers received from this survey as well.

The section about reproductive behavior and family planning begins with the question of how many children a family should have. Most of the respondents have no specific opinion, 37.3% answered that there is no ideal number, but it depends on several factors. For just over 40% of women, there is no ideal number, close to 29% answered that the family should have two children, and 27% answered that the ideal number of children is three. Men have more specific opinions, and even 35% answered that the family should have two children, while 31.7% answered that having three children is probably the best.

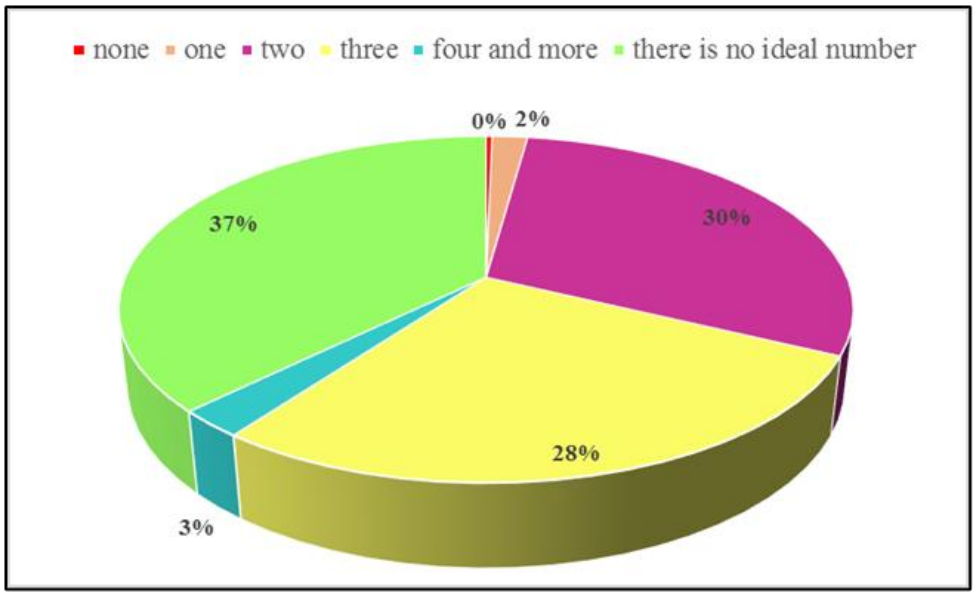

Figure 6. Answers to the question: In your opinion, how many children should a family have?

Nearly half of the respondents did not have children (45.6%). Only one child had 28.3% of the respondents, while 21.9% had two children. The share of those having three children was 3.8 %, and 0.4% had four or more children. The average age at which respondents with child/children had or gave birth to their first child was 27 years (26.9 years for women; 28.6 years for men).

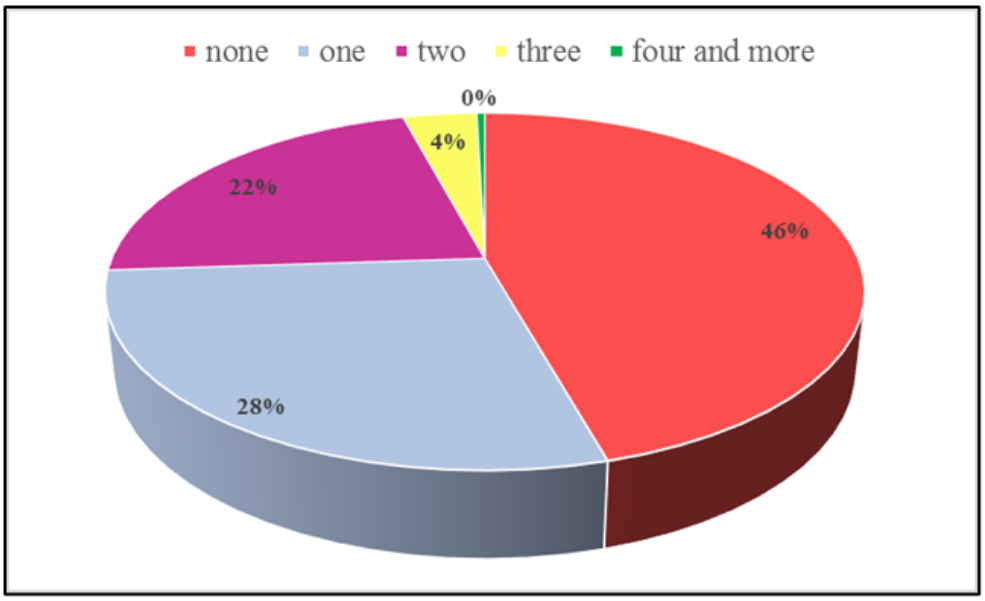

Figure 7. Answers to the question: How many children do you have?

In the opinion of all respondents, the ideal age for a woman to have her first child is 26.3 years, while for men, it is considered the age of 28.5 years. Women believe that the ideal age for a woman to have her first child is 26.4, and for men, they point to the age of 28.8 years. On the opposite, men are considering a younger age, for both women (25.9 years) and men (27.7 years). People under the age of 29 think that the ideal age for a woman to give birth is 26, and for man 28, compared to people over the age of 30 who think that

couples should have a child at a slightly older age, i.e. 26.6 years for the woman and 29.1 years for the man.

When asked if and how many children they still plan to have, 29% of the respondents answered that they want 2 children, 16.4% waned 3 children, 15% wanted only 1 child, and 2.6% wanted four or more children. With no exact opinion on the subject were 22.9 % of the respondents, while even 13.8% stated that they do not want to have a child at all. Most women (28.3%), as well as most men (33.1%) wanted two children. The same was the answer for 35% of people younger than 29 years, and 22.6% persons older than 30. Only 5.6 % of young people answered that they do not want to have a child.

Opinions on whether they would choose to give birth or have a child outside of a marital union are almost equally divided in three because 35.7% said they would not have a child out of wedlock, 32.3% would choose to have a child out of wedlock, while 32% said they had not thought about it. The opinions of the surveyed women on this issue are almost equally divided, while the majority of men, 43% answered that they would probably not make such a life decision. Nearly half of people under the age of 29 would not have a child outside marriage, while almost 40% of people aged 30 and over said they would choose to have a child even if unmarried.

This phenomenon of mothers deciding to give birth to a child outside marriage is increasing in the past years, but varies depending on the cultural differences, especially given the fact that in many societies, giving birth outside marriage is still considered a deviant behavior [3]. On the other hand, births outside marriage are one of the elements that bear the "signature" of the second demographic transition [11], and in the modern world, single motherhood is "normal" and no longer a shame.

Similar to the previous section, several factors were listed and considered as important in deciding whether and if an individual should have a child. The questions were offered with graded answers from 1 to 5, i.e. from completely unimportant to very important.

The average grades were pointing that the respondents considered the health of the mother as well as the support of the partner as the most important factors in the decision to give birth to a child. No less important was considered the health of the father. All other factors are much less important for the respondents, while the Government measures are rated as least important, with the lowest average grades.

For women and people up to the age of 29, the most important was the number of kindergartens and the support of the partner and parents for the decision to have a child.

Table 2. Average assessment of the importance of each of the listed factors for the decision to have a child/another child

Question	Average rating				
	Total	Women	Men	29 years and younger	30 years and older
The health of the mother	4.4	4.4	4.4	4.5	4.4
The health of the father	4.3	4.3	4.3	4.4	4.2
The economic status of the mother	3.5	3.6	3.1	3.5	3.5
The economic status of the father	3.6	3.6	3.5	3.7	3.5
Costs for children	3.5	3.5	3.3	3.6	3,4
The financial situation	3.8	3.9	3.7	3.9	3.7
The possibility of extending paid maternity leave	2.9	2.9	2.8	2.9	2.9
The possibility of using maternity leave for the father	2.6	2.6	2.6	2.7	2.6
Flexible working hours for parents of young children	3,4	3,4	3.2	3,4	3,4
Work engagement (career building)	3.0	3.0	3.1	3.1	2.9
The number of kindergartens and their capacity	3.0	3.0	2.7	2.9	3.1
Partner support	4.4	4.5	4.3	4.5	4.4
Support and help from the parents	3.7	3.7	3.6	3.8	3.6
Government measures (have a third child; allowance for a fourth child)	2.1	2.1	2.2	2.2	2.1
The political situation in the country	2.4	2.3	2.7	2.3	2.4

Source: author's calculations using survey data

Demographic characteristics of the respondents

Most of the respondents in the survey were women, (77.6 %), while the share of men was quite lower (22.4%). The respondents were of different ages, but the most common age groups were from 25 to 29 years and 30 to 34.

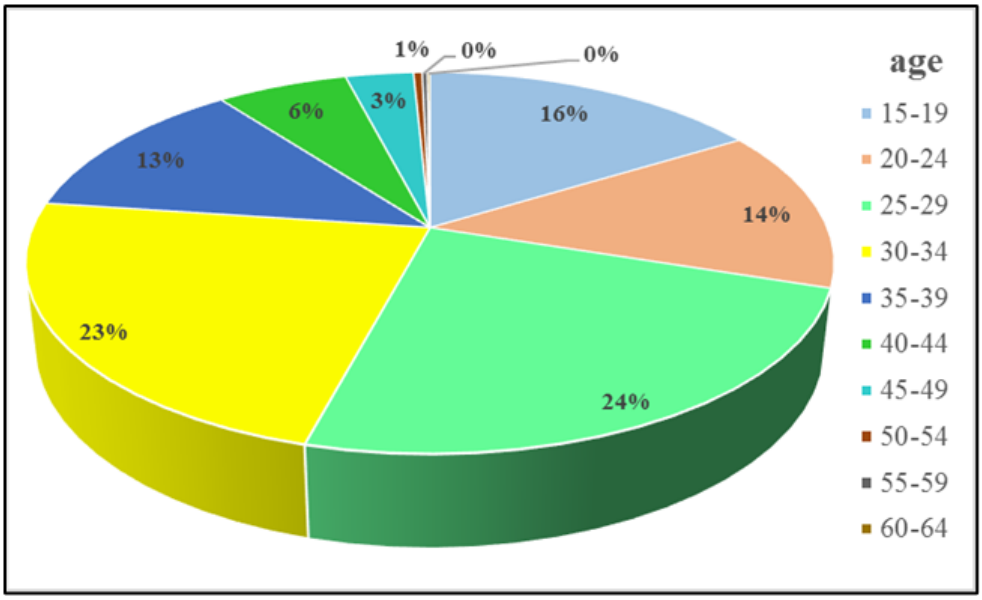

Figure 8. Age of the respondents

Most of the women, i.e. just over half, were aged 25 to 34, while at that same age were one-third of the men that took part in this survey. About 70% of the respondents under the age of 29 were women, and the share of women older than 30 years was even 85.3%. Most of the respondents, i.e. over 90% declared themselves as Macedonians.

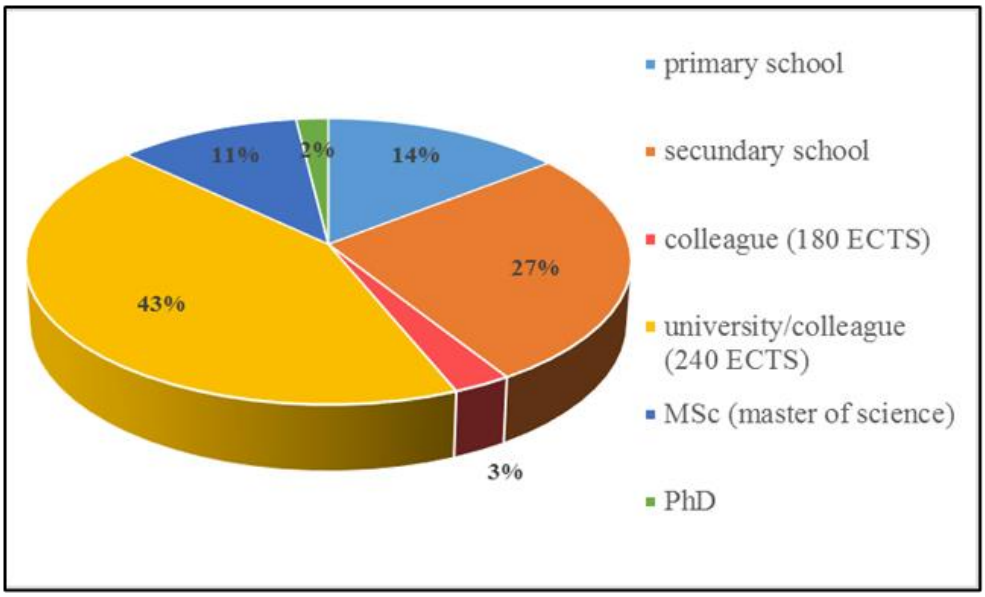

Figure 9. Respondents' education

Most of the respondents have had a colleague or university degree, followed by the number of those with high school diplomas, and then the respondents with completed only primary education. However, these data should be taken with caution, as a large number of respondents who took part in the survey, given their age, were still in the educational process. Almost half of the surveyed women had obtained higher education, and with that same level of education were 32% of the men respondents.

The results indicate that the respondents, especially women, have a higher level of education that is due to changes in the educational structure of the population, especially the involvement of women in the educational process. A higher level of education is a kind of guarantee for a more stable job, which means a more stable future, especially for women. In the past women were not able to support themselves, but this is not the case today. Therefore, it would be much easier for women with higher education who are likely to be employed and have a solid income to decide to end their marriage and even to have a child without a partner.

More than half of the persons were employed. Nearly 60% of the women in this survey were employed, while 13.8% were students. Among men, 40% of the respondents were employed, and 44.2% had the status of a pupil or student.

The last question, which was the only non-mandatory question, was answered by a total of 3,106 respondents. Of the total number of answers, 14.3% choose "I do not want to answer", and only 2% of the respondents did not answer at all. Most of the women who answered what their incomes are, earned between 20,000 and 30,000 MKD (which is between 330 and 500 EUR) per month. The share of those who earned between 12,000 and 20,000 MKD (200 and 330 EUR) or have no income is approximately the same. Most men had no income, i.e. 34.4%, while men earning between 20,000 and 30,000 MKD per month participated with 14.2%, and those with incomes from 12,000 to 20,000 MKD, participated with 11.8%.

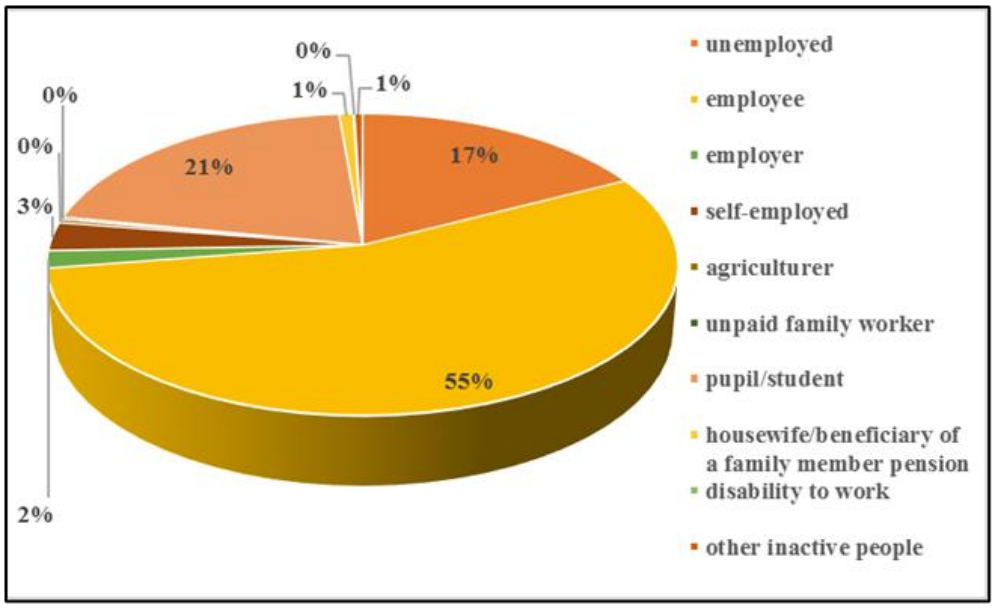

Figure 10. Respondents' status of economic activity at the time of the survey.

However, this analysis should be taken with a dose of reserve because a large part of the respondents, especially men are still involved in the educational process and are not job seekers, but also because the sample size of male and female respondents differs significantly.

The survey covers respondents from all parts of the country, but as most of the population in the country is located in the Skopje region, the share of respondents that origin from Skopje was 58.6%.

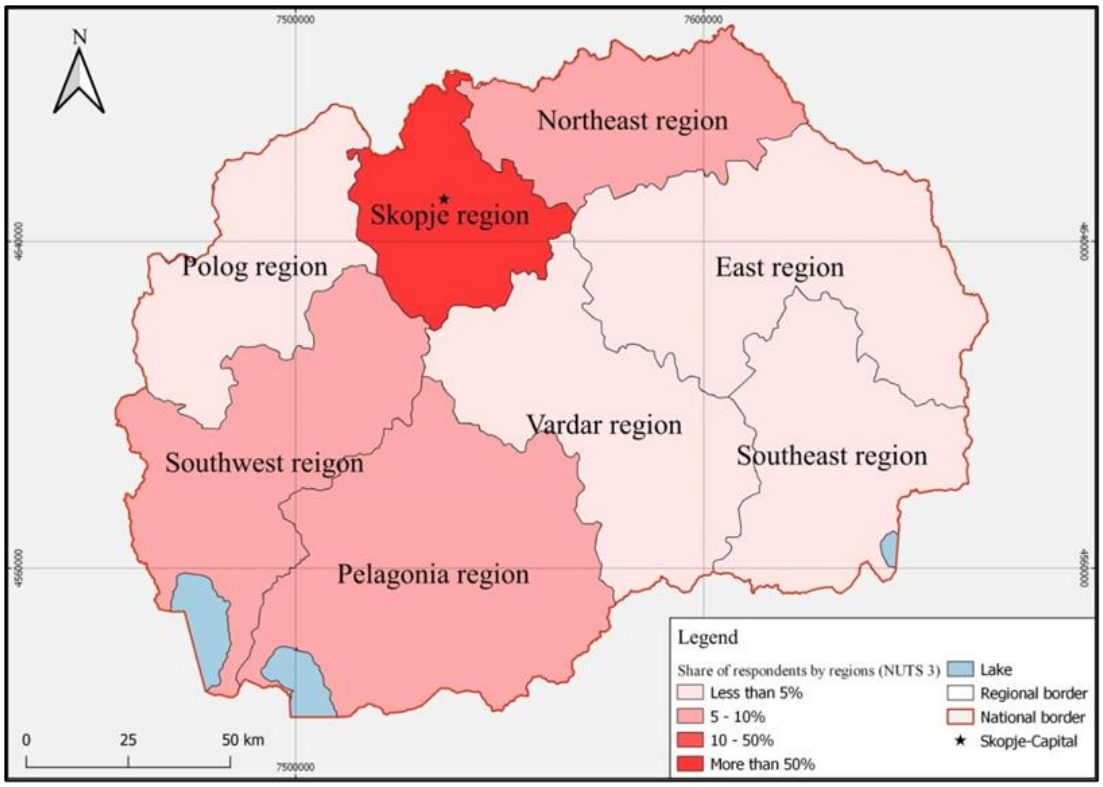

Figure 11. Share of respondents by region (NUTS 3 level)

CONCLUSION

Vital statistics and census data clearly indicate to the changes that occurred over the years (number of marriages: 1991-15,311; 2002-14,522; 2019-13,814, number of live births: 1991-34,830; 2002-27,761; 2019-19,845[4]), but the data from the conducted empirical research pointed to the opinions and attitudes of respondents, highlighted the factors that influenced the decisions they make and the effects of the measures taken by the state authorities to improve the situation. The survey confirmed that: the education of the respondents affects the age of marriage and influences the attitude towards the ideal age for marriage; Education affects the desired number of children, but also the decision to give birth/have a child outside the marital union. The age of the respondents influences the attitude towards the years at which the persons should get married, the attitude about living with the partner before the marriage, but also about the decision to have a child outside the marital union. The age at which married respondents had a child in 80.75% was affected by the years at which they got married. The ethnicity of the respondents affects the number of children, but the impact of the finances has a great influence on this issue also.

Among the main reasons that influenced the decrease in the number of marriages are primarily the new perceptions and views of life, the new socio-economic conditions, the higher level of education, involvement in the labor market, especially for women, greater independence of individuals, the way of choosing a partner, age at marriage, and all of this accompanied by other demographic components, i.e., reduced birth rate, population gender and age inequality, migration, reduced number of generations of the marital contingent, etc. Hence, significant results can be obtained in analyzing the demographic characteristics of people who are about to marry [8].

The results from this research are only a starting point for further researches on this topic, which will ultimately help to create social policies, as well as to create population and family policies in harmony with the development trend of the population and its marital status. These policies are expected to include measures and activities that will further improve the situation with the demo-reproductive processes in the country [9].

The analysis of the modern demographic conditions is of particular importance for population policymakers, social scientists, demographers, and demo-geographers, as well as for anyone seeking to understand society, family, and marital behavior in order to anticipate future trends.

Seminars and conferences should also be organized to present the findings of specialized studies and scientific and professional researches in the field of fertility, marriage, and divorce, which will be attended by competent representatives of relevant government agencies, consulting providers, universities and research centers, various civil society institutions, and individuals interested in marriage and family matters.

Acknowledgment

The survey was part of the research for the doctoral thesis "Demogeographic development of marriage and fertility in the Republic of Macedonia", by Marija Ljakoska, defended on July 08, 2019, at the Ss. Cyril and Methodius University in Skopje, Faculty of Natural Sciences and Mathematics, Institute of Geography.

4 https://www.stat.gov.mk/

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ANALYSIS OF THE EVOLUTION OF THE CORONAVIRUS DISEASE RATE. CASE STUDY: ROMANIA, MARCH – NOVEMBER 2020

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ABSTRACT

The Coronavirus pandemic has been a challenge for the entire population of the Earth, andthe national administration of the states has experienced difficult times in trying to limit the spread of the new virus. The effects of the pandemic were strongly felt at the economic level, displacing a large part of the population from their jobs, but also at the demographic level, with massive returns to the country of romanians working abroad. The primary objective of the study was to analyze the evolution of the disease rate, calculated by reporting the number of positive tests to the number of tests performed that day. The secondary objective of the study was to highlight the fact that a higher testing capacity will lead to an increase in the number of cases at the state level. The aim of the study was to raise awareness of the need to address responsible behavior in the face of such a challenge. The results of the study identified that in order to understand the real situation it is necessary to analyze the above mentioned rate, as the number of positive tests shows a tendency of direct proportionality with the number of tests performed per day.

Keywords: virus, medical geography, COVID-19, health, medicine

INTRODUCTION

The impact of new viruses on medicine is intense and unpredictable, giving the need to stay alert to potentially devastating global or local pandemics, and the SARS-CoV-2 pandemic has caused incredible changes in a multitude of economic sectors. in the mentality and behavior of societies, as well as the dynamization of the relationship between the national administration and the population, causing a series of mistrusts, fears and effects that have contributed decisively to the transformation of current inter-human relations [1][8][7]. Emergency prevention measures have been a problem for the national administration of the states that have become recipient poles of the virus, thus illustrating a number of important elements of existing societies [2][5][6]. The prevention method and the degree of acceptance of the measures are stimulated by a series of extremely variable factors and with very fast fluctuations, the fake-news phenomenon contributing decisively in impatient some vulnerable socio-human categories, hindering the national administration's mission to properly manage the delicate situation. , such as the current Coronavirus pandemic.[3][6][9]. The Romanian state entered the list of recipient states of the virus in February 2020, and will see a significant increase in the number of cases

since then, representing the starting point in a large decision-making process to maintain control of the virus, by establishing emergencies. , alert states, lockdown measures, the closure of schools, but also the hotel and restaurant industry, decimating the economy on many distinct levels, registering drastic economic declines and closing many small and medium businesses that could not self-sufficient. financially support during the pandemic. The evolution of the virus was very fast, unpredictable, sudden and extremely dynamic, developing new symptoms, new forms of transmission, but also an important resistance against existing prevention measures [4][10]. Campaigns to promote prevention measures were carried out in Romania on all existing social and media channels, through public and private television, through local and national newspapers, but also through people with a significant media influence, injecting considerable sums in promoting aggressive awareness of these SARS-CoV-2 efficacy campaigns and its dangers. The research contributes to the development of the specialized literature for the medical field, but also for the development of an overview on the SARS-CoV-2 pandemic on the Romanian territory.

METHODOLOGY

The research was carried out through daily data, provided by the Romanian Government, public data that were later transformed into graphics using the Microsoft Office bundle, especially Microsoft Excel. To perform the study, the daily infection rate was calculated, obtained by finding the weights of the positive tests from the total daily tests, thus illustrating the degree of efficiency of the virus. The study proposes the analysis of the period March 1 - November 30, 2020, perfectly illustrating the most important periods of evolution of the SARS-CoV-2 pandemic in Romania, starting from the first cases, as well as the way in which the most important measures had an impact on the evolution of the infection rate. The analysis of the infection rate produces an increase of the authenticity and importance of the study, in view of the fact that the number of daily tests is variable, by operating in public-private partnership during the week, following the weekends to be made only by testing in private partner centers. producing a considerable decrease in the number of tests.

RESULTS

March 2020 represented the beginning of the first cases in Romania, the testing period of potential new cases, but also of the first emergency measures in the state. The general growth trend is an upward one, producing an increase in the infection rate of over 18.8% for this month. The establishment of the state of emergency, by the President of Romania, on March 16, 2020, did not produce an immediate decrease in the number of cases, this decrease being observed in April (Figure 1).

April 2020 obtained a decrease in the infection rate by over 7.8% over the analyzed period, the general trend being a downward one, due to the quarantine measures decided in the previous month. Due to the impossibility of leaving the home without urgent reasons, the transmission possibilities decreased considerably, the new cases being rather correlated with the previous cases, managing to keep an optimal control to understand the transmission mode and transmission frequency of the virus. Easter did not represent a dynamic factor of the infection rate, due to the impossibility of leaving the existing quarantine measures at national level (Figure 2).

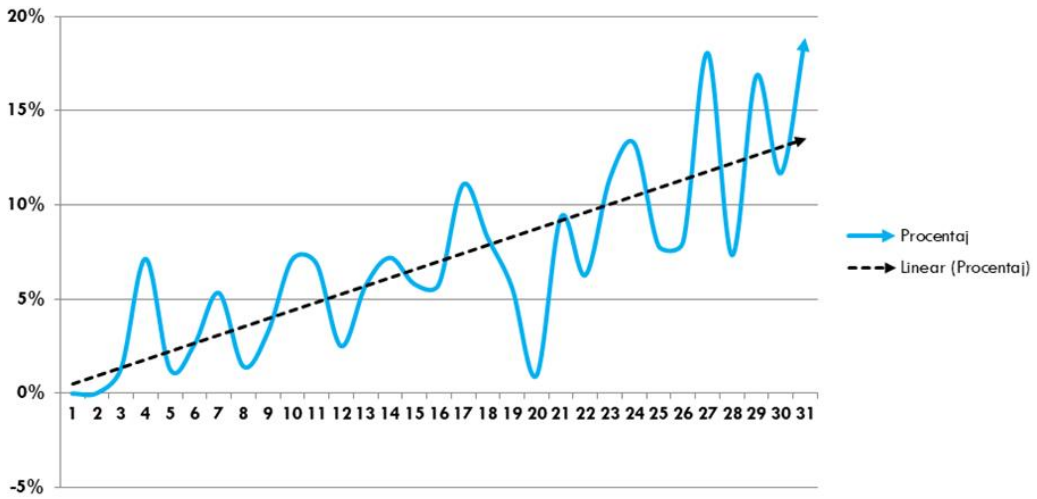

Figure 1. Evolution of the SARS-CoV-2 virus infection rate, March 2020

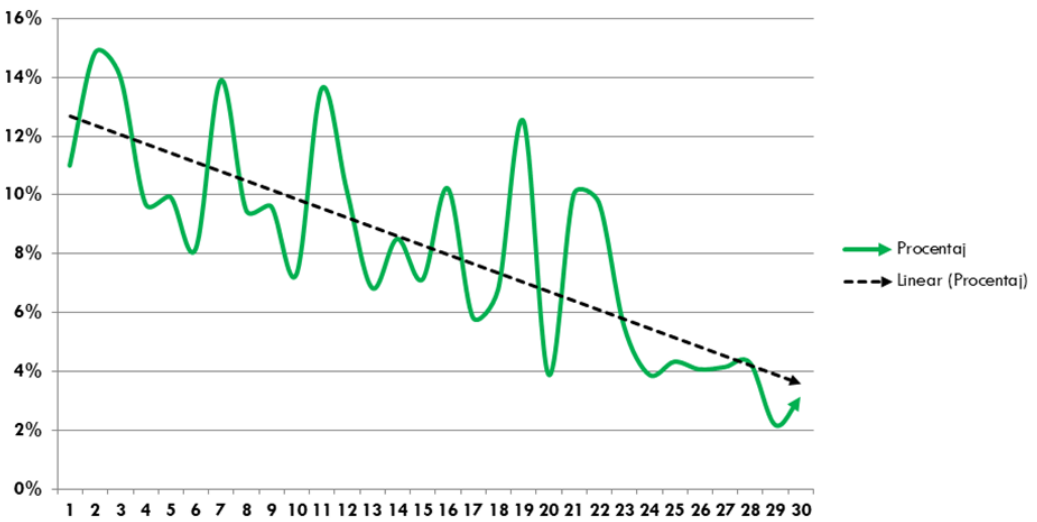

Figure 2. Evolution of the SARS-CoV-2 virus infection rate, April 2020

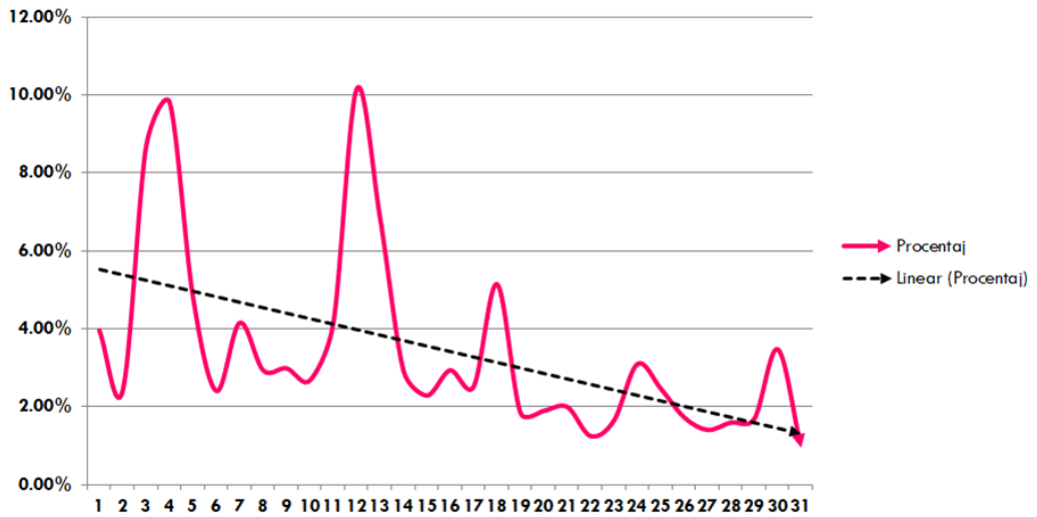

Figure 3. Evolution of the SARS-CoV-2 virus infection rate, May 2020

May 2020 represented the end point for the state of emergency, establishing a state of alert on May 15, wishing a relaxation of emergency measures, due to the decreases recorded in the previous month. Relaxation measures were not a positive element in combating the SARS-CoV-2 virus, but the pressure of the population on the national administration became more and more oppressive, so that these measures were necessary to release the economy and social mentality, although the pandemic management increased to a certain extent much more difficult to control. The general trend is one of decrease, the consequences of the relaxation measures being observable for June 2020 (Figure 3).

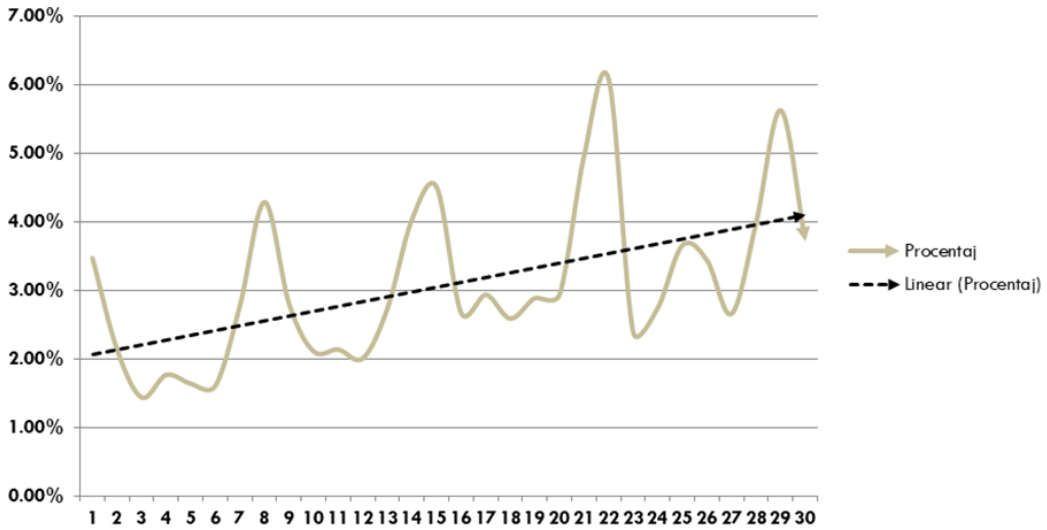

Figure 4. Evolution of the infection rate with SARS-CoV-2 virus, June 2020

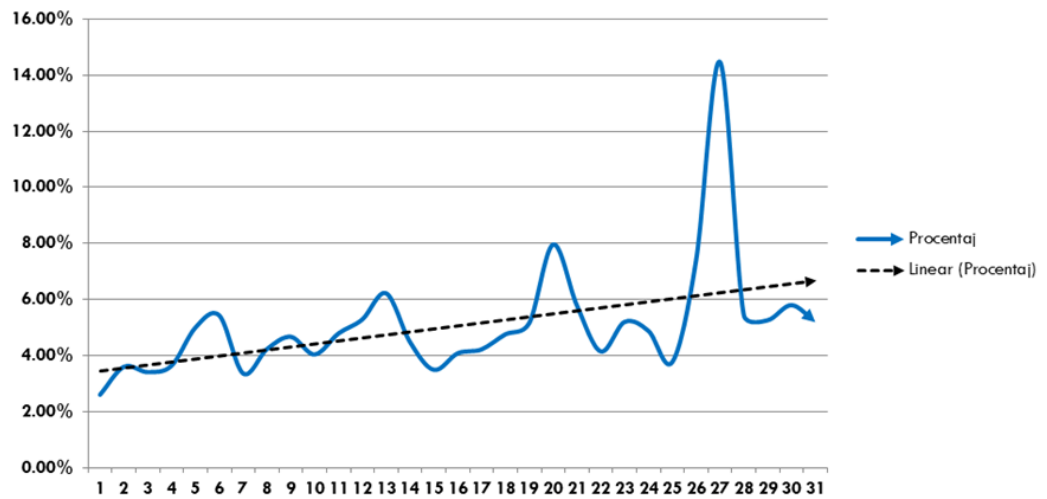

Figure 5. Evolution of the SARS-CoV-2 virus infection rate, July 2020

The relaxation measures proposed by the national administration have increased the efficiency of the virus and the transmission rate, but within controllable limits, the maximum period being at the percentage of approximately 6%. Also, the gradual opening of the summer season and of the hotel industry produced an increase of coronavirus cases, their epicenter being mostly the Romanian coast, but also the mountainous area of Romania. The continuation of the alert state was necessary to guarantee a minimum

control necessary for the national administration. The general trend is an ascending one, but the liberalization of the measures produced the decongestion of the relationship between the national administration and the population, but also the relaunch of some economic sectors affected by the pandemic. (Figure 4)
With the opening of the summer season and the liberalization of emergency measures, the population's confidence in tourist trips increased considerably, which continued the gradual increase in the number of coronavirus cases, reaching a maximum of 14.4% in July (Figure 5).

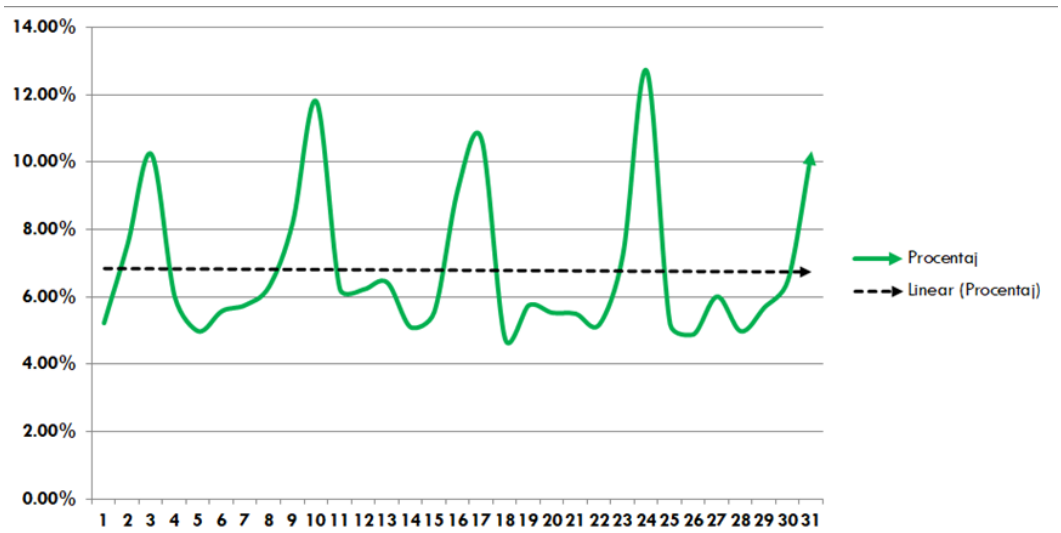

Figure 6. Evolution of the SARS-CoV-2 virus infection rate, August 2020

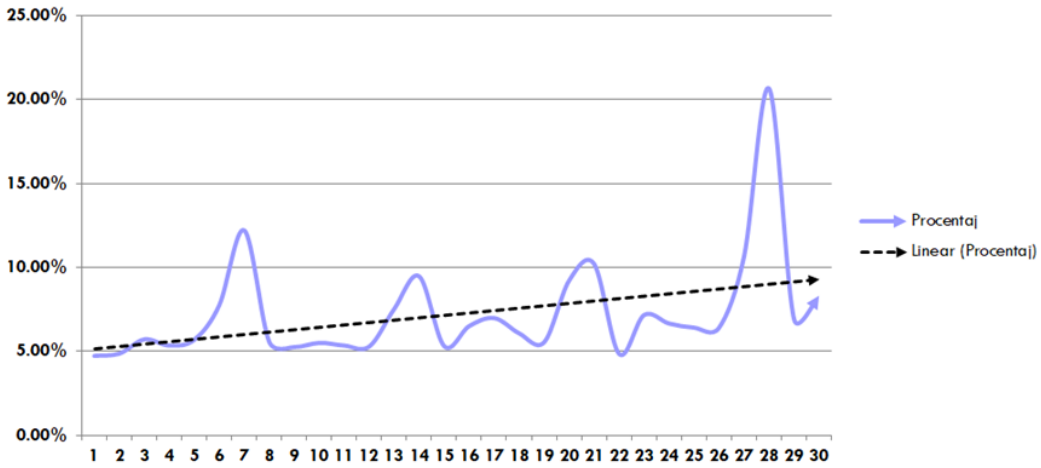

Figure 7. Evolution of the SARS-CoV-2 virus infection rate, September 2020

The continuation of tourist activities led to an increase in the minimum infection rate from 2.6% to 4.75% between July and August, thus continuing the considerable increase in the number of cases nationwide, generated by domestic and international tourist trips. Although the trend is one of stagnation, the fluctuating evolution of the number of cases indicates that there is no exact stability of the test centers, being very unlikely extremely sudden decreases in the rate in just a few days. The maximum recorded in August is 12.71%, but it is important to mention that there are at least five periods of infection rate over 10% (Figure 6).

September led to a further increase in the minimum infection rate, exceeding the 5% threshold, but it is important to note that the daily infection rate reached a record high of over 20%, along with an upward trend. The unpredictability of the pandemic in the country was increasing considerably, the control of cases being extremely difficult to manage, the hospitalization and testing centers being supersaturated during this period. September also began with the opening of schools, which facilitated the growth observed in October (Figure 7).

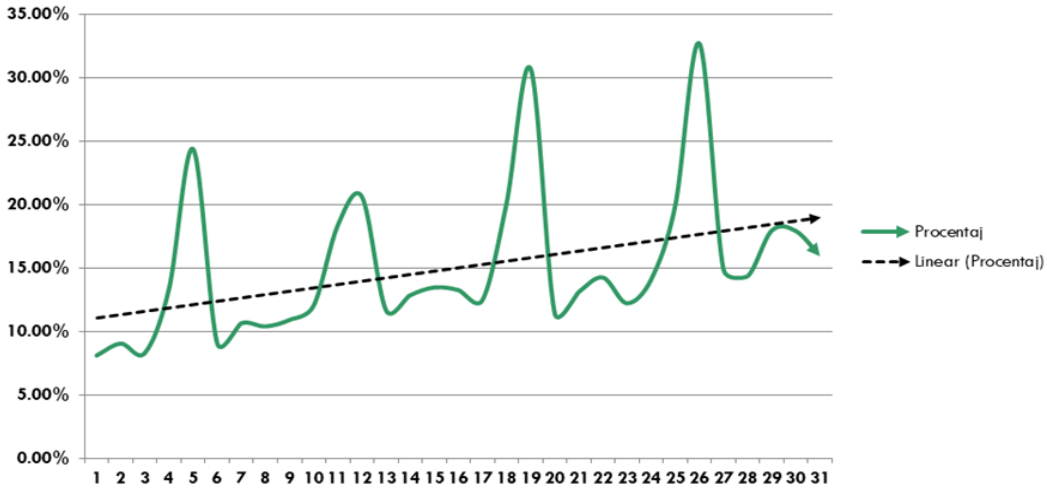

Figure 8. Evolution of the SARS-CoV-2 virus infection rate, October 2020

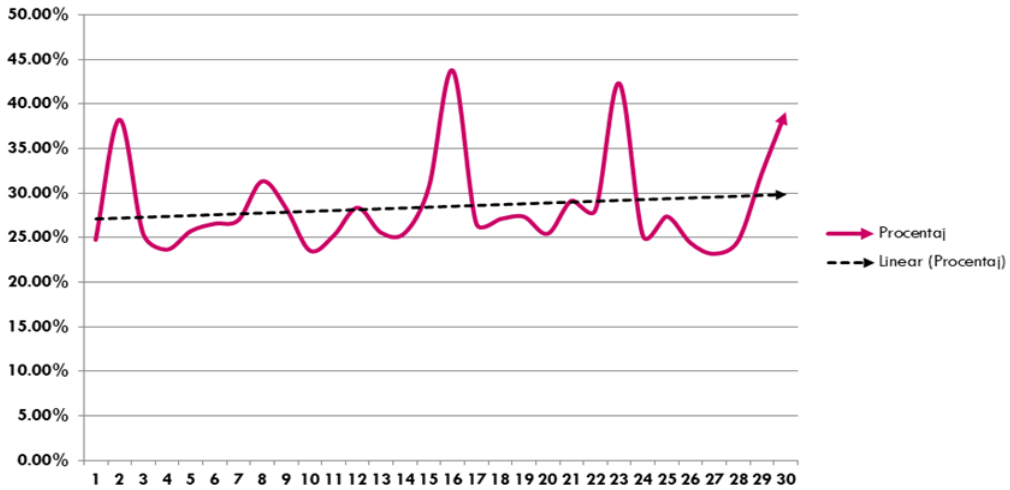

Figure 9. Evolution of the SARS-CoV-2 virus infection rate, November 2020

The increase in aces and the minimum infection rate are correlated with the opening of schools, thus increasing the possibility of transmitting the SARS-CoV-2 virus to all socio-human categories, the minimum graph being recorded at 8%, reaching a new historical maximum, of over 32.6%. It is important to highlight the fact that the existing alert state did not present efficiency in the face of challenges and decision pressures on the situation of schools and the efficiency of online education, registering multiple values above the threshold of 20% (Figure 8).

The closure of schools becomes inevitable in the process of preventing and stopping the SARS-CoV-2 virus, despite fluctuating social pressures, so the Romanian Government

decides to close schools and restaurants, but also to establish measures to prevent the virus by banning them from leaving their homes. in the time interval 23 - 05, without presenting a statement on his own responsibility and a good reason. The measure wanted to stop private party events, but the minimum schedule already reached the value of 23%, making it difficult to develop prevention and stopping measures, reaching a maximum of 43.7%, despite a stagnant trend (Figure 9).

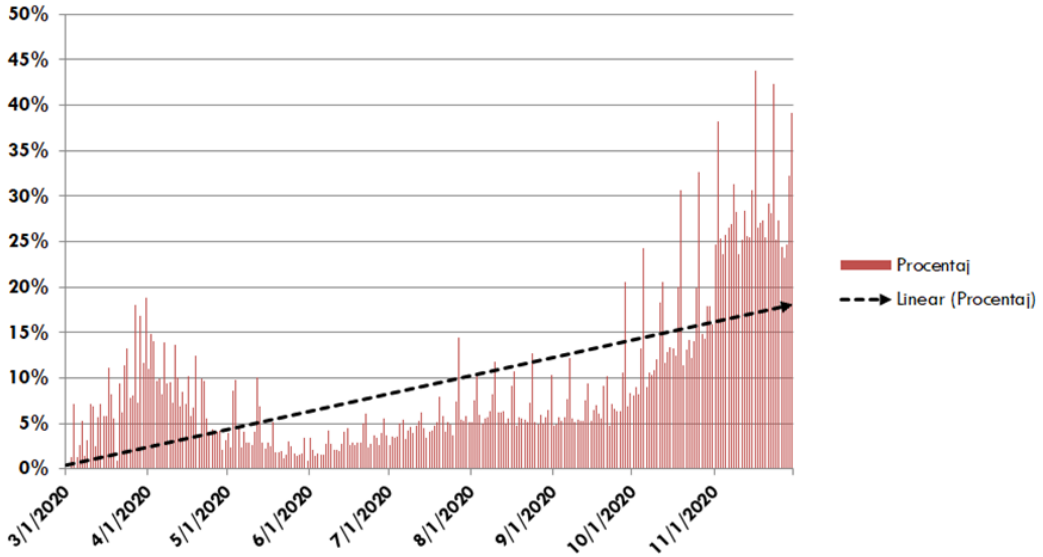

Figure 10. Evolution of the SARS-CoV-2 virus infection rate, March - November 2020

The infection rate experienced an overall period of upward evolution, through a considerable increase in the infection rate for the analyzed period, distinguishing an increase of over 43% for the analyzed interval. Reaching the first peak was achieved in April, continued by its completion, followed by a period of slight growth for the summer. The beginning of autumn and the considerable relaxation of the measures led to the increase of the infection rate to a new peak for the period October - November 2020 (Figure 10).

CONCLUSIONS

Due to its unpredictability, the possibility of self-destruction of the economy through poorly managed measures, but also through possible emergency measures that may distort the relationship in the population's trust in local government, the Coronavirus pandemic was a challenge for the Romanian authorities, but also for citizens and entrepreneurs. The study confirms the initial premises, according to which the total number of tests contributes decisively to the increase of the number of positive tests, and the calculation of the infection rate is most effective, by its reduced possibility to provide erroneous data or that could be misunderstood. The research also shows that the statistics provided by the national administration can be misunderstood, through a reduced testing capacity for weekends, thus providing potential misunderstandings among citizens, thus fueling the pressure of the national community on leadership. state. Also, the study reveals that Romania has exceeded the first peak of the pandemic, carried out between March and May, followed by a second peak, starting in the fall of 2020, carried out until the final period of the study.

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CREATIVITY INCLUDING TECHNOLOGY IN BOOSTING SOCIAL INNOVATION IN A SMALL POST-SOCIALIST INDUSTRIAL TOWN: FIENI (ROMANIA)

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ABSTRACT

Under the intensification of the urbanization process since the 1950s, many Romanian settlements were declared towns and industry started to play a central role in their development. In the transition period to market economy, the restructuring process in small Romanian towns in the 1990s and 2000s, like in many towns and cities from Central and Eastern Europe, faced various socio-economic challenges. The paper focuses on analysing how a small urban community from the Southern part of Romania, Fieni, with two emblematic industries in communist times (the cement and light bulbs industries), perceives the importance of creativity including technology in implementing social innovation projects, tailored to respond to the deindustrialization consequences that impacted the town's evolution after 1990. The methods relied on identifying possible urban projects, oriented to the social innovation sector, using the advantages that creative industries can provide, within a workshop organised with the local actors from Fieni. Bringing together population, representatives of administration and different economic activities, the results section analyses the projects adapted to meet the local needs, taking into account the priorities and endogenous factors, without forgetting the past of this community.

Keywords: regeneration, social innovation, creative industries, small industrial town, Fieni, Romania

INTRODUCTION

Early deindustrialization characterised in the last decennia mostly the developed cities, but nowadays it is very common among towns and cities with different degrees of development, various factors being at its origins. The changes in the way goods result from rapid technical innovation can alter the relationship between economic growth – development – manufacturing [1]. Depending on different degrees and contexts of deindustrialization, the regeneration process takes different forms. Innovation in regeneration is more than needed. For example, in the Economic Development Strategy for the industrial restructuring of Manchester, from the late 2000, digital inclusion, digital industries and digital innovation are proposed [2]. These pillars refer to: building

digital/creative enterprises, promoting digital inclusion among the population, increasing transformation of public services through innovative uses of digital technologies and encouraging inclusive sustainability.

The reality to which cities are confronted is more complex than the general theory which says that, when a city has more innovation and entrepreneurship, it can overcome the downward spiral of demographic and economic decline by enhancing endogenous growth [3].

As Joseph Schumpeter stated in the first part of the XXth century, technical innovations have led to the economic growth of cities over time. Today, they lead to a stability of cities and of their relations with the surrounding spaces. In comparison to old times, the socio-economic stability of cities can be better guaranteed and sustained in theory due to a much faster "rhythm" of innovation and development over time of the institutional framework of the social economy. Of course, big cities are bigger winners in this course than small towns, which have reduced capacities to respond quickly to challenges of all kinds and in which social innovations have not reached a maturity that would allow a multiplication or adaptation of solutions to each problem type in order to avoid socio-economic dysfunctions.

The general interpretation of social innovations says that these are new ideas (products, services, models) that simultaneously meet social needs and create new relationships or social collaborations, thus being solutions to insoluble problems [4]. Social innovations have always participated in finding solutions that seemed unsolvable without a concerted involvement [5].

The development of social innovation concept shows an approach linked to social and solidarity economics, while also to sustainable development. The social economy refers to the development of goods and services production activities aiming achieving collective interest, social cohesion and sustainable development [6].

The actors involved are, in general, from the private sector: associations, non-governmental organizations, foundations, mutual societies etc. Lately, the state contribution is increasingly concrete in proposing programs or directly initiating actions, alone or in partnership with the private sector.

Innovation in the transition to capitalism has emerged in a different framework influenced by the past, being confronted with some limitations related to the difficulties of facing competition on the free market. The social and cultural innovation plays an ambiguous role in post-socialist transition countries of Central and Eastern Europe [7]. Innovation in countries transitioning to capitalism emerged in a different and influenced by the past framework and it was confronted with some limits. In general, the most evident were the values inherited by innovation-averse traditional values of socialism that generated low innovation capacity and inertia [8, 9], so countries had to make efforts in adapting to the technical innovation and the entrepreneurial spirit, specific to capitalism [10].

In Romania, the initiatives to boost social innovations are becoming visible after the accession of Romania to the European Union in 2007 in several directions: e.g. social services for vulnerable people, integrated community centres, tourism and alternative electric sources. But the phenomenon is not identical at all urban levels. Big cities find institutional and financial support easier than small communities, which are confronting with more barriers in implementing social innovation projects: "lack of a developed culture of innovation, in general, in Romania; no great openness for new models and practices in the field of social services; a poor developed ICT in many small towns;

financial issues, expressed by few local funds, including external sources, for standing up a social entrepreneurship; deficit of skilled workers" [11].

The aim of the paper is to identify if social innovations in a small post-socialist town from Romania can be developed based on creativity and using technology. The research questions are: What kind of social innovation can be applied depending on local human, financial, material and logistical resources? To what extent can the industrial past participate in this process? What can be the feedback of this category of social innovation in the community?

Fieni, the case study of this research (Fig. 1), falls into the category of shrinking small towns from the Southern part of Romania. With a total population in the second part of 2020 of 7,351 inhabitants, the town has lost in the last 5 years approximatively 5% of its population. In reality, the population is continuously decreasing since 1995, because of the deindustrialization process. Losing the main economic activity that guaranteed urban development, the industry, Fieni became gradually synonymous to strong outmigration (and so it gained a deficit of qualified workforce), low birth rate and demographic aging (17.3% for >65 years old in total population in 2020 in comparison to only 8% in 1992). These negative changes impact especially the age group of 18-55 years [11].

The economic progress of Fieni has occurred since the early years of the XXth century with the opening of the cement factory (the largest producer of cement in Romania in 1940) and of the light bulbs factory in the 1930s (the largest plant of this type in the country at that time). In the communist era, the production of the two industries diversified and became internationally renowned. In the capitalist times, the privatization process from the second part of the 1990s was not successful for either of the enterprises: while the cement plant continued to represent the main option for the local workforce, for the light bulbs industry the private investment meant layoffs and, in the end, closure. The town is relying today on two industrial specialisations: cement and lime production. Fieni has the oldest functioning cement factory in Romania.

Figure 1. Localisation of Fieni

METHODS

The research methods used for this study relied on organising a workshop with the local actors from Fieni (population, representatives of administration and different economic activities), with the purpose of identifying future possible social innovations adapted to their urgent problems, deficiencies or needs, while using technology and creativity.
The present research is a continuation of a previous study [11] in which other workshops were also organised with the local actors. The workshops focused on the history of social innovation at local level and the identification of general practical social innovations taking into account the local experiences and dysfunctions. In order for the participants to feel at ease, ice breakers were used. As it happened in previous workshops, the participants were divided in several working groups. The facilitator of the workshop was in charge that all the voices were heard, joined the discussions when some concepts seemed to be less known by the participants and supported with examples of best practices from other parts of Romania or from abroad, which can be adapted to Fieni.
The structure of the workshop was centred on the idea of using creativity and technology in future social innovations projects foreseen in an intergenerational activities' framework, in three main directions aimed at: providing diversified services for the young population, supplying support for the elderly and using local culture as a tool for the town promotion and tourism.

RESULTS

The goal of the workshop was the identification of future probable social innovations in relation to technology use and creative industries. The idea of this research was born after the community identified previously possible social innovations relying on their assets and connected them to local issues requiring urgent solutions. The general social innovations proposed in the previous consultations were related to development of agriculture and entrepreneurship: livestock breeding in individual households and harvesting through the local breeders' / producers' association and a digital information platform for entrepreneurs; a museum of the town; the re-organisation of the owners' associations in the residential areas [11]. Among the general directions outlined, the importance of technology and creativity was more obvious in two projects: a digital information platform for entrepreneurs in agriculture and projecting a museum of Fieni.
Starting from these two ideas and free discussions between the organisers and participants at the workshop, other resulted draft ideas were analysed.
Using technology turned out to be useful for a more informed and involved community. Some proposals were made: 1) a big digital screen in front of the City Hall to display various information about news regarding the town's activity, local programs and projects, including messages targeted to encourage the participation of the population in actions aimed at developing the community; 2) a website where all social problems identified in the town can be reported, so that people who have the possibility to intervene can bring their support; 3) publishing the local newspaper in social media.
The big digital screen can contribute to increasing the degree of transparency from the part of local authorities towards the population, which can lead to progress in the degree of trust of the inhabitants towards them, but also to a closer communication within the community. Communication can go as far as supporting and helping people in difficult situations, thanks to a web platform where urgent needs of support can be reported, including the notification of time registration and the exact location of the corresponding

issues. While the local newspaper does not reach every inhabitant, although it is distributed free of charge, its electronic format uploaded on City Hall Facebook account (with almost 7% of locals following it and almost 70% of population accessing posted info) could increase the awareness of different stages of projects (in progress, accomplished or which will be taken into account) and, in the same time, of different disfunctions of the town, for which solutions are needed.

Creativity in social innovations can not only be found in different IT solutions, but it can also contribute in different cultural and tourism plans: 1) Museum of Fieni; 2) Museum of light bulbs in Fieni; 3) introduction of new events; 4) culture & creativity in different edifices.

The idea of opening a museum of the town is not new, efforts in organizing it being registered in the past. Today, there is no museum of the town, but a small industrial museum of the cement history inside the cement plant, which can be visited only on demand (by groups from the local or nearby schools or high schools, in general).

The future museum of Fieni is projected to focus on the local history and traditional crafts, with a future exhibition of pictures of old houses with specific architecture, folk costumes, household items. The museum could be hosted by the old school in Fieni, opened in 1912 with the efforts of the cement investors, today a non-functional building, but registered on the list of historical monuments (Fig. 2). If there are insufficient exhibition' pieces purchased by the town or coming from donations, the walls could be covered with pictures of local riches. Moreover, volunteering could help in the promotion of this museum, thus transforming it more into an eco-museum, a space jointly exploited by the local population and which passes to the future generations knowledge, behavior, customs and work techniques [12]. In addition to the few jobs generated, the opening of a museum in town could generate new jobs and investments in Fieni by increasing the town's visibility [11].

The Museum of light bulbs would bring a plus value for the town's tourism by developing a new niche, namely industrial tourism as alternative tourism and as an extension to the tourism from Prahova Valley. This new cultural function of the former industrial buildings (Fig. 3) could materialize through interactive activities and the production of winter globes (a former economic activity that could be revived).

Some new events could be introduced next to the existing ones: e.g. Festival of Lights, with images projected on the walls of the light bulbs factory, based on themes related to industry; Halloween; Pumpkin Festival (or others in relation to local agriculture) etc.

Beside these, other ideas would fit in this creative and cultural framework: a truck / bus from the communist period, with stories about the past (e.g. "Fieni - a transit and in transition town"); culture in railway stations, which can be transformed into bookstores (this kind of cultural activity exists in the Baltic states) or restaurants, a wide-spread type of functional reconversion.

Last but not least, the rehabilitation of the functional water tower (Fig. 4) with the participation of the cement factory, including representations with identity elements or transmission of various messages (including town's promotion and advertising), was taken into discussion. This is an international approach because refurbishment or/and reusing water towers is not only a form of conserving, but also of capitalizing. In Romania, few water towers have already been reconverted, in general giving birth to: cultural activities; tourism; both cultural activities and tourism; other services [13].

Figure 2. Old school (Cercleux, 2019)

Figure 3. Light bulbs plant (Cercleux, 2019)

Figure 4. Water tower of the cement plant (Cercleux, 2019)

DISCUSSION

Social innovations relying on technology and creativity may certainly bring benefits to Fieni. An important actor and support for the implementation of these ideas is represented by the population [14]. Therefore, good cooperation at its level and in relation to other territorial actors is the key element in the success of the proposed projects. Furthermore, this means a good functioning of the principles that shaped the basis of the social or solidarity economics: social cohesion and sustainable development. Circular economics, defined as an economic system aiming at eliminating waste by reusing, sharing, repairing, remanufacturing and recycling (products becoming resources again), plays an important role in this process.

In Fieni, the concerns about providing social services tailored to all age groups are becoming more visible in the last years. There is a functional retirement center that the community also thinks of as a day center for the elderly, where craft activities could take place (but with free access for every member of the community with skills in certain activities or just willing to bring help). It could be supported financially, in part, by selling the products made by retired population and volunteers.

Initiatives for the elderly could be doubled by ideas for the younger generation as well. An initiatives' center for young people with activities related to local entrepreneurship, including environmental protection (with the support of the Edelweiss NGO) is welcome. The active participation of those two population categories in doing things in and for the community could generate efficient intergenerational activities, an important pilon in boosting creative social innovations. The local meetings for debating various initiatives could be hosted in the Cultural Center from Fieni, with free entry for any volunteer from the community, where new collaborations in developing projects could be established.

Intergenerational mutual help activities are part of social innovations category, successfully implemented in developed societies. In the case of Fieni, with a declining young population and an elderly population accustomed to feeling part of the community (as it happened during communism, when almost each member of the community was part of an artistic, sports or other type of group, team or club), further types of activities from intergenerational cooperation are opportune: e.g. the Walking club - in which young people could voluntarily participate in the drawing of routes to project adapted activities in nature and sports for the elderly. On the other hand, the older generation could involve voluntary in activities in a Children's Club.

If in some traditionally capitalist countries intergenerational solidarity has gained experience, in the case of Fieni good collaboration and mutual support among generations are needed in the context of shrinkage and loss of identity values and of feeling of belonging to the place, in the context of the socio-economic transformations occurring after 1990. As a consequence of these mutations, the owners' associations in the residential areas were gradually dissolved, following the departure of the population abroad for working.

The implementation and the expectations of activities coming from both types, creativity and technology, sometimes meet together in the same project: creativity with technology. When they start producing positive effects in the territory, they can lead to further encouraging effects in the local policies, strategies and projects (Fig. 5 A and B). As with other new activities, those social innovations using technology and creativity will need investments, ideas for transforming them into projects and different kinds of support: logistic, technical, raw materials and human resources. As for the impact on the community, in both cases it is reflected in ensuring social cohesion and a more sustainable economic climate, in which, as a result of an efficient communication between stakeholders, new activities in the creative sphere (and not only) can be born from the implementation of social innovations.

These new tools for boosting investment and a larger participation from territorial actors can generate new activities to support the local economy and the regeneration process. Obviously, from a social point of view (population, as an important member in planning actions), as well as economically speaking (functional reconversion), there are opportunities and risks that can support or limit certain interventions: e.g. limits in the functional reconversion of some buildings, from administrative, architectural or conservation perspective. However, the greatest risk could be represented by the reluctance for new or weak intergenerational communication.

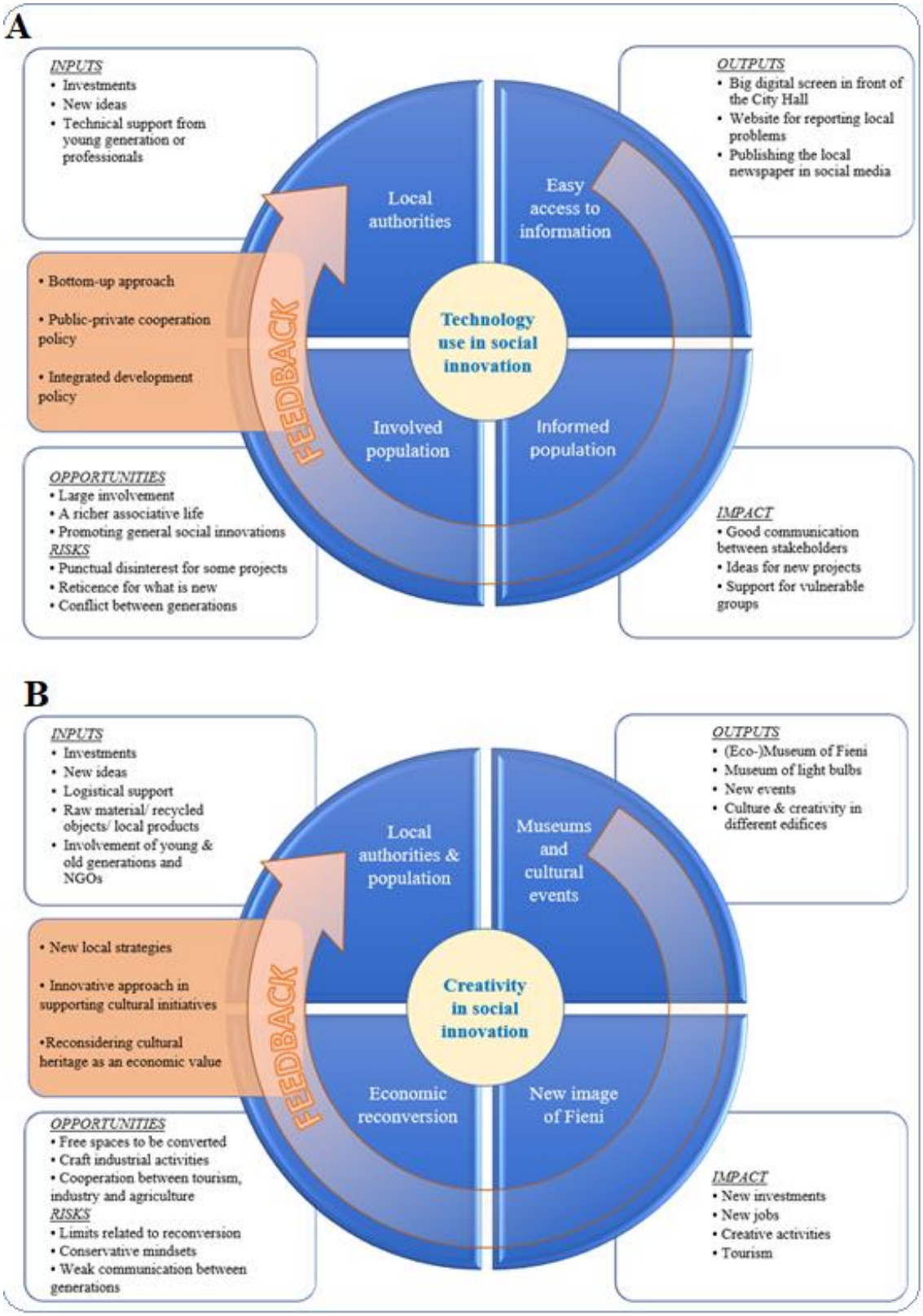

Figure 5. The implementation process of social innovations relying on technology (A) and creativity (B)

CONCLUSIONS

The social innovations developed so far in Fieni have in general responded to urgent community problems, being related to providing services to a declining population and impacted by the disappearance of an important industrial branch.

The findings of the study show that the ideas of future projects for social innovations relying on creativity including technology can bring important socio-economic contributions not only in the immediate term, but they can also have an impact on medium and long-term territorial planning policies.

Beside the local risks in developing social innovations for a certain economic sustainability, such as depopulation phenomenon, demographic aging, lack of openness or reticence for new ideas of projects with which the community is not accustomed and the low access of the population to ICT, financial issues remain important and may be exacerbated by an economic crisis in the next period.

The limit of the study is represented by low presence of young people at the workshop, which made quite difficult the identification of the young generation's needs that weigh in their decision to remain in the community and participate in its revival.

For the future analyses, it is interesting to consider if, in the reality of implementation of some of the above ideas, the large consultation and cooperation in decision making in Fieni, taking into account the lessons learned, can conduct to more social innovations using technology and creativity.

Acknowledgement

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EQUAL OPPORTUNITIES IN ROMANIAN POLITICS - WORK IN PROGRESS. A CHRONOLOGICAL AND SPATIAL ANALYSIS OF WOMEN'S PARTICIPATION IN POLITICAL LIFE

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ABSTRACT

The political parties play a unique and fundamental role within the democratic process and they can also play a significant role in what concern the opportunities to promote women in political structures. Thus, the present paper seeks to describe the way in which the main political parties supported the women's involvement within political life at local level (mayors) from 1996 till present. In order to realize the study, quantitative methods are going to be used, the data being collected from the official sites regarding the local elections. In this sense, there were analyzed the 1996-2020 databases that concern: the candidates, their parties and their gender, the winners and their parties, the voters' turnout. The results show that the percentage of female candidates proposed by the parties is slightly increasing, but it does not exceed the 10% threshold, a sign that gender equality is more accepted in theory than in practice. The study focuses on women candidates who have been nominated by parties to run, but also those who have won. Interesting are the situations by parties and two trends can be observed: large parties neglect the attention given to women, these being below the national average (PSD, PNL), and small or newly founded parties promote them to a greater extent.

Keywords: political parties, female mayors, local politics.

INTRODUCTION

Political parties are the key gate-keepers and power players for fair representation of women and ethnic or racialized minorities [1] (Kantola, 2018) and their policies can promote women within political life or block their access. However, it must be emphasized that Romania's experience with pluralism is not a vast one, being able to talk about such a thing on the Romanian territory only during 1918-1938 and then, after the Fall of Communism in 1989. However, the just founded parties (in 1989) were not born out of conflicts of different social interests, their connection with the social environment being weak [2] (Ingrid van Biezen, 2003). In what concerns the women's representation in local politics (mayors), in Romania the first three female mayors were elected in 1930, when they had the right to vote only under specific conditions [5], but there was no

[5] The 6th Article of the 1923 Constitution: Special laws, voted by a two-thirds majority, will determine the conditions under which women can exercise political rights. Women's civil rights will be determined on the basis of full gender equality.

specification about the right to be elected. In municipal and county election of the same year many personalities involved in women's emancipation as Ella Negruzzi, Calypso Botez, Margareta Paximade-Ghelmeceanu, Ortansa Satmary [6] were on the electoral lists of the National Peasant Party, while Sarmiza Bilcescu-Alimăneştianu or Maria Pillat [7] on the electoral lists of the National Liberal Party. Following the election, more than a hundred women became counselors across the country [3] (Ștefania Mihăilescu, 2006,). Despite the fact that early first steps were taken in Romania, women's political participation at local level remains a significat challenge, as the communist party let deep scars translated through decorative participation [4] (Ghebrea, 2015). In other words, the female's representation in politics, education, was only to consolidate power and create a large workforce [5,6] (Massino, 2004; Ciucă, 2010) and not to guarantee gender equality. Thus, women actively participated in the mass culturalization campaign, in all electoral activities from the position of mother, worker and citizen, but not because of their status as women, having a well-defined program of action, with specific claims and tailor-made solutions, women being seen as a means of transfer [7] (Cosma & Țârău, 2002). Women were in the attention of the Communist Party and occupied party secretaries' seats at county level, ministers' seats and there were gender quotas. These were short-term solution, which did not bring any input or inertia, so once the imposed quotas were removed, the gaps increased. Therefore, only after the fall of the Communism we have a clearer image in what concern women's representation in politics.

Yet, soon after 1989 there was an unstable society, emerging from communism, with problems related to respecting the fundamental rights and freedoms. Thus, the presence of women in politics is equivalent to marginalization, and the difficult construction of solid legislation and law enforcement issues have made the women's presence even more complicated in this area. Of course, there is also the positive legacy of communism - a clear improvement in the status of women and a policy of equal opportunities, maintained in accordance with current legislation [8,9] (Gal, Kligman, 2003; Matei, Iațu, Vert, 2010). On the other hand, there was inherited the traditional mentality that the main duties of women are related to the birth, upbringing and education of their children [9] (Matei, Iațu, Vert, 2010) and the negative image of women promoted by the party that led to the projection of this image on women in post-December politics [4] (Ghebrea, 2015).

METHODOLOGY

Study area

The study area of the present research is Romania and it takes into consideration the NUTS 2 and NUTS 3 Regions (Fig. 1.). The eight development regions have an average of 2,42 million inhabitants as the population varies from 1,77 millions in the West to more than 3 million inhabitants (Table 1.) in the North-East Region

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The 108 Articol of the 1923 Constitution: The members of the county councils and the communal councils are elected by the Romanian citizens by universal, equal, direct, secret, obligatory and minority representation, according to the forms provided by the law. They will be able to add by law and law members and co-opted members. Among co-op members may be major women. (http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=1517)

[6] Intellectual women of the period, suffragists and women's right activists.

[7] Intellectual women of the period, suffragists and women's right activists

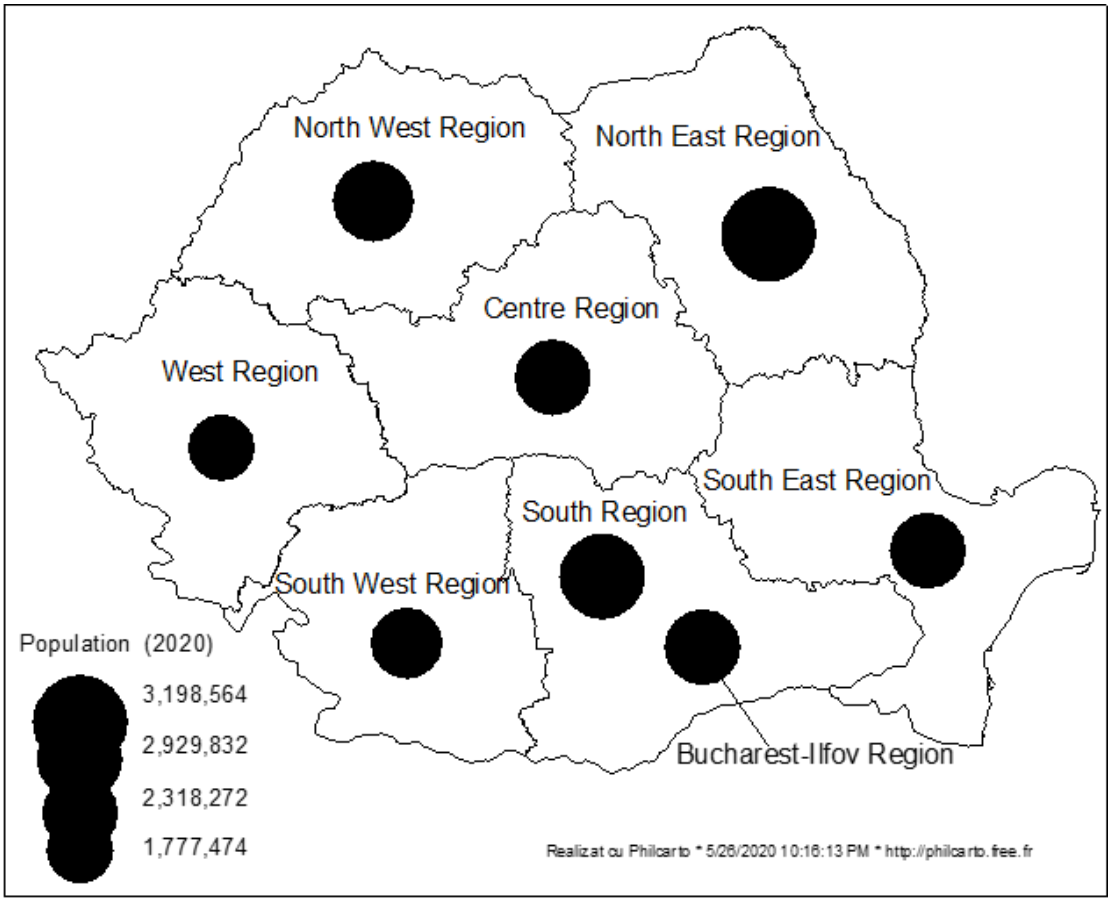

Figure 1. Administrative structure of Romania and their population (NUTS 2). Data source: INS [17]

Table 1. The Romanian population by region. Data source: INS

Region	Population (2020)	Population above 18 years old (with voting right)	% Population with voting right out of the total population
North-East Region	3198564	2460068	76.91
South Region	2929832	2369795	80.89
North West	2552112	2037147	79.82
South-East Region	2396171	1917418	80.02
Central Region	2318272	1836644	79.22
Bucharest - Ilfov	2315173	1895735	81.88
South-West Region	1926860	1577683	81.88
West Region	1777474	1449463	81.55

Statistical data used

To carry out the study, quantitative (analysis of electoral results) and qualitative methods were combined. The data were collected from official local election websites (BEC and Prezență vot) [18]. In our research we analyzed the local elections of 1996, 2000, 2008, 2012, 2016 and 2020 based on: candidates, their parties and gender, winners and their parties, gender and turnout. The graphical method will be used in designing the results.

It should be noted that in 2000 there are no officially validated statistics on the number of candidates, their gender nor the party to which they belong. Therefore, we take into account the fact that our analysis may be influenced by this lack of data. Also, for 1996, 2008 and 2020 the official databases were not classified by gender, which means that they were processed manually and we are aware that there may be a margin of error of 3-5%.

RESULTS AND DISCUSSIONS

Regarding the participation in the electoral process and women's political representation, the results of the analyzed data show that they are reduced in the structures of the local administration in the 1992-2020 legislature, from 1,4 % to 5,33%. More precisely, out of more than 3200 seats the female candidates won 71 in 1996 (2,44), 93 in 2000, 100 in 2004 (3,43), 104 in 2008 (3,31), 116 in 2012, 144 in 2016 (4,58), and 165 in 2020 (5,33%).

Despite the fact that the first female mayors were elected in 1930, we can see in Fig. 2. that the evolution of the percentage of female mayors is very slow and difficult. Also, compared to the EU average 13% in 2011, approx. 15% in 2017 (Fig. 3.), this share is very low, but it is noted that including at European Union level the growth is quite slow.

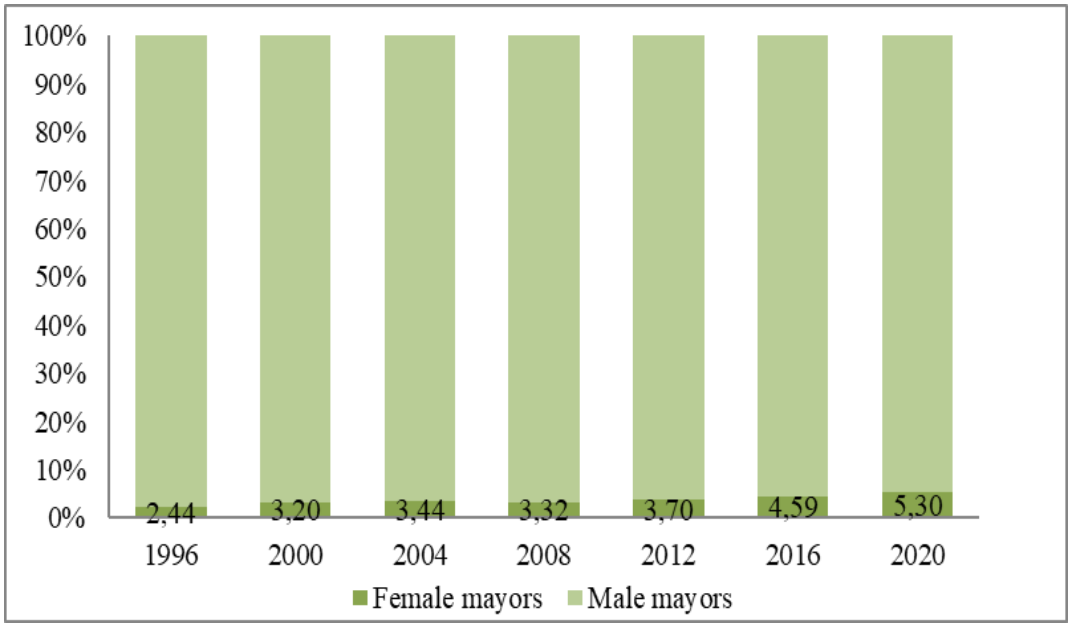

Figure 2. The evolution of male and female mayors in Romania, 1996- 2020.
Data source: roaep.ro and BEC

The low level of female mayors (Fig. 2.) can be translated into ”absence syndrome” [10] (Tekeli, 1991), if we correlate it to the concept of a critical mass of 35% or more at which women`s representation reaches a ‘tipping point’ [11-13] (Childs & Krook 2008, Lewis & Simpsons, McGregor & Webster 2017). In Romania none of the eight regions (NUTS 2) has exceeded the threshold of 35% (Fig. 4.).

This absence can be understood through at least two hypotheses: after 1990 women preferred to pursue a professional career and since there has been no trend in women's participation in politics, they focused on other departments or they avoided the politics as class it had not a great reputation, and mass media contributed to the women’s pejorative categorization [14] (Băluță, 2012).

It is very important to understand the political mechanisms (specific to the partisan space and the functioning of the current Romanian political space) that maintain a reduced presence of women in the post-December Romanian politics [14] (Băluță, 2012). The elections in Romania are conducted on the basis of a closed party list system, thereby each party has a key role in determining the number of women candidates and their place on the lists.

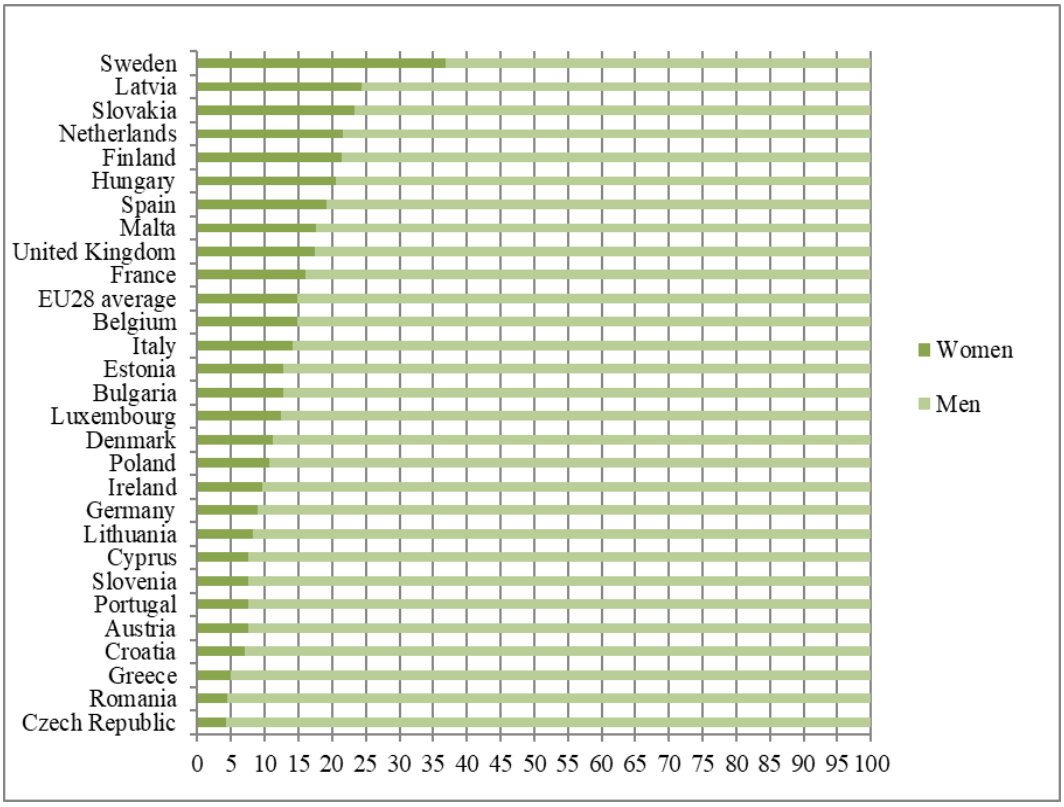

Figure 3. The percentage of male and female mayors within European Union (28 countries) in 2017. Source of the data: EIGE https://eige.europa.eu

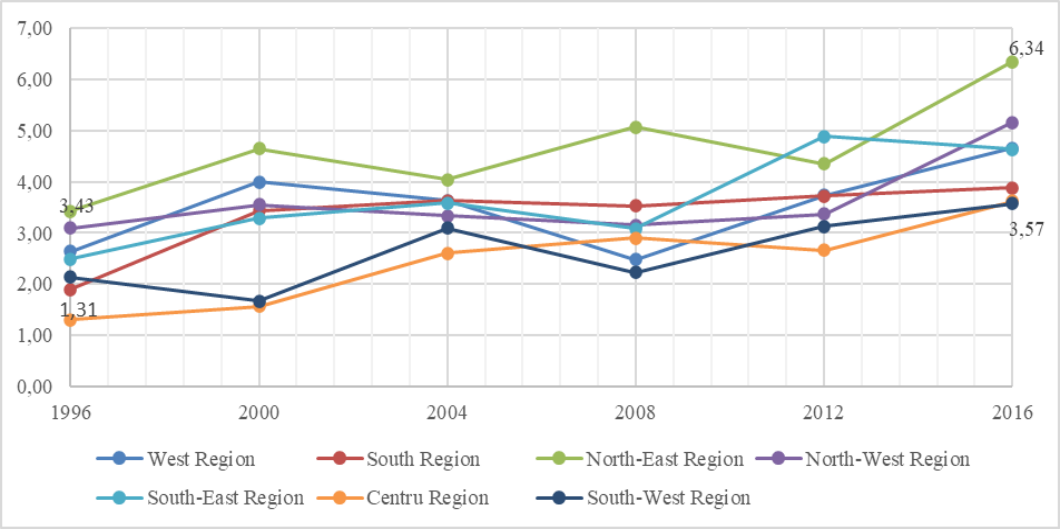

Figure 4. The evolution of female mayors (%) in Romania by NUTS 2 within 1996-2016 period. Data source: roaep.ro and BEC

The recruitment of women can be affected by shadowy arrangements as male-dominated networks influence political parties' candidate selection [15] (Sundstrom, 2014). The Law on Political Parties is silent on the way in which parties nominate their own candidates and does not contain any conditions on internal party democracy, so that each party is free to nominate its candidates as considered. The most important parties in Romania have a women's organization, which can be a useful training ground for women, where they can develop political skills and techniques. However, women's organizations tend to

support a system in which women remain outside the central, decision-making activities of the party as no party has developed special policies to promote women in politics.

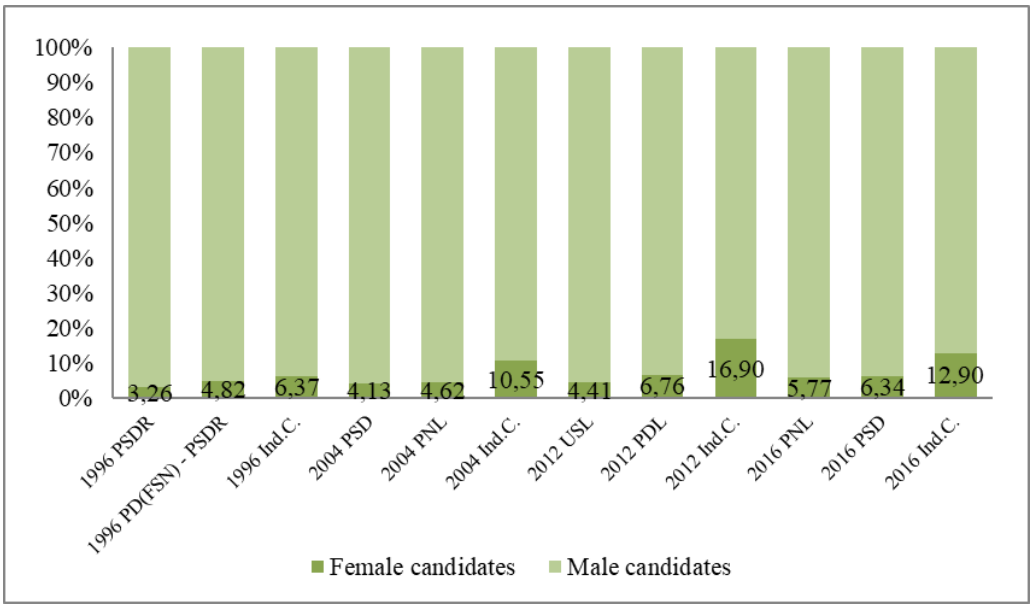

Figure 5. The percentage of male and female candidates of the most important parties and alliances in 1996, 2004, 2012 and 2016. Data source: roaep.ro and BEC

Moreover, it was observed that till 2016 the 10% threshold of female candidates was exceeded only by the independent candidates and almost reached (9,1) by the populist political party, People's Party – Dan Diaconescu, that was new and won a total of 31 mayoral seats (less than 1% of total). The parties that won the most seats put on their lists, over the years, less than 6% female candidates (Fig. 5.) and their success rate is lower when compared to the male candidate's rate.

Another aspect that may have negatively influenced the female's political presence within the local politics (mayors) could have been the one round system that from 2012 contributed to the decrease of candidates (both male and female) (Fig. 6.). Majority is a principle of democracy, so the candidate must be elected by 50% +1 of the voters to represent them [16](Birch, 2003). This principle in Romania was theoretically ensured thanks to the elections in two rounds, but starting with 2012 the local elections are validated after a single round. This decision clearly benefits strong political parties and can be a disadvantage for small parties, women and minorities.

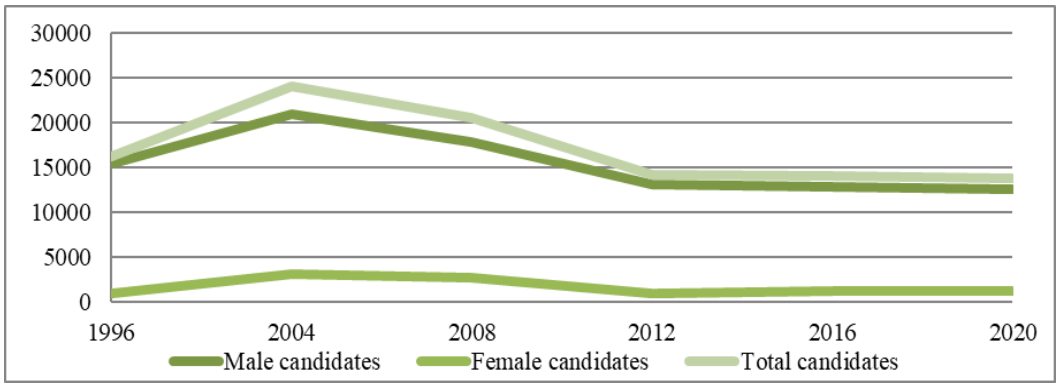

Figure 6. The evolution of the number of candidates in Romania (total, male, female) 1996-2020. Data source: roaep.ro and BEC

CONCLUSION

The present results show that the trend of women's participation in local politics has been increasing from one election to another which is significant, but the current relatively young democracy and socio-economic transition may explain this phenomenon. Yet, there is a long way till reaching equal representation, or, at least the tipping point, as that the parties do not have a strategy in promoting women. The low interest of the parties in promoting women may explain the low chances and rates of success. Perhaps imposing a female participation quota to the parties would lead to a greater involvement, of both parties and women, with the possibility of better political assertion, but it is difficult to predict the impact. Moreover, the role of Romanian society and the distrust manifested in women politicians (Euro barometers 465 and 493) and, maybe, the lack of successful models. If there are models in business, in the media, in politics they are less present, and the performance of some women politicians led to the decrease of confidence in women politicians.

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SIGNIFICANCE OF VARNA AIRPORT FOR BULGARIAN TOURISM

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656.7.072:311.2(497.2)"2010/2019"

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ABSTRACT

Nowadays, air transport is closely related to tourism industry and contributes to faster and more convenient long-distance travel. As a result, air transport has recently overtaken road transport and has become a priority mode of transportation for tourist purposes.
Air transport in Bulgaria and the private airport of Varna have a centuries-old tradition. In connection with the growth of tourism industry in Bulgaria, the importance of air transport and, respectively, of Varna Airport for the transport of passengers - tourists to and from the country - is growing.
This paper studies the specifics of Varna airport in terms of its tourist functions. The working hypothesis is that Varna Airport is a key factor for the development of tourism not only in the city but also in the region, offering fast and convenient connections with many cities in Europe and the Middle East. Its ability to welcome and send tourists has considerable potential. It presents and analyzes data about the significance of the airport for tourism in the region and the country as a whole.

Keywords: Varna airport, passenger transport, tourism, tourist flows

INTRODUCTION

Nowadays, air transport is closely linked to the tourism industry and contributes to faster and more convenient long-distance travel. As a result, air transport has already overtaken road transport and has become a priority mode of transport for tourist services. Air transport contributes to economic growth, tourism development, employment. Bulgaria is well known in the tourist markets as a destination offering many and varied tourist opportunities. The combination of sea, mountains, various sights and events, as well as various types of tourism makes it desirable for many foreign tourists.
The city of Varna is known as the sea capital of Bulgaria, offering different types of tourism - sea, cultural, congress, SPA, wellness, sports, shopping, events and more. In this regard, it can be said that Varna is gradually becoming a year-round tourist destination. Varna is also the most important transport connection of Bulgaria with Russia and one of the most important transport and tourist centers for the Black Sea region.
The possibilities of Varna Airport for processing passengers and cargo have a great effect on the development of the transport network, tourism and trade in northeastern Bulgaria. The working hypothesis of the current study is that Varna Airport is a key factor for the development of tourism not only in the city but also in the region, offering fast and convenient connections with many cities in Europe and the Middle East. Its ability to welcome and send tourists has considerablepotential. The purpose of this study is to analyze the activities of Varna Airport and its impact on tourism development.

METHODOLOGY

To achieve the set goal and objectives, various research methods have been used:

- collection, processing and analysis of significant volumes of statistical information, as well as own calculations based on it;
- chronological method, tracking the development over time of the studied object and the issues related to its activity;
- collection and review of available literature sources;
- general logical methods - analysis, synthesis, comparison, generalization, etc.

The scope of the present study is particularly relevant in relation to the growing role of air transport in tourism. It can be argued that the problem is understudied in terms of specific sites, such as Varna Airport. It is partially represented in the works of H. Nikolova and H. Georgiev as it is considered mainly in historical terms. [2] [4]

The present study analyzes the activity of Varna Airport for the period 2010-2019. The latest up-to-date data for 2020 are not yet fully available, but it is not difficult to assume that in 2020 there will be serious changes related to restricting travel in a pandemic. Therefore, the specifics of the airport's operations in 2020 are only partially affected.

AIR TRANSPORT AND TOURISM

Air transport is already a leading factor in the development of tourism, as it is an integral part of the tourism industry. In 2018, 58% of tourist trips were made by air, and this share is growing rapidly. [5] Its biggest advantage is the speed with which long distances are covered in a much shorter time than by car or railway transport. It allows you to quickly and conveniently visit many tourist destinations. As Hristo Nikolova points out, this is precisely why this type of transport is becoming increasingly important for the mobility of people and goods. In the first place are comfort and safety, which are a priority for every airline and ensure a high culture of customer service. The social benefits of aviation include expanding people's access to new cultures and destinations around the world, creating jobs and improving the living standards of the local population through tourism, providing connections to hard-to-reach areas and areas covered by social exclusion, contributes to the economic development of the regions and contributes to the sustainable development of tourism [3]. The supply of transport services by low-cost airlines in recent years has increased the demand for air transport, leading to a significant reduction in flight and customer service costs without compromising flight safety.

Modern trends are aimed at increasing convenience, comfort and even providing luxury. However, for low-cost airlines, the travel conditions are subject to minimum comfort requirements. The requirements for safety and security of flights are increasing, as well as for the reduction of noise pollution, as well as the emission of harmful gases.

According to Nikolova [4], the development of air transport is extremely important for the national economy - jobs are created, trade and connections of local companies and citizens with contractors and partners from around the world are facilitated. Its technical and economic features define it as the most economically advantageous mode of transport in the transport of passengers and perishable goods, as well as those requiring express or urgent delivery.

The advantages and disadvantages of passenger air transport determine its role in the system of tourist services mainly for:

- implementation of long-distance mass tourist transport;

- servicing of the organized group and individual tourism during the implementation of the main transfer or in the area of the residence;
- servicing medium- and high-paying clients in international tourism;
- carrying out tourist transport mostly during the active tourist season;
- conducting tourist trips of business (domestic or international) tourism.

The organization of tourist trips by air is carried out in two ways - through regular passenger lines or with specially rented flights (charter services). Comparisons between the pricing policy for charter and scheduled flights show that at the same cost, the airline offers lower prices for charter flights, which is due to the ability to provide a higher load on the aircraft.

In the conditions of competition, the airlines are forced to make a number of reliefs for the tourists traveling on the regular passenger routes, such as reductions in the transport prices, admission for transportation of a larger amount of luggage, etc.

Recently, inclusive and block charter flights have become widespread among airlines that are members of the International Air Transport Association. [19]

Inclusive tours are characterized by the fact that the price paid by the tourist includes, in addition to the transport price, also a night in a hotel and additional services such as a panoramic tour of the town for sightseeing, short car trips or transfer.

It is typical for charter services that not individual seats are purchased, but the entire aircraft or part of its capacity is rented. In the world practice there are a number of types of charter flights, the most common of which are:

a) One-time charter - in this case, the client orders an aircraft for certain dates (only one way or a return service), and in the interval between charter flights the airline can to use the aircraft.

b) Time charter - this type of charter is applied when the client, respectively the guarantor company finds it appropriate to rent an aircraft for a certain period, during which it is at the complete disposal of the guarantor. Time charter is advantageous for airlines because they receive guaranteed pay. At the same time, it is very convenient for the guarantor, especially if they needs to perform mass transport for a certain period.

c) Charter chain - characteristic of this type of charter is that the leased aircraft arrives at the starting point for charter services and from this point operates charter flights to one or more points under the scheme "round trip". The flights of the aircraft to the starting point for charter services are not paid by the guarantor - these flights are usually unproductive for the airline.

d) Block charter - the trips are made on regular airlines, but are booked in advance, i.e. hey block a number of passenger seats on aircraft. The guarantor pays for the whole block of passenger seats regardless of its actual use. Block charter services are profitable for the airlines only during periods of reduced demand for air services, because the block seats are sold at prices that are significantly lower than the respective tariffs.

Charter services are performed on the basis of a previously concluded charter contract (aircraft rental). In principle, the formalities relating to the flights are borne by the carrier. These include settling immigration, customs, border and other issues, as well as obtaining permission from the aviation authorities to operate a charter flight. The main obligation of the guarantor is to ensure the timely movement of passengers and their luggage to the airport. The basis for charter flights is the request from the guarantor, submitted to the airline up to 15 days before the flight. The request shall indicate the name of the guarantor, the date of the flight and other information required by the airline.

A variety of traditional charter tourist trips are one-day plane trips to practice winter sports, hunting, fishing and more. In order to ensure a more rational use of air transport in tourist travel, it is appropriate to apply such forms of organization of transport activities as winter charters, off-season charters, charters for weekly trips throughout the year and others. In some countries acquire popularity the so-called weekend trips with individual or group rates, as well as specialized short trips . In this regard, there are great opportunities for the development of active international tourism.

A well-organized acquisition activity can help to attract more tourist traffic. Acquisition is a method of work applied by specially charged employees of the airlines in order to attract more customers to use the relevant transport services. It consists in establishing close and continuous contact with the possible sources of passengers for air transport - tour operators, travel agents and others. [1]

The technical improvement of the material and technical base of the passenger air transport, the organizational and product innovations in its activity in combination with the favorable prices of the transportations will confirm the aircraft in the future as a preferred means of transport for mass tourism. [14]

As for the Northeast Planning Region in Bulgaria, K. Nedeva and E. Ganchev found that the impact of income on passenger traffic is very strong, but has little statistical significance. The effect of the impact of passenger traffic on the income of the population is weak, but statistically significant, with a lasting manifestation. Therefore, air transport has a significant effect on the sustainable development of the region in its socio-economic dimensions. [3]

ORIGIN AND DEVELOPMENT OF AIR TRANSPORT IN BULGARIA AND VARNA

In the autumn of 1894, with the support of the Varna Regional Commission, 19-year-old Haralampi Jamdzhiev made the first flight of an aerodynamic device in Bulgaria. In 1911 the program for building the Bulgarian aviation started. On April 1, 1922, an aviation department was established at the Ministry of Railways, Posts and Telegraphs, located at Bozhurishte Airport. The aim is to arrange a passenger air network between the largest cities. This is the first attempt to create civil aviation in Bulgaria, which has been developing and transforming over the years. In 1947 a permanent air line was opened between Varna and Sofia. After the airline company the Balkans was closed in November 2002, a month later the government of Simeon Saxe-Coburg-Gotha created a new state airline, called Bulgaria Air [18] Today the main body for air transport management in Bulgaria is the Ministry of Transport, Information Technology and Communications [6] and in particular the General Directorate of Civil Aviation Administrations [15].

Varna's first Tihina Airport was located near Asparuhovo. It occupied an area of 1000-1500 decares. On May 9, 1948, the new airport of Varna was opened and the first plane with official guests from Sofia landed.

The first artificial pavement on the runway was laid in 1961. In 2011/2012 rehabilitation of the runway for taking off and landing has been done. A layer of asphalt concrete with polymer-modified bitumen has been laid. The side safety strips have been widened to 7.5 m. Thus, the total width of the runway is 60 m.

During the rehabilitation, a new drainage and lighting system was built and an adaptation was made in the connection areas of the runway for taking off and landing with the taxiways. The track was put into operation again on February 29, 2012.

The current Terminal 1 was built in 1972. It has been expanded several times over the years. It is a building on three levels. Since 2013, this facility has not been used for passengers because Terminal 2 has sufficient capacity to cover current needs.
In December 2011 - August 2013 the construction works on the new terminal 2 are carried out. It was opened on August 18, 2013. It has a capacity of 1,800,000 passengers per year and has 25 check-in counters. Its total area is 18,000 m2. The terminal buildings are designed so that their capacity can be increased in addition to the existing part. [4]

INFRASTRUCTURE AND SUPERSTRUCTURE

Terminal 2 is designed according to the requirements of Fraport Twin Star Airport Management AD for a modern, functional and sustainable airport complex. The concept is for a flexible structure that will allow future expansion as the number of passengers increases.
Today the airport is located on the territory of 2 municipalities - Varna and Aksakovo, 8 km northwest of Varna. Its area is 2,414 decares and has 5 taxiways. The largest type of aircraft that serves the airport is the Boeing 747. Landing on runway 09 (from the west) can be done in conditions of reduced visibility. [8]
The following facilities are located within a radius of 15 - 20 km:

- Port of Varna
- Developed railway junction
- European roads E70, E87, national road A-2 (Hemus highway) to Sofia and A-5 (Black Sea highway) to Burgas.
- Developed commercial and industrial areas, incl. 4 shopping centers and numerous representative offices of companies

Within a radius of 40 km from the airport are the resorts Golden Sands, Riviera Holiday Club, Sunny Day, St. St. Constantine and Elena and Albena, which attract millions of visitors every year.
The runway 09/27 has the following dimensions: length - 2,517 m, width - 45 m, side safety strips 2 x 7.5 m. The platform of Varna Airport is located north of the runway. The pavement is concrete laid on fields. The platform consists of a total of 24 stands. 14 stands are for positioning / exiting the aircraft on their own, and 10 stands are for taxiing when positioning / towing when exiting. The total capacity of the platform meets the needs of the traffic. The aircraft traffic area is to the south. [8]
Terminal 2 is a one-level building with an approximate built-up area of 17,600 m2. With full operational functionality, the terminal meets the needs of peak traffic in the summer. Based on the traffic forecasts and the program of the facility in the first stage, the terminal will be able to serve the expected needs for departing passengers by 2026 and for arriving passengers by 2031. The planned extensions of Terminal 2 will be realized during the second and third stages of development. It is envisaged that these extensions will be made on both sides of the building, preserving the architectural and functional concept of the facility. [8]
The number of passengers at Varna Airport varies considerably in summer and winter. Therefore, the operational area of Terminal 2 can be separated by means of movable barriers and reduced during the off-season in order to minimize costs. The aim is, on the one hand, to ensure reduced activity in the winter and, on the other hand, to offer diversity in the passenger stay and a good range of shops and restaurants. Adaptation of Terminal 2 to passenger traffic is achieved by creating a central area that operates throughout the year. There are key locations for processing, retail, and ancillary areas. The terminal areas

of the terminal can be closed during the winter when the passenger traffic is reduced. In Terminal 2 there are no physical barriers for persons with reduced mobility. The terminal has offices for information and assistance to people with physical disabilities or reduced mobility.

In order to create and maintain a positive impression on arrival and departure from Bulgaria, the exterior design includes accents aimed at preserving the holiday spirit of passengers.

The latest EU security regulations set higher space requirements than in the past. In this regard, the public and guarded areas of Varna Airport are separated by a fence. The transition from the public to the protected area is possible only after inspection.

The building of the new passenger terminal has a centralized checkpoint for checking passengers and staff. The centralized checkpoint for passengers is located in the departure area. All departing passengers - for domestic and international flights, must pass through this checkpoint. In the first stage of its construction, it is equipped with 9 X-ray machines, 5 pass-through metal detectors (WTMD), hand-held metal detectors (HHMD) and a CCTV surveillance system. The check of passengers' hand luggage is performed by 2 automatic X-ray machines located behind the check-in area. The new system also has an explosive (ETD) detector.

All cars enter and exit the guarded zone through a checkpoint. It is equipped with an X-ray machine, a pass-through metal detector (WTMD), hand-held metal detectors (HHMD), an explosives detector and a CCTV surveillance system. The existing perimeter fence and road network fully comply with the regulations.

At Varna Airport, the design phase of the rehabilitation and extension of the 1220-meter-long Eco taxiway has been launched. The investment project has an expected value of about 4 million BGN. There are ongoing improvements of the construction and fire-fighting measures in the building of the hangar. [17]

ORGANIZATION AND MANAGEMENT OF THE AIRPORT ACTIVITIES

Since 2014, two ground operators have been operating at Varna Airport - Fraport Twin Star Airport Management AD and Golder Handling Bulgaria, respectively. In addition to them, 17 other companies operate at the airport, some of which provide self-service for the aircraft they operate. Varna Airport is a public state property, transferred on concession for a period of 35 years as of 2006 to Fraport Twin Star Airport Management AD [4]

Fraport Twin Star Airport Management AD is a German-Bulgarian company - concessionaire of Burgas Airport and Varna Airport, with 60% participation of the world airport operator Fraport AG and with 40% owned by Airport Services - Bulgaria. So far, more than 395 million private capitals have been invested in the expansion and modernization of the two airports. [10] The investments are aimed at improving the infrastructure and all technical facilities and equipment, as well as training and retraining of staff. Fraport Twin Star Airport Management AD in Varna and Burgas employs more than 700 permanents and about 1200 seasonal employees. [11] There is a Center for Career Development of Employees as continuous training and professional qualification are part of the company's corporate policy. [9] [16] [17]

The management of aircraft taxiing is carried out in close cooperation with the State Enterprise Air Traffic Management. Varna Airport is governed by a Board of Directors, which includes a Chief Executive Officer, a Chief Financial Officer and a Chief Coordination Director. [13] [17]

From March 2020, in order to prevent the infection with Covid-19 at Varna Airport, all recommendations and instructions received from the relevant Bulgarian and world health authorities are strictly followed. The joint efforts with the competent employees of the Regional Health Inspectorate - Varna and the police department of Varna Airport include registration of all arriving passengers in the border control system and additional collection of information through questionnaires filled out by passengers arriving from risky destinations.
In the arrival hall of Terminal 2, before the counters for border checks, there is an installed thermal camera, which is serviced by specialized teams of the Regional Health Inspectorate - Varna in accordance with the flight schedule and the corresponding risk associated with the country of origin. In addition, there is constant communication with the airlines that serve Varna Airport, for better control and awareness on both sides. Safeguards are provided for airport services and other necessary supplies for crisis management by Covid-19. A number of measures have been taken to tackle the spread of the infection, including an enhanced cleaning and disinfection regime, regular ventilation and cleaning of premises and vehicles, separation of passengers arriving from high-risk destinations and the prevention of non-travelers at airport terminals. [12]

OPERATING AIRLINES, FREQUENCY AND DIRECTIONS OF FLIGHTS

In the winter of 2020 - 2021 Varna Airport offers direct flights to 17 destinations in 10 countries (Table 1). These destinations are served year-round.

Table 1: Year-round destinations of flights from Varna Airport. [data source 8]

COUNTRIES	DESTINATIONS	SERVICE AIRLINE
Germany	Frankfurt (Haan)	WizzAir Hungary
	Nuremberg	
	Berlin	
	Munich (Memmingen)	
	Dortmund	
	Hamburg	
	Cologne	
Great Britain	London (Luton)	
	Liverpool	
Belgium	Brussels (Sharleroi)	
The Netherlands	Eindhoven	
Austria	Vienna	
Czech Republic	Prague	
Cyprus	Larnaca	
Israel	Tel Aviv (Ben Gurion)	
Bulgaria	Sofia	Bulgaria Air
Turkey	Istanbul	Turkish Airlines

Until 2020, year-round flights were also operated to Russia (Moscow, Domodedovo), Italy (Beragamo), France (Paris, Beauvais). The table shows that the predominant destinations are in Europe (88%) and only two (12%) are outside Europe, but they also belong to the European tourist region. The most prevalent are the destinations covered in Germany (41%), which in summer serve incoming tourists, and in winter mainly Bulgarians living abroad and their families. In the period 2010 - 2019 year-round flights (domestic and international) from / to Varna Airport are operated by 5 airlines - Bulgaria

Air, Wizz Air Hungary, Austrian Airlines, S7 Airlines, Turkish Airlines, but in 2020 four of them remain. Of the low-cost carriers, year-round scheduled flights are operated by Wizz Air Hungary, which operates the largest number of flights and covers the most destinations. Until 2018, their number was 8, and from 2019, after a second aircraft of the airline was based at Varna Airport, the flights increased by 6. The destinations are mainly to European airports. A worrying fact is observed with the operating airlines - a strong monopoly of only one airline, which hides risks for the quality of the provided services and / or for increased prices in the future. The Bulgarian national carrier (Bulgaria Air) is very poorly represented, serving just one line, the only domestic line.
During the active tourist season, the flights increase. In 2020, they are up to 28 destinations in 15 countries (Table 2).

Table 2: Directions of seasonal flights served by Varna Airport in 2020. [data source 8]

COUNTRIES	DESTINATIONS / AIRPORTS	SERVICE AIRLINE
Germany	Hannover	WizzAir Hungary
	Baden baden	
Austria	Saldsburg	
Spain	Barcelona	
Italy	Bergamo	
Finland	Helsinki	Norwegian Air Shuttle
Poland	Warsaw	LOT
	Krakow	
Hungary	Budapest	
Russia	Moscow (Domodedovo)	SiberiaAirlines
		NordStar Airlines
Turkey	Antalya	Bukgaria Air Charte

During the warm half of the year, the flights connecting Varna with a total of 9 (7 year-round and 2 seasonal) destinations in Germany dominate again. The flights to Austria with the additional destination Salzburg and Turkey with the additional destination Antalya, which serves mainly the tourist flow leaving Bulgaria, are increasing. Flights in 2020 to Spain, Italy, Finland, Poland, Hungary and Russia are only seasonal. They serve not only incoming tourists, but also Bulgarian tourists who have chosen these countries for their vacation. It is noticed that more airlines are included in the summer flights, but the monopoly positions of WizzAir are preserved. During the period 2010 - 2019, the flights during the active tourist season were significantly more (Table 3).

Table 3: Directions of seasonal flights served by Varna Airport for the period 2010 - 2019. [data source 8]

COUNTRIES	DESTINATIONS / AIRPORTS	SERVICE AIRLINE
Germany	Berlin (Tegel) Berlin (Schönefeld), Dresden, Düsseldorf, Erfurt / Weimar, Leipzig, Nuremberg, Frankfurt, Hanover, Hamburg, Stuttgart	Air VIA
	Berlin (Tegel), Berlin (Schönefeld), Düsseldorf, Cologne / Bonn, Leipzig, Münster , Munich, Nuremberg, Frankfurt, Stuttgart	Bulgarian Air Charter
	Berlin (Tegel), Hamburg,	Bulgaria Air
	Düsseldorf, Frankfurt,	Germania
	Berlin (Tegel), Stuttgart	Germanwings

	Munich	Condor
	Munich	Lufthansa
Austria	Vienna	Bulgaria Air
	Vienna	Bulgarian Air Charter
France	Paris (Orly)	Transavia France
The Netherlands	Amsterdam	TUI Airlines Netherlands
Denmark	Billun, Copenhagen	Primera Air
	Aalborg, Billun, Copenhagen	SAS
	Billun, Odense, Aalborg	BRA
	Copenhagen	Thomas Cook Airlines Scandinavia
Sweden	Gothenburg, Stockholm - Arlanda	
Norway	Bodo, Oslo, Trondheim, Stavanger	
Finland	Helsinki	
Russia	Moscow (Domodedovo) St. Petersburg	Azur Air
	Moscow (Domodedovo), St. Petersburg	NordStar
	Moscow (Sheremetyevo)	Nordwind Airlines
	Moscow (Domodedovo)	Yamal Airlines
Belarus	Minsk	Belavia
Ukraine	Kiev (Zhulyany)	Bravo Airways
Poland	Warsaw, Wroclaw, Gdansk, Katowice, Krakow, Poznan	Enter Air
	Warsaw (Chopin), Wroclaw, Katowice, Kosice	Bulgarian Air Charter
	Warsaw, Katowice, Poznan	Travel Service Poland
	Warsaw, Gdansk, Katowice, Poznan	Small Planet Airlines Poland
Lithuania	Vilnius	Small Planet Airlines
Latvia	Riga	SmartLynx Airlines
Estonia	Tallinn	Smartlynx Airlines Estonia
Czech Republic	Lol, Prague	Travel Service
Slovakia	Bratislava	Bulgaria Air
Armenia	Yerevan	Bulgaria Air
		Bulgarian Air Charter
Israel	Tel Aviv	Bulgaria Air
		Bulgarian Air Charter
Lebanon	Beirut	Bulgaria Air
		Bulgarian Air Charter
Kuwait	Kuwait	Bulgaria Air
		BH Air
Iran	Tehran	Bulgaria Air
		Iran Aseman Airlines
		Mahan Air
		Meraj Airlines
		Qeshm Airlines

The table shows that the total number of airlines operating charter flights to / from Varna Airport in the period 2010-2019 is 31. They serve a total of 47 destinations from 18 countries, mainly in Europe. The most destinations (19) are served by the Bulgarian Air Charter airline. Next in activity is Air VIA, which served 12 destinations to / from different cities in Germany. Air VIA ceased operations in 2016. Of the airlines listed in the table, three more have ceased operations. These are the airline "Germania" with

suspended operations from February 5, 2019, the airline "Small Planet Airlines" with suspended operations from November 28, 2018 and the airline "Thomas Cook Airlines Scandinavia" with suspended operations from October 30, 2019. [8] [20] The tables show that there is a negative tendency for Bulgarian air carriers to have an ever-decreasing share in the total volume of air traffic.

The great variety of operating airlines is impressive, as well as the better positions of the Bulgarian national carrier, especially in terms of the Middle East destinations. The strongest impact on the reduction of charter flights is the pandemic of 2020, but some of them were terminated earlier due to economic reasons. Therefore, the air traffic to and from Varna Airport is a dynamic quantity that changes over the years. However, the dominant number of flights connecting with a large number of airports in Germany is maintained. This is not the case with the other areas. Currently, most Middle East charters, most charter flights to Eastern European countries, as well as some charters to Western Europe have been almost completely suspended. The latter are relatively less affected by the ongoing reductions.

PASSENGER FLOW ANALYSIS

The total passenger flow (arrivals and departures) through Varna Airport has increased from 1,201,557 passengers in 2010 to 2,070,308 passengers in 2019, i.e. 72% more. The largest number of passengers passing through the airport is observed in 2018 - 2,265,952 passengers. (Fig. 1). The data show a gradual increase in the total number of passengers served at the airport, with a larger increase observed after 2016. In 2019, a slight decline was reported, which significantly intensifiedin 2020.

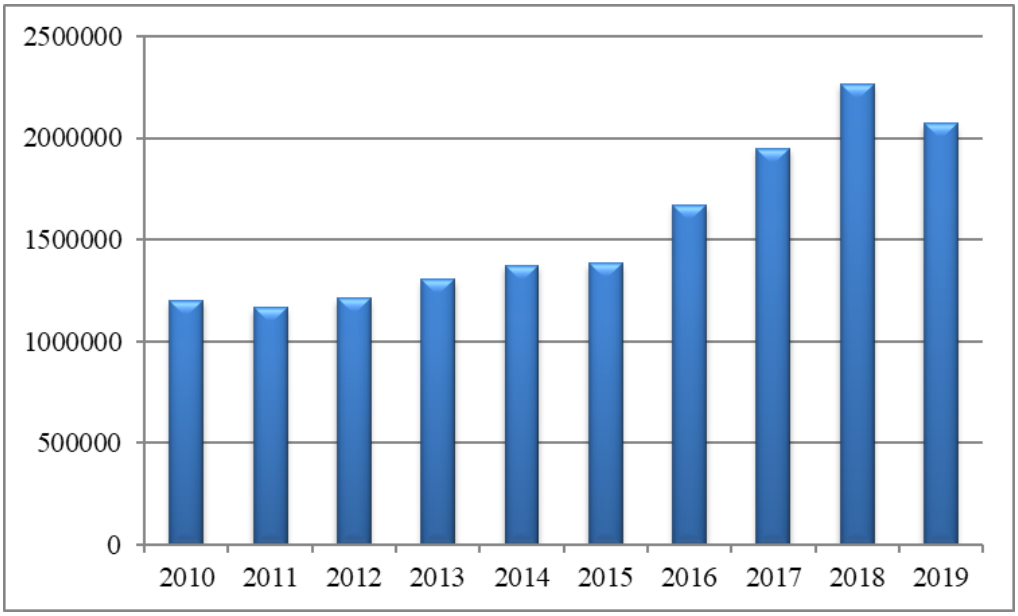

Figure. 1: Total passengers served at Varna Airport (2010-2019)
[data source 8]

The number of arriving passengers has also increased significantly, as in 2010 they were 598,785, and in 2019 their number increased to 1,034,896, i.e. 73% increase (Fig. 2). The growth is not uniform. It can be seen that it is more significant after 2016. In 2019, a slight decline was registered, which intensified in 2020 in relation to the pandemic. The

changes in the number of departing passengers are similar. They are shown in fig. 3. The ratio of arriving passengers with scheduled and charter flights is shown in fig. 4.

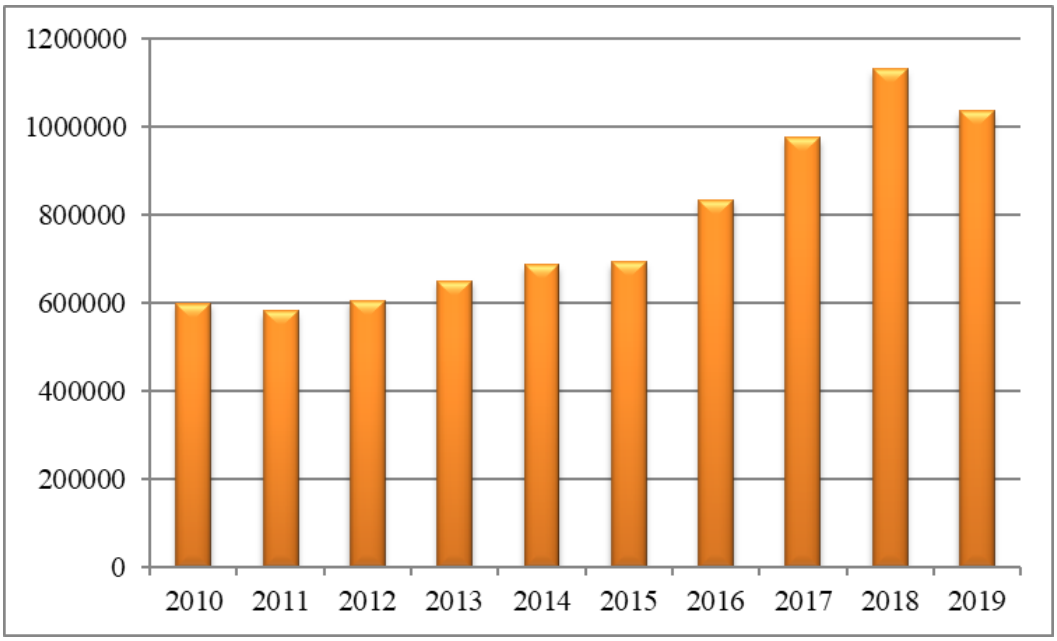

Figure. 2: Number of arriving passengers at Varna Airport (2010-2019)
[data source 8]

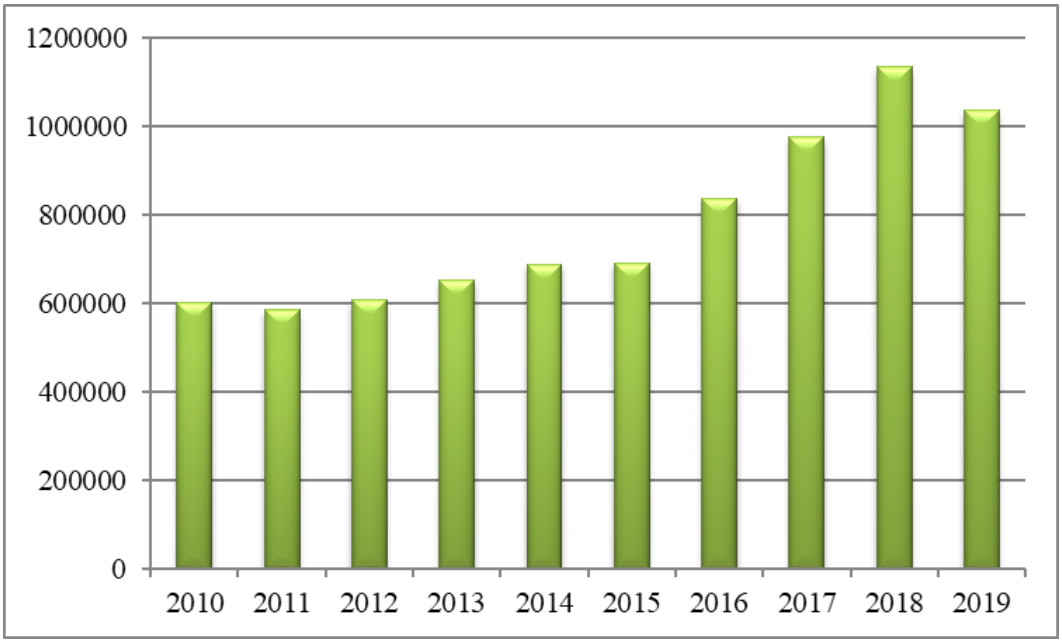

Figure. 3 Number of departing passengers from Varna Airport (2010-2019)
[own calculations]

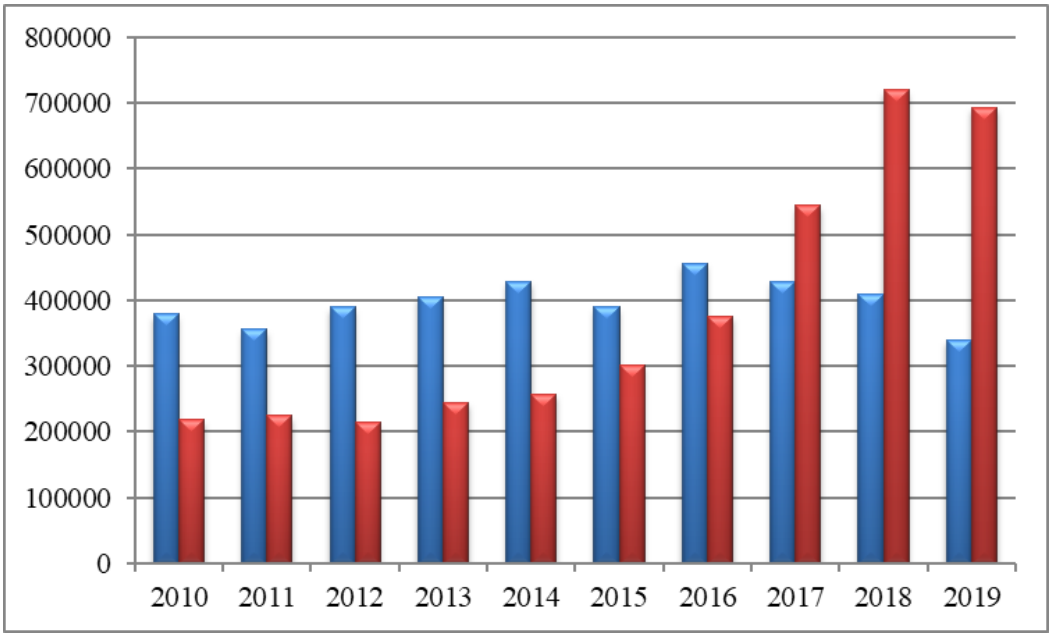

Figure.4: Ratio between arriving passengers on scheduled and charter flights (2010-2019) charter, regular lines [data source 8]

The average annual passenger flow of arriving passengers transported by international charter flights at Varna Airport for the specified period is 398,387 people, and only in 2019 the number is 339,943. In 2010, the charter passenger flow was 63%, and had insignificant fluctuations until 2016, after which there is a tendency to decrease and reach 33% in 2019, due to the increasing number of passengers of regular international flights. This can be considered as a positive trend for increasing the efficiency of Varna Airport. The total number of arriving passengers with charter flights at Varna Airport for the period 2010-2019 is 3,983,871.

The average annual passenger flow of arriving passengers transported by regular international routes at Varna Airport is 379,676 people. The total number of arriving passengers with regular international flights at Varna Airport for the period 2010-2019 is 3,796,768. The total number of passengers carried with regular international flights through Varna Airport in 2010 was 218,744 people, and in 2019 - 693 611. The growth for the studied period is significant - 217%.

Despite the year-round regular flights, Varna Airport retains its strong summer seasonality, which is evident from the monthly distribution of passenger traffic shown in Table 4.

Table 4: Monthly distribution of passenger flow (2010 - 2019) [data source 8]

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2010	8371	9184	11693	15195	46979	109895	145421	134665	72353	21088	12043	11898
2011	10101	8919	13455	16344	43790	116555	151615	138438	75039	7652	*	*
2012	*	33	7683	13766	37554	129904	167674	146178	67108	15275	10481	9032
2013	8006	8562	10485	13177	41538	137221	163020	153763	74755	19282	10539	10239
2014	8279	9497	12286	17451	39870	147830	169068	163016	72787	22019	12308	12057
2015	10783	9844	12076	17205	46094	124410	174916	161544	83309	22955	13990	15104
2016	12831	12522	14688	19422	61130	153555	206358	189461	102940	27149	16091	18191
2017	13708	14532	17773	29674	67255	171247	226120	208112	119980	42095	30287	34175
2018	28204	25492	34326	38802	96437	199663	252203	219284	131977	45431	28519	31104
2019	27093	25378	29353	41935	80967	167205	210347	196135	125061	53741	36104	41577

From the presented data it can be seen that for the period 2010-2019, the busiest months are May, June, July, August, September and October. Throughout the studied period, July has the highest traffic intensity. The lowest numbers are during the winter months and especially in January. These features correspond directly to the functions of Varna Airport related to the service of the summer tourist season. Therefore, it can be concluded that:
1. Passengers travel mainly for tourist purposes.
2. Varna Airports is a key factor for the development of tourism, providing transportation of arriving and departing tourists by air.
In the period 2010-2019 the total number of passengers arriving at Varna Airport is 7,790,300 people. Table 4 shows the percentage distribution of passenger traffic from Germany, Russia, Bulgaria, Poland and the United Kingdom, which are the top five by the number of arriving passengers.

Table 5: Arriving passengers at Varna Airport from top-five countries (2010-2019) [data source 8]

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Num	Share in% of
Germany	130967	133979	154019	146433	161673	184786	249943	254674	297995	266477	1980946	25,4%
Russia	128710	144013	171969	191522	169067	113918	119129	107038	114220	83396	1342982	17,2%
Bulgaria	77495	59671	64112	66657	65052	65348	68838	127826	145224	131311	871534	11,1%
Poland	29338	33317	26685	28696	30019	36812	65713	79709	96764	85518	512571	6,5%
Great Britain	33347	27031	25136	30665	32347	41120	48197	66996	75528	95502	475869	6,1 %

As can be seen, the share of passengers arriving from Germany is the largest - 25.4%. In 2018, the largest number of arriving passengers from Germany for the specified period is 297,995. For the entire period there is a steady growth of arrivals from Germany, which, however, is variable.
For the mentioned period the total share of the arrived passengers from Russia is 17.2%. The number of Russian citizens passing through Varna Airport is highly volatile due to changes in political events and visa formalities. In 2013, the largest number of passengers who arrived from Russia for the period is 191,522.
The arriving Bulgarian citizens make up 11.1% of the total number of arriving passengers. Their number almost doubled during the studied period in relation to the liberalization of air transport.
The share of passengers from Poland is 6.5%. There are also very large fluctuations in the arrivals of Polish citizens. In 2018, the largest number of passengers who arrived from Poland during the period (96,764) was registered in connection with good holiday offers, the increase in flights to Poland, good security measures, and the nostalgia to the 1980s, when Bulgaria was one of the main holiday destinations for Polish tourists.
Passengers arriving from the UK amount to 6.1% of the total passenger traffic. Although a decrease was reported at the beginning, an increase in arrivals was registered at the end of the period. The fluctuations can be explained by the return of the tourist market to countries such as Turkey, Egypt, Tunisia. But Bulgaria offers cheaper holidays compared to other European resorts. Low-cost flights from the UK also have an impact.
The other countries with a clear share of the total number of arriving passengers for the period 2010-2019 are Israel - 4.6%, Austria - 4.4%, Turkey - 3.0%, the Czech Republic - 1.8%, Norway - 2.3 %, Belgium - 1.9%, Belarus - 1.5%, France - 1.2%, Denmark - 1.4%, Finland -1.1%, Lithuania - 1.1%, Iran - 1.2% , Estonia - 1.0%, the Netherlands - 0.7%,

Luxembourg - 0.8%, Cyprus - 0.5%, Italy - 0.5%, Ukraine - 0.5%, Hungary - 0.5%, Sweden - 0.5%, Lebanon - 0.3%, Switzerland - 0.3%, Latvia - 0.3%, Armenia - 0.1%, Kuwait - 0.1%, Slovakia - 0.1%, Slovenia - 0.1%, Serbia - 0.1%, Greece - 0.1%, Egypt - 0.1%.
Table 6 shows the top 30 destinations at Varna Airport (2010 -2019).

Table 6: Top 30 destinations (2010-2019) [data source 8]

Destination	Total number of passengers	Destination	Total number of passengers	Destination	Total number of passengers
1. Moscow	1 026 068	11. Leipzig	202 675	21. Minsk	122 462
2. Sofia	870 323	12. Hanover	202 840	22. Nuremberg	97 860
3. London	404 355	13. Berlin	175 075	23. Helsinki	86 933
4. Tel Aviv	365 066	14. Warsaw	152 297	24. Oslo	87 625
5. Vienna	345 516	15. Prague	118 242	25. Tehran	94 431
6. Dusseldorf	311 974	16. Stuttgart	137 580	26. Tallinn	84 267
7. Istanbul	203 271	17. Cologne	137 607	27. Vilnius	82 297
8. St. Petersburg	241 753	18. Hamburg	126 683	28. Poznan	68 995
9. Frankfurt	223 292	19. Munich	125 867	29. Luxembourg	63 912
10. Katowice	195 124	20. Brussels	125 595	30. Paris	51 687

Table 6 shows that Varna Airport serves a variety of destinations, although flights to most of them are seasonal. Among the busiest destinations are Moscow, London and Tel Aviv in service of Russian, British and Israeli tourists, respectively. Another busy line is Varna-Sofia because of the capital functions of Sofia and its distance from the sea capital. Although German passengers are predominant, German airports are lower in the rankings due to their significant number.
In 2020, there is a decrease of about ¾ in the number of flights. The largest Bulgarian charter airline - Bulgarian Air Charter - is completely grounded. It can be assumed that this directly reflects on the volume of passenger flows, which also decrease by at least ¼.

IMPORTANCE OF VARNA AIRPORT FOR THE FORMATION OF THE TOURIST PRODUCT OF BULGARIA

Varna Airport is the third in terms of traffic in Bulgaria after the airports in Sofia and Burgas. Varna Airport is one of only two airports (along with Sofia) which reports a significant increase in the number of passengers transported during the studied period. Varna Airport serves Northeastern Bulgaria and through its convenient connections it can easily reach Sofia, Istanbul, Vienna, Moscow, and with the low-cost airline Wizz Air other major European cities such as London, Berlin, Munich, Hanover, Paris, etc. Important and promising relations with Asian countries are established in Istanbul.
Arriving passengers have convenient land transport connections, both by highways and railways. And while rail transport provides a convenient connection to the interior of the country, road transport is used to arrive at the resorts on the North Black Sea coast. Both regular bus services and car rental are used. Water transport has potential in this respect, but this potential is not yet fully exploited. Since passengers passing through Varna Airport travel mainly for tourism purposes, it can be concluded that the airport has a key role in the development of tourism, as well as on the economy and trade in the Northeast region of Bulgaria. This is the only airport in the region, as well as the only airport serving passengers in whole northern Bulgaria. With its activity of welcoming and seeing off tourists from more distant countries, the airport is assessed as a key factor for the socio-

economic development of the Northeastern region. The airport is one of the prerequisites for this region to have the best socio-economic indicators compared to other regions in Northern Bulgaria.

Its location near the Black Sea makes it convenient for quick access to the city and the resorts that are located near it - St. St. Constantine and Elena (17 km.), Golden Sands (23 km.), Albena 34 km). Most of the tourists arriving at Varna Airport spend their holidays in these resorts. This is a prerequisite for the large number of charter flights during the summer and regular year-round flights to and from Varna Airport.

The share of Varna Airport in the total number of arrivals in Bulgaria for the period 2010-2019 is shown in Table.

Table 7: Significance of Varna Airport for air arrivals |
[data source 7 and own calculations]

Year	Number of arriving passengers at Varna airport	Number of passengers arriving by plane in Bulgaria	Share of the total number of arrivals in %
2010	598 785	3 183 556	18,8
2011	581 908	3 427 055	16,9
2012	604 688	3 513 737	17,2
2013	650 587	3 633 840	17,9
2014	686 468	3 839 582	17,8
2015	692 230	3 907 021	17,7
2016	834 338	4 751 330	17,6
2017	974 958	5 680 596	17,2
2018	1 131 442	6 222 617	18,1
2019	1 034 896	6 003 406	17,2

It can be seen that for the period 2010-2019 an average of 17.6% of the total number of passengers arriving by plane in Bulgaria used Varna Airport. This share is less than ¼. Therefore, Varna Airport has a modest performance in the overall air traffic of the country and has significantly weaker positions than the leading Sofia Airport. But Varna Airport has a key regional significance.

Table 8: Contribution of Varna Airport to the tourism industry
[data source 7, 8 and own calculations]

Year	Number of overnight stays in the Northeastern region	Number of arriving passengers at Varna airport	Share of arrivals by air of the total number of overnight stays in%
2012	1 320 107	604 688	45,8
2013	1 382 118	650 587	47,0
2014	1 259 503	686 468	54,5
2015	1 328 410	692 230	52,1
2016	1 577 437	834 338	52,9
2017	1 662 437	974 958	58,6
2018	1 778 345	1 131 442	63,6
2019	1 784 731	1 034 896	58,0

The above statement can be proved by Table 8. It compares the number of overnight stays in the Northeastern region and the total number of passengers arriving at Varna Airport. Such a comparison is appropriate because air travelers arrive from relatively distant places, which implies the realization of overnight stays. In 2019, the share of passengers arriving via Varna Airport is 58% of the number of overnight stays in the Northeastern region. This share varies from 46% (2012) to 64% (2018). Therefore, it can be

summarized that more than half (on average 54%) of the tourists in the region arrive through Varna Airport. Therefore, a smaller part of the tourists arrive by the other types of transport, and the air transport represented by a single site (Varna Airport) is leading in the transfer of the tourist flows in the region, and this is especially true for international tourists. These data and the analysis confirm the working hypothesis, namely that Varna Airport is a key factor for the development of tourism not only in Varna but also in the region, offering fast and convenient connections with many cities in Europe and the Middle East. Varna Airport is comparable in terms of functions and load with other airports in the Balkans, such as the airports in Split, Rijeka (Croatia), Ohrid (Northern Macedonia), Kavala, Rhodes, Corfu (Greece) and others. Although with similar functions related to the service of tourists, Varna Airport lags behind the airports in Bourgas (Bulgaria), Dubrovnik (Croatia), Thessaloniki (Greece) and others.

CONCLUSION

Varna Airport has a leading role in the development of Northeastern Bulgaria and in particular the Northern Black Sea coast in social and economic terms. It can quickly reach many cities in Europe and the Middle East. This is a prerequisite for the interest of foreign tourists and business representatives to our country and in particular the city of Varna and the region. The strategic location, which is due to the nearby transport links - Varna port, bus station and Varna railway station, determine the airport as a key transport factor in the region. It can be said that Varna Airport serves almost all tourist traffic as far as international tourists to the North Black Sea coast are concerned.In the last ten years, Varna Airport has seen an increase in flights and passengers. This is due, on the one hand, to the growing number of foreign tourists wishing to rest on the Bulgarian Black Sea coast and see the cultural sights of Varna and the region, and on the other hand, to the boost of year-round flights operated by the low cost airline Wizz Air to major European cities.

The opening of new routes will further stimulate trade and tourism in the city and the region, which is a prerequisite for creating more new jobs, which leads to higher living standards. However, the uneven distribution of flights makes it difficult to use them effectively. Investment in expanding the airport's terminals in response to the growing passenger flow could be considered as a recommendation. During certain days of the summer months and at peak hours, about 1,500 passengers per hour passed through the airport which led to a large congestion in front of the counters for handling passengers and luggage, in front of the security centers and the counters for border control.[8] The expansion of these areas will lead to greater efficiency and will ensure greater convenience in passenger service.

New attractive commercial areas can be created, such as restaurants, coffee bars, children's corners and so passengers will be able to have a better time before the flight.

At the moment, the airport is facing challenges that need to be addressed, such as the growing traffic, on the one hand, and on the other, its uneven distribution of flights on certain days of the summer months. That is why it is important to solve the problems related to the infrastructure and staff to increase the level of service. All this will be a prerequisite for a quality service for the passing passengers and will strengthen the position of the airport as a key factor for the development of tourism in the region.

8 For example, the busiest day in 2019 was July 30, with 15,960 passengers [17]

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THE INTERCULTURAL AND COMMUNITY CULTURE SCENES OF LONDON AND VIENNA

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ABSTRACT

Intercultural and community culture facilities and activities are in a prime position to help bridging the gaps between different parts of the population. The present contribution deals with the specific scenes in London and Vienna and analyses the underlying cultural policies. The comparison of those two settings shows that London has bigger institutions with a longer tradition to offer than Vienna. The intercultural and community culture scene of Vienna has developed more recently and is of a smaller scope. With Culture for all Londoners, London has developed a concise cultural strategy. Vienna has no such strategy to offer – the issue is only addressed in the recent government agreement of the Social-Democratic Party and the Liberal Party. However, what both documents are missing, is a specific policy in favour of intercultural and community culture activities. Therefore, the author's recommendation to both administrations is to develop such strategies.

Keywords: Intercultural dialogue, cultural facilities, urban development, London, Vienna

INTRODUCTION

European metropolises and cities deal quite differently with the diversity of their population. In handling the challenge of diversity, intercultural and community culture facilities and activities play an important role. London and Vienna are the capitals of two countries with different dimensions and historical backgrounds. Therefore, these two metropolises were chosen as examples for a comparative study of different approaches in the field of intercultural and community culture activities.

This paper starts with an overview of specific theoretical aspects, first providing some concise information on the underlying research project. The main chapter describes the intercultural and community culture scenes of the British and the Austrian capitals and analyses their respective cultural policies. In the concluding chapter, a comparison of the two metropolises' activities in the given field is drawn and a short outlook is given.

THEORETICAL ASPECTS

Let us first cover some of the most important theoretical issues in the given field. The most comprehensive concept of cultural urban development, which strongly emphasises the micro-level of specific urban areas, is Franco Bianchini's and Lia Ghilardi's Cultural Planning Approach (2004). Bianchini and Ghilardi depart from a broad definition of culture, so-called E-culture. They propose including all cultural resources of an area (neighbourhood, quarter, district, town, region, etc.) and creating two-way relationships between cultural activities and other political fields such as architecture, urban planning, housing, economics, social affairs, education, and tourism [1].

The current discussion on arts, culture, and migration shows different key aspects: The most important is cultural diversity, which refers to "the range of different cultures that are to be found in a given region or state, and to the manner in which these cultures coexist and the basis of that coexistence" [2]. Other key aspects are, e.g., intercultural dialogue, cultural diversity policies for the arts, and intercultural cities [3].

Intercultural cities are agglomerations with an ethnically diverse population, which – by a variety of measures – try to turn diversity deficits into diversity advantages [4]. In 2008, the Council of Europe launched its Intercultural Cities programme, which is devoted to "capacity-building and policy-development". According to the programme, cities will develop "intercultural strategies for the management of diversity as a resource". [5] [6]. In 2021, 145 cities took part in the Intercultural Cities network, most of them in Europe [7].

In general, cultural facilities are defined as venues such as theatres, cinemas, galleries, exhibition spaces, music venues, and multi-purpose locations [8]. In our context – with reference to European cities – we can distinguish between two types of cultural facilities: Intercultural facilities or centres serve the purposes of intercultural dialogue and cultural exchange [9]. Venues of community culture (or minority culture) conduce to the artistic and cultural self-representation and to the empowerment of specific ethnic groups. The boundaries between intercultural and community culture facilities and activities are sometimes blurred.

RESEARCH PROJECT

Data presented in this contribution stem from a specific research project currently carried out by the author at the Institute for Urban and Regional Research of the Austrian Academy of Sciences in Vienna. The project focuses on the investigation of the possible positive effects of intercultural and community culture activities on intercultural dialogue, participation, inclusion, mutual understanding of different people, a stimulating and peaceful cohabitation, the amelioration of cultural and other infrastructures, to a reduction of social and spatial imbalances and to a positive development of peripheral areas. For this purpose, the author applies the research methods of document analysis, field research, participant observation, and in-depth interviews with key actors in the given field.

LONDON AND VIENNA

In European metropolises and cities there are numerous institutions and facilities promoting intercultural dialogue and diversity in the arts as well as locations and associations of community culture. In the following, London and Vienna serve as examples. As we will see, the structures of the intercultural and community culture landscapes of the two metropolises differ considerably.

London, the capital of the United Kingdom, is probably Europe's most diverse metropolis [10] [11]. As such, London has acquired much expertise on intercultural as well as community culture issues. This makes it worthwhile to investigate developments in the British capital. The debate on intercultural and community culture issues has been going on in the United Kingdom for quite some time. The 2002 UK Race Relations (Amendment) Act obliges all public institutions to prove that they are working towards racial equality. This is an important step towards equality in the field of arts and culture [12].

In 2019, Greater London, which comprises the City of London and 32 boroughs, had a population of 8.96 million [13] [14]. The Mayor and the London Assembly – which together form the Greater London Authority – govern Greater London [15]. By its administrative structure, Greater London is divided into Inner and Outer London. Clockwise, the 12 statutory Inner London boroughs are Hammersmith and Fulham, Kensington and Chelsea, Westminster, Camden, Islington, Hackney, Tower Hamlets, Greenwich, Lewisham, Southwark, Lambeth, and Wandsworth. The core of Inner London is the City of London [16]. Sadiq Khan succeeded Boris Johnson in the function of the Mayor of Greater London in the spring of 2016. Justine Simons is Deputy Mayor for Culture and the Creative Industries [17].

In December 2018, Sadiq Khan and the London Assembly presented the new culture strategy Culture for all Londoners [18]. As recommended by Bianchini and Ghilardi [19], the well-defined culture strategy tries to link culture with many other aspects of urban life, that is, with urban development in general, outskirts development, identity, neighbourliness, creative industries, health and well-being – and even with climate change. The most important among the 85 properly defined actions [20] are the London Boroughs of Culture (Waltham Forest in 2019, Brent in 2020), Culture Seeds – a scheme of tiny grants for grassroots cultural activities, a pilot project for the advancement of the cultural engagement of volunteers, the support of "cultural activities and interventions that increase participation, engagement and community cohesion" [21], the implementation of a "Cultural Infrastructure Plan to support and safeguard cultural places and spaces" [22], the Good Growth Fund, as well as the launching of a new culture and education district at Queen Elizabeth Olympic Park.

The cultural strategy's basic aim is to include all Londoners. Nevertheless, reference is being made to "diversity advantages" [23], "building strong, diverse relationships within and between community groups" [24], public art which raises awareness of the "complexity of the city, its diversity and how it influences our perception of the world around us" [25], maintenance and support of the "diverse heritage" of different neighbourhoods in London [26], as well as to the protection of "diverse cultural spaces and programmes" [27].

In London's rich intercultural and community culture scene, we first find intercultural theatres such as Arcola, Bush, Immediate, and Kiln [28]. Intercultural multi-use facilities include the Bernie Grant Arts Centre, Watermans, the Rich Mix Cultural Foundation, Pan Intercultural Arts, and the Albany. Furthermore, there are intercultural programmes in the fields of theatre, music, the fine arts, and more, which are displayed at established institutions such as the Royal Court Theatre, National Theatre, or Lyric Hammersmith.

Figure 1. The Bernie Grant Arts Centre in Tottenham, North London.
https://commons.wikimedia.org/wiki/File:Bernie_Grant_Arts_Centre_JL_001.JPG

Figure 2. The Rich Mix in Shoreditch, East London.
https://commons.wikimedia.org/w/index.php?curid=22371870

The Yaa Centre and Half Moon represent community culture facilities. More frequent than those are community culture touring companies such as Talawa, Tamasha, Out of Joint, One Dance, Dash Arts, Kali Theatre, New Earth, and Chinese Arts Now. Additionally, there are quite a number of community culture festivals as well as some intercultural festivals.

Most of the facilities listed above are situated in Inner London. Some facilities, including Kiln Theatre (in the Northwest of London), Bernie Grant Arts Centre (North), and Watermans (West) are located in Outer London, i.e., on the outskirts of the British capital. The Bush Theatre pursues neighbourhood policies, the Albany acts as a community resource, and the Bernie Grant Arts Centre tries to contribute to the regeneration of the

surrounding area. Quite a few of the facilities and organisations such as Arcola Theatre, Bernie Grant Arts Centre, Yaa Centre, Tamasha, One Dance, and Kali Theatre offer labs and training for young artists. Community culture facilities and touring companies aim at different ethnic minority groups such as black people or people from East and Southeast Asia.

The second city of our little survey is **Vienna**. At the beginning of 2021, the Austrian capital, which comprises 23 districts, counted 1.92 million inhabitants [29] [30]. Vienna's current Mayor is Michael Ludwig, who has been in power since 2018. Likewise, Veronica Kaup-Hasler has been Vienna's Councillor of Culture since 2018 [31].

The Vienna administration yet has to deliver a cultural strategy for Vienna. In contrast to the government agreements of the previous government coalition between the Social Democrats and the Green Party (2010 to 2020), the government programme of the new coalition for progress between the Social-Democratic Party and the Liberal Party only offers some general statements in favour of diversity, inclusion, and participation. One of those pronouncements is the following: "Culture plays a central role in making cities inclusive, safe and resilient. For this to happen, the diversity of urban society has to be reflected in all areas of arts and culture. We want to see an expansion of multilingual offerings and measures that enable diversity in the audience and on stage." [32].

As in the case of London, a short description of Vienna's spatial structure shall first be given. The wider city centre comprises the districts one to nine on the right bank of the Danube and inside the ring road Gürtel [33]. The outskirts of Vienna are made up of the districts ten to twenty and the district twenty-three on the right side of the Danube and the districts twenty-one and twenty-two on the left side of the river.

Figure 3. Brunnenpassage in Ottakring, in the West of Vienna (2018 – this and all forthcoming photos by Walter Rohn)

Vienna's intercultural and community culture scene is quite small and has developed only recently. Under the heading of intercultural activities, we have institutions and locations, festivals, associations, and intercultural programmes at large cultural institutions.

Community culture comprises institutions and associations presenting a regular programme and locations with sporadic activities.
The first part of our survey of specific activities in Vienna deals with intercultural activities. The theatre laboratories Lalish (18th district of Vienna) and DiverCITYLAB (10th) are the first to be mentioned under the heading institutions and locations [34]. Aslı Kışlal directs DiverCITYLAB, the school for young actors. Brunnenpassage (16th), which presents different art forms such as theatre, literature, and cinema as well as participatory formats such as different choirs and dance classes, is Vienna's most important project in this field. The social institution Caritas established Brunnenpassage in 2007 and still supports the facility, which is directed by Anne Wiederhold. In a broader sense, Kulturhaus Brotfabrik (10th) is an offshoot of the Brunnenpassage. Kulturhaus Brotfabrik, which is located at a former bread factory, runs two additional sites in the tenth district: Stand 129 and Favorit. Brunnenpassage and Kulturhaus Brotfabrik act as neighbourhood centres.

Figure 4. Nenad Vasilić and Marija Blagojevic at
Stand 129 in Favoriten, in the South of Vienna (2017)

Kulturraum Neruda (4th) and Centro Once (11th) offer music from Latin America, while Café Derwisch (16th) presents different music styles. Hinterland Gallery (4th) and Philomena plus (2nd) deal with fine arts from the Middle East.
Wienwoche and Salam Orient are intercultural festivals offering various art forms. In Between at the Akzent theatre (4th), the International Accordion Festival and the KlezMORE Festival Vienna present music. With the exception of In Between, all festivals stage concerts, performances, etc. at facilities and places all over Vienna. Wiener Vorstadttheater and daskunst – the latter is also led by Aslı Kışlal – are associations in the field of theatre. Moving Cultures and BlueSimon specialise in music. Kültür gemma! provides grants to migrants for training in cultural facilities and Diverse Geschichten supports the writing of screenplays. Furthermore, large cultural institutions in the city

centre such as the Burgtheater, Volkstheater, Museumsquartier, etc. inter alia present intercultural programmes.

Figure 5. Aslı Kişlal's production of "Doyçlender: Almanci" at theatre Werk X Petersplatz in Innere Stadt, in central Vienna (2015)

The second part of our tour deals with community culture. Under the heading institutions and associations, the Croatian Centre and the Burgenland-Croatian cultural association in Vienna (both in the 4th district), as well as the Croatian cultural association Progress Austria-Vienna (15th) serve the Croatian community in Vienna. For people with a Serbian background, the Serbian Centre (7th), Serbian cultural centre Stevan Mokranjac (10th), and others act as anchors. The Yunus Emre Enstitüsü (9th) is the Turkish cultural institute. The cultural institutions listed above represent the countries where the greater part of the people who have moved to Vienna originate from. Furthermore, there are, e.g., the cultural institutes of the Czech Republic, Germany, Poland, Slovakia, Spain, and the United States of America (all in the 1st district), Hungary (2nd), Bulgaria and Italy (both 3rd), France, Romania, and Russia (all 4th), and the United Kingdom (7th). Recently, the Latin America Institute (9th) has been incorporated into the network of adult education in Vienna. The following locations sporadically present events of community culture: the Akzent theatre (4th) stages theatre productions from Croatia, Serbia, etc. Hallmann Dome, Arena34, and Kral Eventhalle (all 10th) are large halls where pop stars from the former Yugoslavia and from Turkey perform. Restaurants and cafés at Ottakringer Straße (16th/17th) sporadically present concerts and other cultural events. Multiplex cinemas such as the Hollywood Megaplex Gasometer (11th), Lugner City (15th), and Millennium City (20th) inter alia show films in Croatian, Serbian, and Turkish languages.

In this chapter, an overview over institutions, locations, associations, festivals, etc. in London and Vienna, which have performed before the Covid-19 crisis and which still exist, was given. We hope all activities will survive the crisis!

COMPARISON BETWEEN LONDON AND VIENNA AND OUTLOOK

According to its history of immigration from overseas, London has a long tradition of intercultural and community culture facilities and activities. In Vienna, activities of that type are more recent. Intercultural theatres and multi-use locations are more frequent in London than in Vienna. In the given field, London has quite a large number of bigger institutions such as the Arcola Theatre, Kiln Theatre, the Bernie Grant Arts Centre, Watermans, and the Rich Mix Cultural Foundation. The largest intercultural (transcultural) venue in Vienna is Brunnenpassage, which is quite small in comparison to its London counterparts. In the field of community culture, Vienna has more institutions to offer than London. To Vienna's larger facilities, we must add the three concert locations Hallmann Dome, Arena34, and Kral Eventhalle. In contrast to that, London houses more community culture touring companies.

With the exception of Kiln Theatre, Bernie Grant Arts Centre, and Watermans, all intercultural and community culture venues in the British capital are situated in Inner London. By contrast, the majority of intercultural and community culture facilities of the Austrian capital is located on the outskirts of Vienna.

While many London-based venues offer online events to bridge the closures during the Covid-19 epidemic, the Arcola theatre has created its new open-air facility Arcola Outside. Some of Vienna's locations such as DiverCITYLAB and Brunnenpassage are also presenting online events.

In their concepts for culture, both administrations refer to the diversity of their populations and to the advantages that diversity brings [35] [36]. With Culture for All Londoners, the administration of the British capital has developed a definitive cultural policy. Vienna has no such strategy to offer. The only document referring to cultural policy in Vienna is the section on culture in the government agreement of 2020.

There is not much of an explicit policy towards intercultural and community culture activities in either London or Vienna. London sees its cultural policy as a strategy for all citizens. Of course, there are references to several aspects of intercultural and community cultural affairs. In its government agreement of 2020, Vienna states that "the diversity of urban society has to be reflected in all areas of arts and culture" [37].

The population of both metropolises is getting increasingly diverse. Intercultural and community culture facilities and activities can help to bridge gaps between different parts of the population and can contribute to the bettering of living conditions. Specifically, ventures of that kind can foster intercultural dialogue, participation, inclusion, mutual understanding among different people, and a stimulating and peaceful cohabitation. Furthermore, they may contribute to the amelioration of cultural and other infrastructures, to a reduction of social and spatial imbalances, and to the advancement of peripheral areas. Therefore, the author recommends that the administrations of London and Vienna develop an explicit political strategy in favour of intercultural and community culture activities.

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THE REGIONAL IMPACT OF LOCKDOWN FROM COVID-19 ON SMALL AND MEDIUM SIZE ENTERPRISES – BULGARIAN CASE

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ABSTRACT

The whole world is faced with the biggest economic and financial crises in the world since the Great Depression. Small and medium-sized enterprises are important for the Europe union. The figures show that more than 90% of the enterprises are small and medium-sized. The methodological aspect which is used in analyses includes the statistical and financial approach. The figures are presenting entrepreneurial advantages from which some companies used to generate profit. Other aspect includes government policies and financial subvention to closed small and medium-sized enterprises.
The impact of lockdown from COVID-19 on small and medium enterprises in Bulgaria is significant. Most enterprises are closed or work with fewer employees. The crucial impact is on the services and production sectors. Services like the food and beverages and transport sectors are faced with bankruptcy. Even though they could not have the chance to switch on online orders business opportunities. The measures in production line sectors are not at the high level and it caused the lockdown. All of these aspects aimed to present the past, current, and future problems and their solving by financial subvention in regional aspect.

Keywords: small and medium enterprises, regional development, covid-19, lockdown

INTRODUCTION

Small and medium enterprises are significant for fulfilment of these niches which are not profitable for big businesses. SMEs form more than 95% of businesses in Europe union (EU). They cover more than 50% of employment worldwide and form up to 40% of gross domestic product in developing countries like Bulgaria. Figures estimated by World bank shows that about 600 million jobs will be need by 2030.[1] This put SMEs in the center for taking different employees and give them different roles and responsibilities which is not possible in big companies. They can accelerate high development in markets in which are working around 5-10 employees. Most problems for Bulgaria like developing country are less cash access, less formed financial reserves, little turnover, less investments in innovations, small enterprises. That is why COVID-19 have caught these enterprises unprepared. In that case the government took measures for helping them to survive to the end of the pandemic situation.
The sectors which have been locked down in Bulgaria are the same as the whole EU. But some of them are differed. For example, a construction business, manufacturing and some services are still working. Bulgarians really like to go on restaurants, pubs and so on. That is why many people are involved in this business. Last figures show that more than 300 000 people are unemployed. It means that around 13% of the population in employed age

are unemployed in Bulgaria. According to the National Statistical Institute (NSI) in 2015, the relative share of small enterprises with up to 9 people is 92.49% and in 2016 - 92.46%, for 2017 - 92.48%. [2]. That is why the promlem with SMEs is current topic.

1. Economic and labor overview in the European union from the begging of COVID-19

In according to Eurostat business and economy: a cautious economic recovery with stable consumer prices tempered by contracting retail sales. The EU economy as a whole rebounded in Q3 2020 after an unprecedented slump caused by the coronavirus pandemic, but output remained well below pre-pandemic levels. In quarter-on-quarter terms, gross domestic product (GDP) bounced back by a record 11.5 % in Q3 2020 after a steep drop of 11.4 % in Q2 2020. The largest quarter-on-quarter increases in GDP were recorded in France (18.7 %), Spain (16.4 %) and Italy (15.9 %), while the smallest were in Greece (2.3 %), Finland (3.2 %), Estonia (3.3 %) and Bulgaria 3.8%. In year-on-year terms, EU GDP decreased by 4.2 % in Q3 2020, with differences across Member States.

In the EU, turnover in services jumped quarter-on quarter by 12.3 % in Q3 2020 but still decreased year-on-year by 6.3 %. Air transport and the tourism sector continued to be amongst the hardest hit by the ongoing pandemic. In the EU, the total number of flights tumbled year-on-year by 66.9 % in December 2020 after a decline of 68.3 % in November 2020. The total number of nights spent at tourists accommodation establishments dropped steeply year-on-year by 48.3 % in October 2020 after a decline of 41.1 % in September 2020. Across Member States, in October 2020, the highest decreases in the number of nights spent at tourists accommodation establishments were recorded in Croatia (-79.9 %), Spain (-79.7 %) and Malta (-75.5 %).

The EU's industrial production rose for a seventh successive month in November 2020 and was almost back to pre-pandemic levels, highlighting the sector's resilience to the recent pandemic restrictions. In month-on-month terms, industrial production rose by 2.3 % in November 2020 after rising 2.0 % in October 2020 and 0.4 % in September 2020. Across Member States, in November 2020, the month-on-month changes in industrial production ranged from -5.1 % in Portugal, -3.5 % in Belgium, -2.6 % in Croatia to 5.3 % in Denmark, 6.3 % in Greece and 52.8 % in Ireland. In year-on year terms, the EU's industrial production decreased by 0.4% in November 2020, after a contraction of 2.9 % in October 2020. Electricity consumption in the EU decreased year-on-year by 0.4 % in October 2020 after a decrease of 1.4 % in September 2020.

At the EU level, construction output climbed in November 2020. Production in construction rose month-on-month by 1.2 % in November 2020, following an increase of 0.7 % in October 2020. Across Member States, the month-on-month changes in construction output ranged from -4.9 % in Romania, -1.4 % in Spain and -0.9 % in Belgium to 7.0 % in Slovakia, 12.0 % in Hungary and 12.2 % in Slovenia.

EU retail sales contracted in November 2020. Retail trade decreased month-on-month by 5.0 % in November 2020, after an increase of 1.4 % in October 2020. Across Member States, in November 2020, the month-on-month changes in retail trade ranged from -18.0 % in France, -15.9 % in Belgium and -11.0 % in Ireland to1.8 % in Malta and Finland, 2.5 % in Croatia and 2.6 % in the Netherlands. In year-on-year terms, EU retail trade dropped by 2.0 % in Q3 2020 after an increase of 4.1 % in Q2 2020.

Consumer prices in the EU, when measured on a year-on-year basis, remained rather flat in December 2020. The EU annual inflation rate was 0.3 % in December 2020, up slightly from 0.2 % in November 2020. Across Member States, in December 2020, annual

inflation ranged from -2.4 % in Greece, -1.2 % in Slovenia and -1.0 % in Ireland to 2.4 % in Czechia, 2.8 % in Hungary and 3.4 % in Poland.

EU exports and imports of goods to the rest of the world increased month-on-month by 1.9 % and 2.1 %, respectively, in November 2020. Openness to trade – exports and imports to GDP ratio - stood at 91.2 % in Q3 2020, down from 99.4 % in Q3 2019.

Economic sentiment showed signs of recovery in December 2020 amid prospects for a vaccine roll-out. DG ECFIN's Economic Sentiment Indicator (ESI) for the EU improved month-on-month by 2.8 points to 89.5 in December 2020, almost offsetting the drop registered in November 2020. The ESI, however, remained 13.5 points below its pre-pandemic level in February 2020.

EU labour market showing some signs of improvements. The unemployment rate in the EU slightly declined over recent months after the peak observed in July 2020. The EU unemployment rate was 7.5 % in November 2020, down slightly from 7.6 % in October 2020. It was 0.3 percentage points (pp) below its peak in July 2020 and 0.9 pp above its level in November 2019. Across Member States, in November 2020, the unemployment rate ranged from 2.9 % in Czechia, 3.3 % in Poland and 4.0 % in the Netherlands to 8.9 % in Italy, 10.4 % in Lithuania and 16.4 % in Spain. However, the unemployment rate is insufficient to describe labour market developments in the current circumstances.

Labour market slack in the EU, which comprises all persons of working age who have unmet needs for employment, decreased quarter-on-quarter by 0.2 pp to 13.9 % of the labour force in Q3 2020, far from offsetting an increase of 1.3 pp in the previous quarter. Across Member States, in Q3 2020, the highest share of people with unmet demand for employment was in Spain, Greece and Italy, where it exceeded 20 % of the extended labour force.

Employment edged up in Q3 2020 after a strong decline in Q2 2020. The EU employment rate for people aged 20 to 64, as measured by the EU's Labour Force Survey, increased quarter-on-quarter by 0.3 pp to 72.4 % in Q3 2020, only partially offsetting a decrease of 1.0 pp recorded in the previous quarter. Across Member States, in Q3 2020, the highest rates were recorded in Germany and Sweden (both 80.4 %), and the Netherlands (79.7 %), while the lowest ones were in Greece (61.2 %), Italy (62.2 %), Bulgaria 73.8% and Spain (65.6 %).

Government finances: debt and deficit rising to counter the pandemic. At the EU level, the government deficit and the government debt in relation to GDP increased substantially year-on-year in Q3 2020 due to emergency measures to counter the pandemic. The government deficit to GDP was 5.3 % in Q3 2020, up from 0.6 % in Q3 2019, while the government debt to GDP ratio rose to 89.8 % in Q3 2020 from 79.2 % in Q3 2019. Across Member States, in Q3 2020, the government deficit to GDP ratio ranged from 0.9 % in Denmark, 1.0 % in Spain and 1.1% in Estonia to 9.4 % in Italy, 9.5 % in Belgium, 9.8 % in Malta and in Bulgaria 3.8%. [3]

The figures are showing that in the whole EU economic, financial and labor situation in not good. In the last quarter the situation is little bit better but still we can not assume that the economic is recovering. The SMEs should focus on the future using smart technologies so they are constantly monitoring the most important infrastructure - roads, bridges, tunnels, railways, metro, airports, seaports, communication systems, water supply, power supply, even important buildings - for optimal resource allocation and safety[4]. Smart cities can provide formation of E-hub which typical example is the E-hub Bourgas which will provide training, support and mentoring for students and PhD students to help them to become entrepreneurs[5]. For SMEs the future is in grants from

government. Investment in innovation helps reduce environmental pollution, supports the deployment of products whose production consumes less resources [6]. In tat context circular tourism can combine tourism and sustainable resource management. Its purpose is to produce goods and tourist services, while limiting the impact on the environment (including consumption and non-renewable energy).[7]. That it is why when it comes to cost reduction and sciesity of resources we think about the water. Cutting cost approach and optimization processes are a must for this new role of business management. The specific role of the management is the incorporation of using financial, nonfinancial, BI intelligence and I/O things work together for value creation[8]. Example for using technology is the integrated GIS approach with hydraulic calculation includes the following stages: Creating a digital elevation model (DEM).[9].

When it comes to formation for modelling the conditions affecting population migration activity, 30 indicators classified into five groups are selected by the method of an integral index construction: demographic stability and public health status; education coverage; labour market and employment conditions; standard of living; economic development of the country/region [10]. Indeed migrants are cheap labor but the economic benefit of it is extremely small spent in vain. [11] To sum up SMEs are faced up to many choices when it comes to the employee and labor market.

2. Governmental measures in Bulgarian in pandemic situation

First measure is called 60/40.Micro and small enterprises in Bulgaria, which have registered a decrease of at least 20% in their turnover for April 2020 compared to the average monthly turnover for 2019, will have the opportunity to receive amounts from 3,000 to 10,000 thousand BGN help. The Managing Authority of the Operational Program "Innovation and Competitiveness" 2014-2020. Support for micro and small enterprises to overcome the economic consequences of the COVID-19 pandemic '. The procedure allows the following categories of costs:

- Costs for the purchase of raw materials and supplies;
- External service costs (including overheads);
- Staff costs (incl. Remuneration costs and the costs of social security and health contributions at the expense of the employer, excluding staff costs supported under measure 60/40);

The total amount of the grant is 173 million BGN and covers all sectors of the Bulgarian economy (except for those supported by the Rural Development Program). The application will be made entirely electronically through the system Information system for management and monitoring of EU funds in Bulgaria 2020 with the maximum simplified administrative procedure. Project proposals that meet the evaluation criteria will be funded, in the order in which they are received, until the financial resources under the procedure are exhausted. The submitted project proposals for which there is no financial resource are not subject to evaluation.

The 60/40 scheme to support employment in the context of a coronavirus pandemic will be turned into an 80/20 for the tourism sector, and companies in the sector will also be able to rely on a subsidy within a minimum wage and for hiring the unemployed.

Second measure is called 80/20. The 80/20 scheme for restaurants, tourism, hotels and transport will continue to operate until March 31, 2021. “So far, BGN 602 million have been paid under the 60/40 measure, about 250,000 jobs have been preserved. The workers not only kept 100% of their income, but also kept their work for more than 3 months. Under the measure, which refers to restaurants, tourism, hotels and transport - 80/20 is

also open to self-insured persons, with a total of 1,700 employers and self-insured persons supported, "said the Minister of Social Affairs. The unemployment rate indicates that the registered unemployed to date are 226,013 people, and since the beginning of the state of emergency until now 205,528 people have found work.

Third measure is a project called “Save me”. From January 2021, the changes under the project "Save me" of the Employment Agency, which provides financial compensation to employees from closed businesses, are already in force. Thus, a new way of forming the compensation for the period 01.01.2021 - 31.03.2021 is established, taking into account the current anti-epidemic measures. The main change is that for a working day of 8 hours, agreed in the main employment contract, the compensation will be 75 percent of the monthly insurance income for October 2020 for the respective position of the insured person. by the order of art. 4, para. 1, item 1 of the Social Insurance Code in the main employment contract in the economic activities for which temporary restrictions for their implementation have been introduced by an act of a state body. In the case of part-time work, the amount of compensation is determined in proportion to the agreed working time in the main employment contract, effective as of the date of the act of a state body.

Fourth measure is called 80/0 then is transformed to 75/0. "Under the measure for closed businesses, 4019 applications have been submitted so far. The aid is - BGN 24 by December 31. Measure 80/0 is envisaged to be changed to 75/0 - 75% of the insurance income of the employees. From 1 to 31 In January, this will be the benefit that people will receive. More than 32,000 parents of children in online education have applied for targeted assistance. The measure was available in January. For a whole month, they will receive one minimum wage, respectively proportionally for each week in which the child was in distance learning. "Under the measure for hotels and restaurants 80 out of 20 - 1,700 employers are supported.

More than 40,000 jobs are reserved in the restaurant, tourism, and transport sectors. "Unemployment is 6.7% for November 2020. 226,013 are registered unemployed until now.

All of these measures are not appropriate for Bulgarian reality. Most of the businesses and employee could not apply them. The reasons were hidden in the following specific problems:

- Employers who were closed could not use the measure 60/40 because of a lack of fresh money
- Employers did social expenses to their employee on the minimum salary for the country and they got less money.
- The government pay amounts in delay to the employee in December 2020 and January 2021.
- SMEs in Bulgaria are too small for overcoming the crisis like this. That is why they prefer stop working.

In order to develop the regional economy, the most important requirements for the localization of such free (special) zones in accordance with world standards are:

- political and economic stability in the region, accompanied by a concept of economic development and planning;
- good construction of the transport system and communications, proximity to a railway and communication center of national importance;
- environmentally friendly, environmentally friendly, high standard of physical planning;
- reliable infrastructure for all seasons during the year - transport, water, energy;

- market access - preferential access to important markets with a major advantage;
- developed financial and banking infrastructure with prerequisites for servicing in the field of electronics and engineering;
- a required labor force, a low labor cost, a production qualification that essentially determines the type of industry that could be developed in the area;
- the existence of an existing industry with a well-developed production infrastructure and a plant economy, - a good organization of the zone and general coordination,
- prerequisites for the development of light industry in the presence of traditions and highly qualified personnel, which is a prerequisite for high quality of production and competitiveness.[12]

CONCLUSION

In this pandemic situation is very hard both EU and member states to develop new businesses. Definitely the economic situation is worse in the whole EU. The market expenditure in that time is hard for new stocks and manufacture products. The Bulgarian situation is very complex because of fresh money lack. That is why most SMEs which are family business are closed and some of them will be not opened again. The problems are both governmental and business owners. The governmental problems can be summed up in not appropriate measures which were not done in the right time. First, when the business was closed you can not expect that it will have 40% to cover the tax and social expenses. Second, freelancer professionals are missing from all of these measures. Third, people with family could not survive by 24 BGN which is around 13 euro per working day. It means that this money will be given only for the working days in the month.
The business measures have the following type:

- SMEs are very small and most of them are family businesses. It means that the whole family is in a risk.
- SMEs do not have reserves for any unpredicted situation.
- There are not options for fresh cash.

The employee measures are locked only in lending money without interest. These amounts must be paid in the next a few years.
Bulgarian companies have little experience with investing in scientific and technical laboratories and centers. That is why the business challenge in Bulgaria is the investment and the assessment of the intellectual capital [13]. Not only labor risk but also environmental risks should me marked. In these days we are faced to many risks like flood, Earthquakes, rains and etc. Flood risk assessment gives an opportunity to the central and local authorities, business, NGO's and the general public to reach a common understanding of the flood risk which they face as a community and to promote the debate on priority measures for its prevention and reduction. [14].
Summarizing all problems and measures mean that the people will choose to move in other countries and some businesses will not be opened anymore. Future questions for discussions can be related to the risk assessment of environmental disasters and the impact to the SMEs on a regional level. To improve the accuracy of the risk assessment it is also necessary to use additional documented local information related to the applied risk mitigation measures as well as the existing emergency response plans in case of flooding. In this sense, the accuracy of the risk assessment depends largely on the knowledge and experience of local stakeholders (local authorities, residents, NGOs, businesses,etc.).[15]

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VIOLENCE AGAINST RURAL WOMEN OVER THE AGE OF FIFTY IN CENTRAL SERBIA

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ABSTRACT

This paper analyses violence against rural women over the age of fifty from the point of view of social factors relating to social transition processes, exclusion, poverty and re-traditionalization in Serbia. Attention is paid to types of victimization of elderly village women arising from factors of structural type, but also familial in character: everyday practice in the family and private intimate relations. The analysis (both quantitative and qualitative) is based on the sample of 165 rural women over 50, using the method of triangulation. The analysis rests on the data collected directly in family households of rural women, using methods of observation and interview. The main hypothesis underlying the analysis is the connectedness of changes on the macro, mezzo and micro levels and their influence on changes relating to gender identity.

Keywords: violence, social structure, elderly rural women, rural families, central Serbia.

INTRODUCTION

The research on various forms of violence against rural women older than fifty years of age in Serbia is the result of the need to deal with the current, but insufficiently studied problem of groups that are marginalized on multiple levels. The main goal is to shed light on this problem and contribute to its visibility. The age limit of fifty was determined on the basis of personal experience from encounters with rural women: they stood out from the group of younger rural women due to their increased exclusion and poverty. There are marginalized to the extent that they have become invisible. Their lives and problems were secondary and insignificant to family members. The first part of the paper shows previous studies of this issue in feminist theories and patriarchy - a pillar of discrimination against women. The main concepts and typologies are explained and the structural level within the Serbia society is analyzed. The second section presents the conceptual and analytical framework and methodology on the basis of which the research and analysis was conducted. The third section presents the results of the research - forms of violence, their characteristics and dimensions, and the fourth section contains the discussion and conclusion.

THEORETICAL FRAMEWORK

Within the theoretical framework of the analysis, the theoretical and hypothetical basis that mediates between the global and micro level is used, and it includes feminist theories and the patriarchal system.

Feminist theoretical approach

A significant contribution to the topic of discrimination against women was made by feminist discussions on the gender salary gap, but also by discussions on property

inequality between women and men, which the term “gender asset gap” is used for. Difference in ownership of property between men and women is called the gender asset gap[10]..

Factors that affect this gender asset gap are found in laws and customs. Inheritance customs set the extent to which women's right to property is recognized. Patrilineal inheritance gives priority to inheritance to male family members and is the most common form of inheritance in Serbian villages. Such forms of inheritance turn women into unpaid labor working on family farms, or force them to become agricultural wage workers. Living on the husband's estate, women have no control over the marital property, which in the event of divorce or widowhood remains in the husband's family.

Patriarchy as a cause of discrimination against women

The terms discrimination, marginalization, as well as the exploitation of women and violence against women, are understood as parts of the same problem - the patriarchy problem [6]. For radical feminists, gender inequality is a product of an autonomous system of patriarchy and represent a primary form of social inequality. The cause of repression against women is found in patriarchy, a complex system of male dominance that prevails in all aspects of social and cultural life. Patriarchy produces and perpetuates abuse and violence against women through structural (through social institutions) and ideological influences (the process of socialization). Family is seen as the main instrument of repression against women, realized through sexual and maternal obligations, as well as a means of male control over female bodies [8]. Radical feminists mostly agree that the basis of patriarchy involves the appropriation of female body and sexuality. Firestone [13] believes that men control the role of women in reproduction and upbringing of children. Since women are biologically capable of having children, they become financially dependent on men in terms of livelihood and protection. This “biological inequality” is socially organized in the nuclear family. The author uses the term “sexual class” to describe the position of women in society. Pamela Abbot et al. point out that this direction has shown that even the most intimate, personal relationships are essentially political – relations of power [1].

All radical feminists point out that male violence against women is the main cause of male supremacy. They further emphasize that domestic violence, rape and sexual harassment are an integral part of the systematic oppression of women. Even everyday interactions - such as non-verbal communication, listening and interrupting conversations, as well as how a woman feels in a public place - contribute to gender inequality [15].

The term violence against rural women over the age of fifty implies the unfavorable position of these women in the public and private sphere, with special emphasis on the family and everyday relationships - private intimate relations. The marginalization of rural women over the age of fifty is understood as a diminution of their value and their work, not paying attention to them, treating their problems as secondary and insignificant. The term “gender” implies a socio-cultural construct of the roles of men and women, as well as the characteristics attributed to “masculinity” and “femininity”. Gender is a biological (pre-socialization) aspect of fertility with which a person is born, gender is part of the identity that is acquired during the process of socialization [1]. Therefore, the problem does not lie in the fact that the differences exist, but rather that gender characteristics are valued differently, and a hierarchy is established between them. The gender regime regulates the relations between men and women, creates individual

expectations and behaviors that are in line with the social context. Limited by gender regimes, men and women have limited opportunities to go outside these boundaries, and it always happens at a certain price. Individual possibilities and freedoms are limited by the general gender pattern. Gender is all the more important if society is more patriarchal, and that is precisely applicable in the micro-sphere, in the sphere of privacy"[5]. Gender differences serve as a basis for social inequality. Research and study of gender inequalitydiscusses the dominance of men over women - in the field of economics, politics, family [15].

Structural level

At the structural level, discrimination against rural women over the age of fifty is based on the great pauperization of rural residents and rural families in the process of transition in Serbia. This is particularly valid for agricultural households and for farmers, who are at the biggest "loss" due to such economic and social circumstances. Research by Rajković[24] about poverty and inequality of the rural population by socio-economic categories, showed that at the beginning of the transition, farmers' households (and rural population) participated in total poverty rate in 1990 with 17%, and in 1994 with 34% , while now their poverty index is 69.8% [24], due to the decrease in wages and other incomes, the absolute decrease in the number of employees in the formal sector (loss of status "peasants-industrial workers"), poor employment opportunity and increased production for one's own needs - natural consumption. They are immensely dissatisfied with their position on the social ladder (70.2%), and most of all with the state that is not protecting them and which does not care about the peasants. The marginalization of the socio-economic position of the peasantry is increasing, which is especially true for elderly households [24]. Thus, elderly households in rural areas are becoming a significant social, but also a moral problem of our society, which sociologists wrote about four decades ago [11]; [19]. Discrimination against villagers, manifested in the field of social and pension insurance, was also emphasized: until November 1981, there were 5% of agricultural workers that had insurance in Serbia, and in 2002 only 6%, while in 2014 it was 7% [22]; [27].

Global social changes that Serbia has gone through in the last thirty years have reflected on changes in gender regimes: after the collapse of socialism, in the conditions of collapsing institutions, deepening economic crisis, insecurity due to wars and deteriorating material standard of the majority of the population, retraditionalization and repatriarchalizationtrends could be observed[5]; [17]. These trends are characterized by the withdrawal of women from the public sphere, primarily from the formal labor market, into the private sphere, where their resources are used to ensure the survival of the family household, in extremely unfavorable conditions of deteriorating living standards and collapse of social care institutions[5]; [20]. Blagojevic describes this phenomenon as "self-sacrificing micro-matriarchy", the power of women is relocated and articulated into the private sphere, with intensive use of woman's resources in the household, in order to mitigate the negative effects of the difficult transition[5]. This is also known as the gender regime, as a "system of power, roles, identity, practice and discourse, which regulates relationships between men and women in a certain socio-historical context and is based on extremely asymmetric relations, roles and expectations"[5]; [2].

Women over the age of fifty who live in the countryside are marginalized social groups and have a significantly disadvantaged social position. Their discrimination is multiple and at the same time stems from gender and from belonging to a marginalized group - a

rural family, which rarely or not at allhas access tothe most impoprtant (public) institutions and society resources, due to marginalization and exclusion of villages from the general social flows of Serbian society, which is a consequence of many years of urban-centric policy. Such a policy has polarized the society of Serbia to isolated rural areas and urban space[24].

RESULTS OF PREVIOUS RESEARCH

According to research by authors in Serbia[24]; [2][5]; [4], women often live in male-headed households. Patrilinearity is a determinant of discrimination against rural women over the age of fifty, which is associated with the traditional structure of authority in the process of gender socialization.

Education, as the most important factor in changing the social position at the individual level, cannot eliminate the social marginality and social exclusion of rural women over the age of fifty, since they are usually of low level of education and low professional qualification. The more unfavorable educational structure of the female rural population comapred to the urban one has been known since before[24]; [4]; [2]; [5]; [3].

Poverty of rural women over the age of fifty is perceived as a key dithe main determinant of discrimination. A previous survey of assisting family members showed that the vast majority (91.4%) workedin agriculture, as well as that as many as 44% of these women found themselves in this position due to job loss, and that “this category is characterized by extremely unfavorable position, not only in the economic sense, but also in terms of exercising main social rights (health insurance, pension insurance, availability of social benefits”[3]. With the process of transition and increasing unemployment rate in Serbia, the percentage of women in this category increased from 69.6% in 2005 to 72.3% in 2009[27].

Previous research on social exclusion in rural areas of Serbia[4], showed that in villages (where about 43% of the total population of Serbia lives), the share of active people is lower among women than among men, and the share of unemployed pepople is higher among women than among men.

Various studies have shown that psychological violence can cause more emotional harm to the victim than physical violence[14]; [16]. Psychological violence is aimed at “one’s experience ofoneself” and it can have a profound impact on the way the victim perceives his or her personality, identity, self-confidence and mental health.

Cultural prejudice in favor of men is another dimension of discrimination. Women (and girls) are often exposed to “secondary poverty”[2] in rural households, which rely on the traditional structure of authority with male dominance, because less resources are invested in girls than in male members of the household (sons), due to the lower expectation of them contributing to its material well-being. The “son as the only heir” system [25], according to which female children will end up in“someone else's house”– that is, since they leave their parents' house, and the sons stay, leaves deep consequences on the psychological development of a female child in a rural family in Serbia.Research on parenting in rural families in central Serbia[24];[25]showed that the desire for a son is what drives family reproduction in Serbia. After the birth of the desired son, pregnancy is terminated by abortion.

Previous research on domestic violence, conducted on a representative sample of the population of Serbia, in three major regions: Belgrade, Novi Sad and Nis[17; 18]shows that domestic violence is primarily violence against women, that there are active and passive forms of violence, exploitation and discrimination, that it exists in 82.7% of

families in the sample, as well as that it manifests itself as shouting/insulting, beating, denying free movement, and that women offer little resistance. The main perpetrator of domestic violence is the husband/father, with the great influence of the husband's parents. The son is also at the top of the list of perpetrators of violent behavior in the family. Violence is both present in urban and rural areas, and it has been found that an urban married woman offers more resistance compared to a rural one. The most common reason for violence is lack of money, disturbed marital roles, and the dominant factor is patriarchy. The production of violence against women in the family is the main mechanism of the social reproduction of patriarchy.

METHODOLOGICAL PROCEDURES

The subject of this research is the economic, psychological and health violence against rural women over the age of fifty in central Serbia in relation to younger rural women (by age) and in relation to rural men (by gender).

The aim of the research is to analyze various forms of violence against rural women over the age of fifty, with the intention of shedding light on their marginal position and contributing to the better visibility of the problem of violence against these women in Serbian society.

In this research, the term violence against rural women over the age of fifty includes the infliction of increased mental and health injuries and suffering, as well as deprivation of financial means of subsistence and access to social protection, which forces them to accept the status of assisting household members. In accordance with this definition, discrimination against rural women over the age of fifty is operationalized through the following dimensions: economic, psychological and health, with appropriate indicators, which are shown in the following table (Table 1).

Table 1: Violence forms and indicators

Form/dimension of discrimination	Indicators
Economic discrimination	Structure according to the activity of study participants and their husbands in the family household, where the discriminatory structure is as follows: active - employee, persons with personal income, as well as assistinghousehold members in agricultural households Property differences within the family Discrimination within the family division of labor Disproportionate workload
Psychological violence: Inflicting damage on self-perception, self-confidence, experiencing one's own personality	Verbal humiliation, belittling Prohibition, restriction of movement (leaving the house unaccompanied)
Health violence	Poor health Limited access to primary health care

The instrument for data collection contained a structured questionnaire, which had seven parts and based on which a detailed experiential scientific record was formed in 600 rural family households on the social position of villages, rural families and rural women in central Serbia [24]. The questionnaire was filled in by the researchers through direct conversation and observation in the house of the female study participants. The conversation lasted an average of three hours. The research on violence in this paper is a subsample of the project and includes 165 rural women over the age of fifty.

Central Serbia is the name for a part of the territory of the Republic of Serbia, which is located outside the territory of the autonomous provinces: Vojvodina and Kosovo and Metohija. This name was officially used between 1945 and 2009/2010, when the area of Central Serbia was divided into new statistical regions: Belgrade, Sumadija and Western Serbia and Southern and Eastern Serbia. The following regions were covered by this research: Belgrade, Šumadija, Niš, Zlatibor, Macva and Rasina, twenty-six municipalities / cities and ninety-seven villages (Map No. 1). The area included in the sample covers 20,418 km2 or 26.4% of the total territory of the Republic of Serbia and 44% of the total population [26].

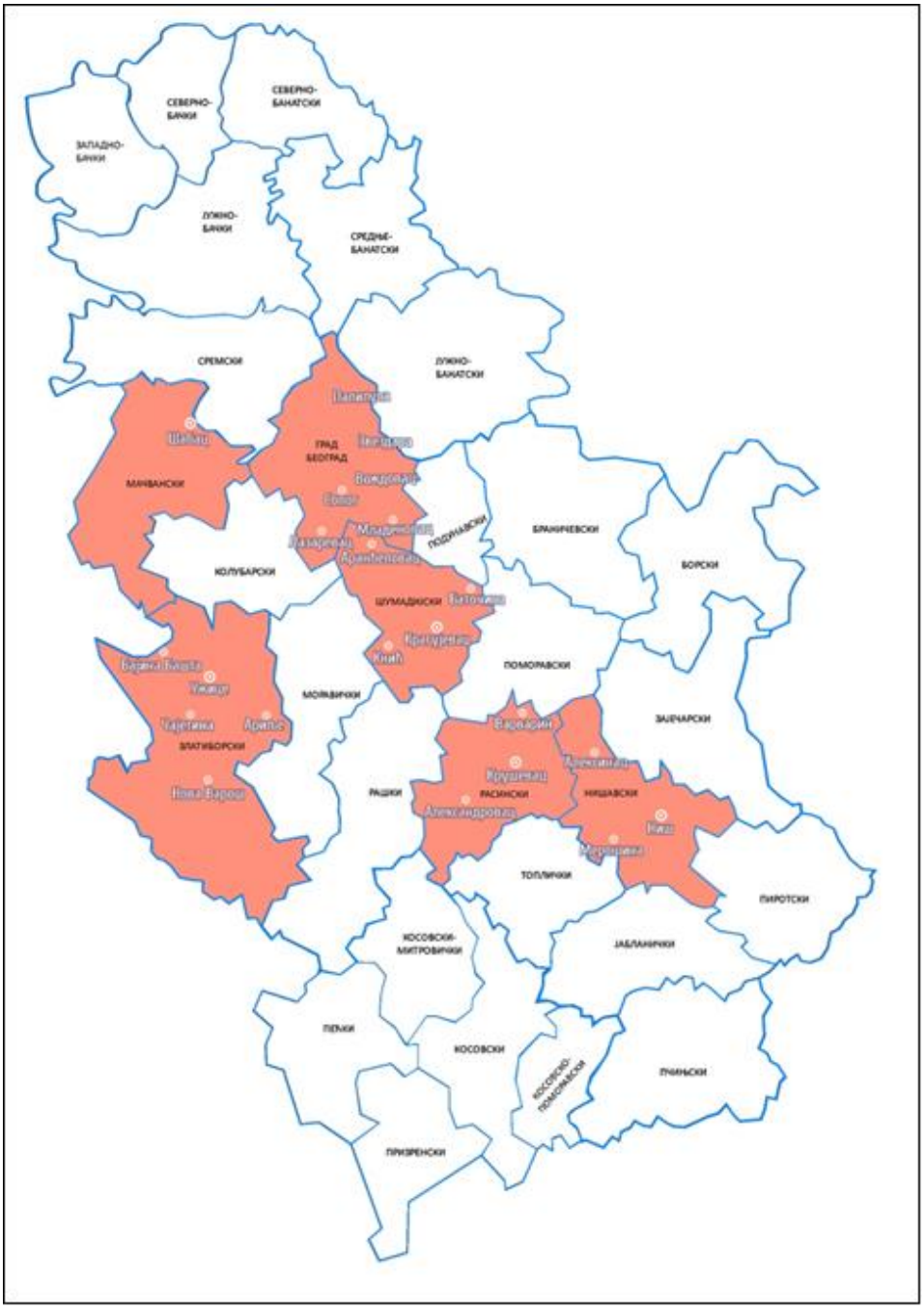

Figure 1: Geographical position of the studied area within the Republic of Serbia

Initial hypotheses

1. Age determines discrimination against older rural women compared to younger ones,
2. Low education level of rural women over the age of fifty is a discriminatory factor in relation to younger women.
3. The low quality of everyday life of rural women over the age of fifty, which is filled with contradictions, alienation and ambiguity.
4. The patriarchal system of relations in society and family affects gender-based violence
5. Health and access to health care services for all rural women is a dimension of violence - the lack of opportunity to protect themselves from disease and health care, the negative consequences of which are most pronounced in rural women over the age of fifty.
6. Gender and generation discrimination of rural women over the age of fifty in the family division of labor.
7. Traditional gender regimes are important causes of gender discrimination in the family, which is reflected in the different attitudes of parents towards sons and daughters in primary socialization. Discrimination of this kind diminishes motivation and encourages isolation and the absence of the idea of opposing patriarchal discipline.
8. Women over the age of fifty are socially excluded on multiple levels and for a long time because they are: low-skilled, living in conditions of severe financial deprivation and removed from wider social networks, with low life chances, which affects their lives and basic rights.

Why rural women older than fifty?

Because of the disregard for and invisibility of these rural women. Because diversity and marginality are their main characteristics. Because their everyday life is different than the life of middle-aged and young rural women and that is why they can be seen as a special group of women. The essential characteristic of everyday life of rural women older than fifty is ambiguity - accepting contradictions, getting used to them, inability to clearly articulate and adequately satisfy their needs, absence of subjectivity in satisfying needs [6]. Practice shows that increased exclusion and poverty of rural women over the age of fifty, increased economic discrimination, psychological violence and health violence, distinguishes them from the group of rural women. Statistics considers women between 51 and 60 of age as middle-aged. However, in this paper, this age group of women is defined as older middle-aged, and women aged 61 and over as older rural women.

Variables: Age was viewed as an independent variable, at two levels: older middle-aged women (51 to 60 years old) and older women (61 and older). The age group of participants aged 61 and over is very heterogeneous and can be observed at four age levels (79 in total): 1. 61 to 65 years of age (20 participants), with an average age of 63.6 years; 2. From 66 to 70 years of age (19 participants), their average age is 67.7 years; 3. 71 to 80 years of age (30 participants), whose average age is 74.3 years and 4. 81 to 90 years of age (10 participants), average age of 84.1 years. Dependent variables are activity, property status, position within the family division of labor, workload, verbal humiliation, belittling, health, access to primary health care.

Method used for data collection: examination using interviews. Data analysis methods: Statistical data analysis was done on quantitative data, using the SPSS program. Qualitative data were analyzed in their relation to theories and earlier research.

Research time frame: The analysis is based on data collected in several phases between 2013 and 2016, as part of an extensive research on the social position of villages, rural families and rural women in central Serbia [24].

The sample was deliberate, quota sample, which includes participants - rural women fifty years of age and older, who live in six districts of central Serbia: Zlatibor, Sumadija, Belgrade, Macva, Nisava and Rasina. The sample included a total of 165 participants, who were divided into two groups: one aged 51 to 60 and the other aged 61 and over (Table 2).

Table 2: Age structure of participants, by districts (areas)

	Zlatibor		Sumadija		Belgrade		Macva		Nisava		Rasina		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	20	23.3	13	15.1	12	14.0	19	22.1	11	12.8	11	12.7	86	100.0
2	14	17.7	8	10.1	12	15.2	7	8.9	21	26.6	17	21.5	79	100.0
3	34	20.6	21	12.7	24	14.5	26	15.7	32	19.5	28	17.0	165	100.0

Legend: 1. aged 51 to 60; 2. aged 61 and over; 3. Total

The analysis of the education status of the sample shows that the participants had a very unfavorable education status, since in as many as 90.9% of cases they either never attended school, or attended four grades or completed only primary school.

The structure of participants by occupation also points to their discrimination. From the aspect of occupation, the number of female farmers is the largest among the participants in both age groups (81.8%). Nevertheless, as many as 92.4% of participants older than 61 do agriculture, while in the category of those aged 51 to 60 this percentage amounts to 72.1%.

In terms of marital status, only three participants (1.8%) never married, and 98.2% got married once. Among those who got married, 74.5% are still married, 1.8% are divorced, and 28.8% are widows (as many as 38% of participants over the age of 61 are widows). Moreover, 96.9% have children, and among the participants who have children, 39.3% have one child, 43.5% have two children, and 14.1% have three or more children.

Furthermore, 62.4% of participants most often lived in multigenerational, extended family households, while 12.7% lived in a nuclear family. At the same time, there is a large number of elderly households - “unions of the elderly”[7]: every fourth participant, or 24.9% of them, lived alone or with an elderly partner.

Participants most often lived in the conditions of a patrilineal household pattern. Namely, when getting married, women usually move into the husband's household, and live in a house that is owned by him, or owned by his family, which significantly affects the power which family relationships are based on. In this regard, significant differences can be seen in terms of ownership and inheritance rights in conditions of patrilocality between men and women. The patrilocalresidence pattern is the most common residence model for our participants’(77.6%), followed by matrilocal(15.1%), and the joint ownership of the participant and her husband in 7.3% of families.

RESEARCH RESULTS

In this paper, the research of violence against rural women over the age of fifty is based on three key dimensions: economic, psychological and health.

The Economic Dimension of Discrimination

Economic violence is an important type of discrimination against rural women over the age of fifty because it forms the basis for other forms of violence. Economic violence means denying economic resources to meet the needs of women or preventing them from engaging in economic activities that are important for ensuring their livelihood - inability

to find employment, working on the property without financial compensation. At the operational level, the following were identified as victims of economic discrimination: 1. Those who have limited access to earnings – they do not have permanent sources of income, and at the same time perform all tasks in the family household: structure by activity; 2. Those who have limited access to resources; 3. Those who are overloaded due to division of labor within a family and due to gender asymmetry.

Table 3: Structure by level of activity as an indicator of discrimination.
Structure based on the level of activity of the participants and their partners

		Farmer and assisting household member		Active employee		Supported (lost their job)		Persons with personal income		Total	
		F	%	F	%	F	%	F	%	F	%
WIVES	51-60	62	72.1	10	11.6	7	8.1	7	8.1	86	100
	61 +	73	92.4	2	2.5	-	-	4	5.1	79	100
HUSBANDS	51-60	29	33.7	18	20.9	3	3.5	36	41.9	86	100
	61 +	40	50.6	2	2.5	-	-	37	46.8	79	100

Participants are most often helping (assisting) household members. Based on the structure by level of activity (Table 3), the participants make up the majority in the category of assisting household members in agricultural households: 72.1% of women between 51 and 60 years of and 92.4% of women aged 60 and over, with only 11.6% and 2.5% employed. By linking these data with the data on the occupation of the participants' husbands and younger rural women [23], a high degree of economic discrimination of rural women over fifty years of age by sex and age is confirmed: 1. In the age group of participants between 51 and 60 years of age, in 58.1 percent of cases, their husbands are employed outside the household, and with participants aged 61 and more this percentage amounts to 43% of families; 2. Young rural women aged between 18 and 30 are employed in 31.7% of the cases, while middle-aged women aged between 31 and 50 in 40.2% of the cases. In the age group of women aged 61 and more, only every twentieth woman had the right to a pension (persons with personal income), and in the age group of women aged between 51 and 60 - every thirteenth. This is a special social group on the margins of society: working in agriculture, outside the formal and informal "open"labor market, within the private family labor organization, in mostly agricultural households [2]. Our survey participants work in conditions that are not regulated by laws and rules governing the formal labor market. First of all, they do not use machinery, because the machines are operated by men, their job is simple and physically very difficult for a woman; secondly, the participants who are assisting household members do not have a defined salary, vacation, sick leave, social benefits. Due to many problems in the socio-economic position and realization of rights: by working outside the scope of the formal labor market (without a contract) and without monetary compensation, these participantsare economically discriminated against. Their husbands - farmers are in a more favorable position because they are the owners of the house and property (in participants aged between 51 and 60, husband is the household owner in 88.5% of cases, and in participants aged 61 and over in 88.6% of cases), and therefore they cannot be assisting household members.

In addition to discrimination by level of activity, within the category of assisting household members, there is also gender inequality by sector of activity within the family household (Table 3). This means that among women over the age of fifty, the following

is observed: lower number of active persons and persons with personal income than it is the case among men, as well as lower number of employees in non-agricultural sectors. Based on the above, we can conclude that: indices of gender segregation by employment sector within the family household and indices of segregation by occupation of partners, prove a high degree of economic discrimination / violence against the respondents.

B) Property inequality as a source of economic discrimination

In our research, this indicator of the economic form of discrimination was operationalized on the basis of data on property inequality between women and men in a household, which the term “gender asset gap” is used for, which is associated with gender inequality. The participants are exposed to extreme property inequality, due to strong customary norms that property should be transferred to male heirs. The patrilineal household pattern, which is the predominant one for our research participants, implies patrilineal inheritance and transfer of property to male family members. Living on the husband's property, women do not have control over marital property, in as many as 88.5% of cases in our sample (146 out of 165), and in the villages of central Serbia in 87.5% of cases [24]. The participants own resources in 9.1% of families, and joint ownership of property occurs with only a 2.4% share. At the level of district subsamples, Zlatibor and Macva stand out, in which the patrilineal household pattern is more pronounced, with a share of 94.8% and 92.0%. In the Nisava district, the household and property ownership coefficient in favor of men is 83%. The land is inherited by the son, and in addition to it he inherits the power over his wife whocomes to his house, his father's house, without property and leaves her fatherland to her brother –and these are the pillars of discrimination/violence.

When man is the only legal owner of all property, it legalizes gender segregation and discrimination against women. The words of the participants best illustrate the models of ownership: “the property is still owned by the father-in-law who died”; “the son inherited everything”; “father and uncle”; “husband and brother-in-law, they were given everything” etc. Such forms of inheritance put women in the position of unpaid family labor on family farms, or force them to become agricultural wage workers.

A)Discrimination within the family division of labor - reproductive labor

Reproductive laborby the survey participants in the household was operationalized on the basis of data on the family division of labor or family everyday life - all-day activities of the participant and her partner. The main assumption we started from in this part of the analysis was that the actual position of a rural woman over fifty years of age in the family division of labor is very difficult, and is characterized by too much workload - sacrifice - limitation, as a long-term pattern of their lives. This allows them to alleviate the consequences of crisis in global society and the state's disregard for the rural areas, that is, the difficult financial situation in their household. They believe sacrifice is their obligation and part of their identity. This is evidenced by the data on the daily “time budget” of the respondents, for all types of activity within the family household. The following types of activity are used: 1. Farm work - agricultural work; 2. Work in the commercial yard; 3. Household area - domestic work, intended for everyday consumption, which does not create value and directly serves to meet the needs of family members - reproductive labor, and 4. paid work or employment. Too much workload was calculated on the basis of data on the daily “time budget” of the participants, according to all types of activity within the family household - the duration of these tasks during the day. Thus, three time-related dimensions by activity type are assumed: a) 1 to 4 hours; b) 5 to 7 hours and c) 8 and more hours.

Table 4: Duration of work per type of activity within the rural family household during the day, based on the age of the women, in%

	Commercial yard			Farm work			Household work		
	18–30	31 - 50	51 i +	18 - 30	31 - 50	51 i +	18 - 30	31 – 50	51 i +
No work	74.4	40.1	26.1	50.4	19.7	17.6	1.7	1.0	3.6
1–4	19.6	38.1	38.8	26.5	27.1	18.1	30.8	46.5	55.8
5– 7	6.0	19.1	26.1	16.2	24.1	28.5	25.6	38.8	32.1
8 i +	-	2.7	9.0	6.9	29.1	35.8	41.9	13.7	8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: [24] (for rural women aged 18 to 30 and 31 to 50).

The analysis of the participants' answers to the question how much time they spend during the day working in the commercial yard, on the farm (in the field, in the garden, orchard and vineyard), at home - housework, showed the following generational differences that can be seen in Table 4. As many as 74.4% and 50.4% of young women under 30 years of age stated that they do not work in the economic yard and on the farm, respectively. At the same time, women older than 51 took care of animals in 73.9% of cases, worked on the farm in 82.4% and did domestic work in 96.4% of families. Furthermore, the number of hours of work on the farm increases in rural women older than fifty, compared to younger rural women. Thus, of all rural women aged 51 and over (Table 4), 64.3% of them spent five or more hours working on the farm, every second woman aged between 31 and 50 –or 53.2% and every fourth young rural woman, or 23.1%, which confirms the initial hypothesis on discrimination against older rural women compared to younger ones from the aspect of family division of labor. This is also supported by the analysis of the duration of work in the commercial yard: every third woman older than fifty (35.1%) cares about animals for five or more hours during the day, every fifth woman aged between 31 and 50 (21.8%) and only every seventeenth youngwoman (6%). Rural women over the age of fifty are overburdened with the family division of labor given their age, as they selflessly sacrifice themselves for the benefit of the family for the rest of their lives. This is confirmed by the data of the analysis in the age category over 60 (Table 5).

Table 5: Duration of work per type of activity within the rural family household during the day, for women older than 60, in %

	Commercial yard		Farm		Household	
	61 to 70	71 and over	61 to 70	71 and over	61 to 70	71 and over
No work	15.6	-	-	-	9.4	12.5
1 – 4	65.6	71.9	53.1	34.3	56.3	43.8
5 – 7	18.8	28.1	43.8	21.9	34.3	34.3
8 and more	-	-	3.1	43.8	-	9.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Too much workload involving physically demanding work in the field and around animals is present in women older than 60 (Table 5), while older women (71 to 80 years of age and more) are overburdened working within the family household, due to their age. It is especially surprising that almost every other older rural woman worked on the farm for 8 or more hours during the day - 43.8%, and as many as 71.9% of them worked for up to 4 hours in the commercial yard. As for the total number of hours of daily activity, every second participantoversixty years of age and over seventy years of age (45.2%) workedfor between 16 and 18 hours a day. This means that as the age of rural women

increases, their discrimination within the family division of labor increases, which does not apply to their husbands: in the age group of 60 and over: every otherhusband does not work on the farm (50%) or in the economic yard (55.1%). Almost all participants do all the domestic work - 96.4%, while their husbands do not do such work in 85.9% of families. A survey on a sample of rural women of all ages [24] confirmed that the time budget per day was 18 hours of work in the household, on the farm and in commercial yard for every third respondent (31.7%) and every fifth husband (20%). Rural men have more leisure time than rural women: every second rural man has leisure time during the day while this applies to every third rural woman [24]. The absence of the freedom of choice of the participants does not leave room for the emancipation of men and women and deviation from imposed roles and the tradition of a predetermined position within the family division of labor. Such a high rate of discrimination against rural women over the age of fifty in the field of family division of labor is explained by the patriarchal system of family relations and the high degree of exploitation of women's potential for the purposes of family welfare, under the conditions of poverty and reduction of social rights for rural women and their families.

The Psychological Dimension of Discrimination

We have operationalized this form of discrimination/violence through three types of data: 1. the traditional structure of authority in the participants' family of origin; 2. different attitude of parents towards children of different gender during primary socialization; 3. the practice of belittling female children by parents. We assumed that psychological violence is very painful for the victim, because it leaves lifelong scars to her personality, it affects self-perception, self-confidence, and personal experience.

A) The traditional structure of authority in the participants' family of origin

The psychological discrimination of the participants started at birth. The participants came from families with a traditional structure of authority and traditional socialization, by learning gender roles in as many as 80.6% of cases (133 out of 165), which, on the one hand, implies the self-will of men, i.e., male kinship network, and on the other hand, the subordination of woman to man.

Qualitative research data indicate that the traditional patterns of authority in the family are manifested in obedience to the elder not only by the woman, but also by other family members; however, the elder often behaves differently depending on the person he talks to–he can seem as a kind and pleasant person towards people outside the family, while they show a completely opposite behavior towards the family members: "we obeyed and endured our father's behaviour, he was nice when around other people, and acted as a beast in the house"; "father made decisions, his word was law, we never confronted him"; "It's always as the father says, and then as the husband says, and you are a slave forever"[3,] came to the same results.

B) Parents expectations and gender-stereotyped parenting – focus on male descendants

Traditional patterns of authority in the family implied a significant difference in the attitudes and expectations of parents towards children of different gender, that is, the focus was on male descendants. Such a cultural pattern ensures the prolongation and duration of patriarchy: rigid traditional gender socialization [21];[22]. We asked the survey participants the following question: "Did the parents raise the male and female children differently?" They confirmed discrimination by parents in almost 2/3 of cases: out of a total of 125 answers to this question, in 82 (65.6%) of families there was a difference in raising children – more attention was paid to sons (The results of the research

on parenting in rural families from the previous period are fully compatible with these data, [24]; [25].The rigidity of traditional gender socialization is illustrated by the answers of the participants: “female child will eventually go to someone else's house, and that's it“, as well as the fact that the son is a desired and privileged child: “they condoned our brother's behaviour, he was their God, he did not have to do anything, and my sister and I did everything, he was the center of everything, he was their sunshine, they kept saying that”; “There was a great difference in their behaviour, man was considered as superior, while woman was seen as great misery”; “They sent their sons to school, while they married us early so that they wouldn't spend money on us, we would end up in someone else's house, they tell you that from the start“; “Female children are not seen as their children“, etc.The participants are aware of the injustice inflicted on them, but they are in a situation to come to terms with the expectations and demands of the patriarchal environment and their family. This is reflected in their adopted value systems: 1. The first group of adopted values involves a high degree of satisfaction with the family of origin - subjective feeling of integration within the family, which is associated with ambiguity - acceptance of contradictions, getting used to them. Our survey participants do not understand that the family itself includes ambiguity too. There is love and rivalry, trust and distrust, use and abuse [18]. 2. The second group of values adopted by the participants implies that they accepted different norms of behavior in life and in the family compared to those used for men, which is especially reflected in their attitude towards reproductive and educational labor in the family – women approve of the exclusion of men: “I would be ashamed if he worked around the house ... it's not something a man should do after all“. Lack of choice makes passive behavior necessary: “that was the best you could get and that's it“, but at the same time functional in solving many issues of their daily life, and it especially allowed for easier survival in the family of origin, and even later, throughout life. The patriarchal protection of family members formed a matrix which conveniently included the model of the identity of rural women, following the personal example of mothers, grandmothers and all other rural women. Traditional gender regimes are important causes of discrimination against women – our survey participants.

B) Belittling as a form of discrimination in the family of origin

This form of discrimination was analyzed on the example of two types of families from the participants’' childhood: families with children of different gender and families with girls only. In families with children of different gender: 1. “the son is above everything“; 2. “a woman is powerless, she is always in danger outside the house, she needs a companion”; 3. “woman willend up in someone else’s house”. In the age group of participants from 51 to 60 years of age, the disparagement of a female child by the parents was manifested in 62.5% of families, and in the group of older women (61 years of age and more) in 71.2% of cases. Previous research, which referred to rural women of all ages [24], showed that the disparagement of female children by their parents was manifested in 57.5% of families. A specific form of psychological violence and undermining the psychological position of a female child through belittling is confirmed by the following statements of the participants: “they would tell me - he is a man, he can do whatever he wants, and you have to be careful, you can make mistakes”; “You’ll end up in someone else's house, nobody wants to invest in something that is someone else’s"; “What do you know, you are a woman”; “you are stupid”; “Shut up and work around the house”.

In families with only female children: a) parents were dissatisfied and unhappy that they did not get a son, and the participants said the following: “they regretted not having a son, they told us that they had no motivation to work, that they did not have meaning in life”;

b) parents told their daughters that they constantly needed a supervisor, because they were not able to judge for themselves: “they forbade us to go out, they controlled us”; “They said that we were constantly in danger, that we could not go anywhere since we had no brother” and so on. The participants passively endured and made peace with such different attitudesof their parents towards sons and daughters, and came to terms with the “inevitable” (“natural”) female destiny [21]; [22], and primarily perceive and accept it as a kind of necessary life of a “woman” [12], adapt to it and do not challenge and confront brothers in the rigid patriarchal upbringing system: “mother loved him the most and she told us that, and so did we, the two sisters - we loved him and gave him everything, because of our mother ... he got used to getting everything”. That is why they accept different norms of behavior in life and in the family than those that are set for men. They “find their ways in values, attitudes and experience of themselves through which it is possible and tolerable to live in inequality”[12].

The Health Dimension of Violence

We operationalized the health dimension of violence in this research by analyzing: 1. The health status of the participants, 2. Limited access to primary health care.

A) Health status and limited access to primary health care. Access to health services has been reduced for rural women over the age of fifty, due to their exclusion from the social division of labor –that is, they are seen as assisting household members. Due to the inadequate employment position, participants often do not have the opportunity to exercise even basic social rights, so more than half of them did not have access to health insurance through a valid health insurance card: in the age group 51 to 60 years of age - in 55.8% of cases (48 of a total of 86); and in participants aged 61 and over 58.2% percent (46 out of 79 participants). In as many as 94% of cases, the participants stated that their head of household does not pay pension insurance in their name. They qualified for treatment at the expense of the state only in the case of incurable disease.Unprotected in case of injuries and disability, and left without financial support in old age, in addition to poor health - are the main causes of their discrimination. If we look at the data on the health status of the participants, we can see that every other woman in our samplehad very poor health status (46.7%, or 77 out of 165), and in the subsample of women aged 61 and over, as many as 58.2% of participants were with very poor health (46 participants out of a total of 79). “Fair health status, but with serious problems” was applicable for every third participant (53 respondents or 32.1%). Only every fifth respondent was in “good health”, 21.2% (35 out of 165). The statements of the participants confirm the severity of their health discrimination: “I have a neurological condition”; “I take insulin”; “I suffer from rheumatism”; “I have angina pectoris and I do all the work in the house and outside the house”; “I have epilepsy and I do wage work”; “I go to dialysis, and when I come back home, I bake bread, clean and cook lunch”, etc.

DISCUSSION AND CONCLUSION

A common element of economic, psychological and health violence against rural women over the age of fifty in Serbian society includes three pillars, which are related to: 1. Objective indicators of discrimination, 2. Patriarchal regimes, and 3. Subjective elements: restoration of patriarchy. Objective indicators of discrimination against rural women over the age of fifty are related to the structural level: economic changes at the global, state level, the consequences of which are seen in everyday life. Objective indicators refer to the area of work of these women and their activity in the family household. It has been

proven that the position of rural women over the age of fifty within the family division of labor is characterized by too much workload - sacrifice - limitation. Families of these rural women is the source of their constant exhaustion. The prevailing patriarchal regimes in rural families in central Serbia are being further strengthened intensively, which is a consequence of the change in the position of rural areas during the transition period and the difficult position of villages, rural families and rural women. Discrimination against rural women over the age of fifty is influenced by the legacy of traditional patriarchal values, transitional changes: the increasing marginalization of villages and agriculture, the impoverishment of villages and villagers, patrilineality, inheritance customs. Subjective elements of discrimination refer to the continuous reproduction of patriarchy and its restoration by ideological influences - the process of primary socialization, which has the characteristics of gender socialization: differences in attitudes and expectations of parents towards children of different gender and the focus on male descendants.

The characteristics of violence against rural women over the age of fifty are as follows: prevalence, based on patriarchy and patrilineality, longevity and at the same time unawareness of it, as well as the unawareness of its consequences, poverty of rural women over the age of fifty, impaired health, financial insecurity, exposure to unregulated market laws, commodification and strong deprivation in the exercise of human rights. Moreover, there is no perception of this and thus this problem becomes even more invisible which increases the economic, psychological and health discrimination/violence. The results of the empirical research confirmed the validity of the construct on the basis of which groups of elements and indicators on violence against rural women older than fifty were created. These should encourage decision-makers to take appropriate measures, in line with the international obligations that Serbia has accepted.

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ACCOMMODATION INFRASTRUCTURE IN THE MOUNTAINOUS AREA OF SUCEAVA COUNTY. ANALYSIS FROM THE TRIPLE PERSPECTIVE

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ABSTRACT

The mountainous area of Suceava County presents real opportunities for tourist development, having numerous unique and well-preserved tourist resources, highlighted by their antiquity, originality and accessibility, a large number of traditional rural households and a generous number of accommodation spaces.
Starting from the hypothesis that the tourist offer of the mountain area is attractive, this research aims to analyze the size of accommodation infrastructure in the mountainous area of Suceava County based on data provided by national authorities National Institute of Statistics and National Authority for Tourism and site specialized for the promotion of accommodation structures. The research methodology was performed by processing the data using Excel and the elaboration of thematic maps based on the results obtained. The data and information were obtained by studying specialized articles, on similar studies from other.
In conclusion, based on the data provided by official sources and specialized sites, a discrepancy can be found in terms of the total number of reception structures operating at this time in the Suceava mountain area and implicitly leads to different data regarding the indicator of overnight stays in tourist accommodation structures.

Keywords: rural tourism, mountain area, accommodation structures

INTRODUCTION

Rural tourism is always practiced, but spontaneously, sporadically, casually and especially unorganized. Rural tourism, in an organized way, in the mountainous area of Suceava county is of recent date, having the same trajectory with the rural tourism at the level of the entire country. The beginnings of the organization of rural tourism in Romania is placed in the period 1973-1974, when the political regime of the time, launches the action of "tourist villages", identified in the ethnographic areas of the country [9]. In many EU Member States, rural tourism is seen as a strategy for the future, which can contribute to the economic and social development of local communities, to create jobs and reduce migration [12], [17]. At the same time, rural tourism is considered among the most dynamic forms of travel, having multiple advantages for both the tourist and the host [11]. Referring to the area of Romania, 87.1% correspond to the rural environment, and 43.59% of the country's population lives in the village, thus, rural tourism involves the following aspects: the existence of rural spaces, the preservation of rural functionality, the preservation of a rural infrastructure, the preservation of the traditional way of life, the

preservation of the specific cultural identity [5], [10]. The village, much approached, carries with it a special human significance, identified with the traditions of the place and the religious holidays kept with sanctity [1], or it offers a mythological tourist potential, especially the mountain pastoral form [17], or it represents the return to nature and to the rural communities [8]. In other words, the village becomes the host of complex activities that promote tradition, a return to its origins, the discovery of nature and beauty.

The Romanian village has successfully gone through less favorable periods of history, preserving to a large extent unaltered the purity of its culture. The development of rural tourism means increasing living standards, stabilizing the population, maintaining cultural identity [7], increasing economic power at local and national level [13], [14], while maintaining ecological balance and protecting the natural environment [17].

The road to success is paved by an overall development of the rural environment, based on a moderate increase over time and to the benefit of the rural area because a rapid or disorderly development of rural tourism can damage the environment, and can affect the local population [6], [13].

STUDY AREA

The study area overlaps with the mountain area of Suceava County which occupies 53% of the entire county and is integrated into the chain of the Eastern Carpathians [4] being composed of 36 communes, comprising massive and complex peaks separated from each other by deep valleys [2], [3]. The distinguishing mountain units are: Suhard and Călimani Massifs, Giumalău - Rarău Massifs, Bistriţa, Stânişoara Mountains, Obcinii Feredeului and Mestecăniș.

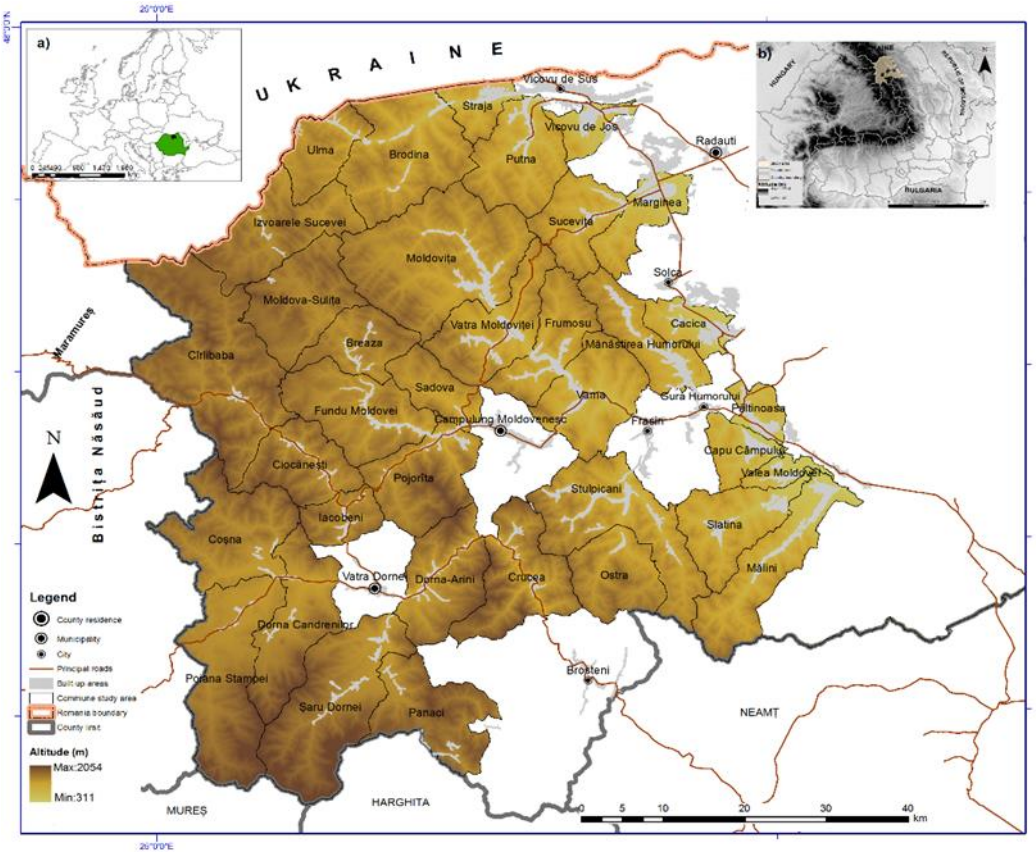

Figure 1. Geographical location of the studied area

RESEARCH METHODS

The research focused on the comparative analysis of the number of tourist reception structures with accommodation functions that can carry out the activity in the mountainous area of Suceava County, based on data collected from official sources of information, such as the National Tourism Authority (ANT), the National Institute of Statistics (INS) and websites specializing in tourism promotion. The objectives of the study were to capture in figures the impact of the pandemic on the number of reception structures in the mountainous rural area, transparency and good cooperation between state institutions and sites specialized in tourism promotion.

The study is structured in two parts: the first part analyzes the evolution of reception structures in 2020, a year strongly influenced by the global pandemic of the Sars Cov 2 virus, compared to 2019, based on data provided by the National Institute of Statistics. In the second stage of the research is presented a comparative analysis of the total number of reception structures in the 36 communes for 2020 from three perspectives (National Authority for Tourism, National Institute of Statistics and websites specialized in tourism promotion).

The comparative analysis was also used for similar studies from other regions of Romania, (Răcășan, 2017) [14], but we adapted it to the mountain area by introducing the infoturist.ro website. being the most used online booking site in Romania according to the study conducted by trafic.ro.In order to highlight the differences between the three sources of information, the data were recorded and processed using Microsoft Excel, maps materialized through spatial representations in the GIS program were used, methods that were the basis of the interpretive approach, as well as the formulation of the conclusions of the present study. The cartographic method is validated by the map of the study area as well as the thematic map showing with the help of conventional signs, the number of reception structures with accommodation function in the chosen area. The comparative method is highlighted by the inserted graphs and maps with a high degree of expressiveness by choosing simple exposure methods in order to capture the essence of the researched phenomenon.

RESULTS AND DISSCUSIONS

From the analysis of the data provided by INS [18], it is found that in Romania, in 2020, compared to the same period of 2019, the tourist accommodation capacity increased by 0.4% in the number of available places, and the number of accommodation structures with accommodation function increased by 2.5%.

Analyzing the number of reception structures in the mountain area of Suceava County, we find that both the total number of places made available to tourists and the number of reception structures in this area, they experienced a significant increase in 2020, despite the fact that during this period there were also reception structures that stopped working or underwent major repairs. Therefore, according to the data provided by INS, in 2019 at the level of the Suceava mountain area, there was an accommodation capacity of 3313 places, and in 2020 there was a capacity of 3646 places, it results that the year 2020 brought an additional 333 places accommodation compared to 2019.

Regarding the number of tourist reception structures, in 2019 there were a number of 230 structures, and in 2020 a number of 246 structures, despite the fact that in some communes, the number of accommodation structures decreased. (Figure 2)

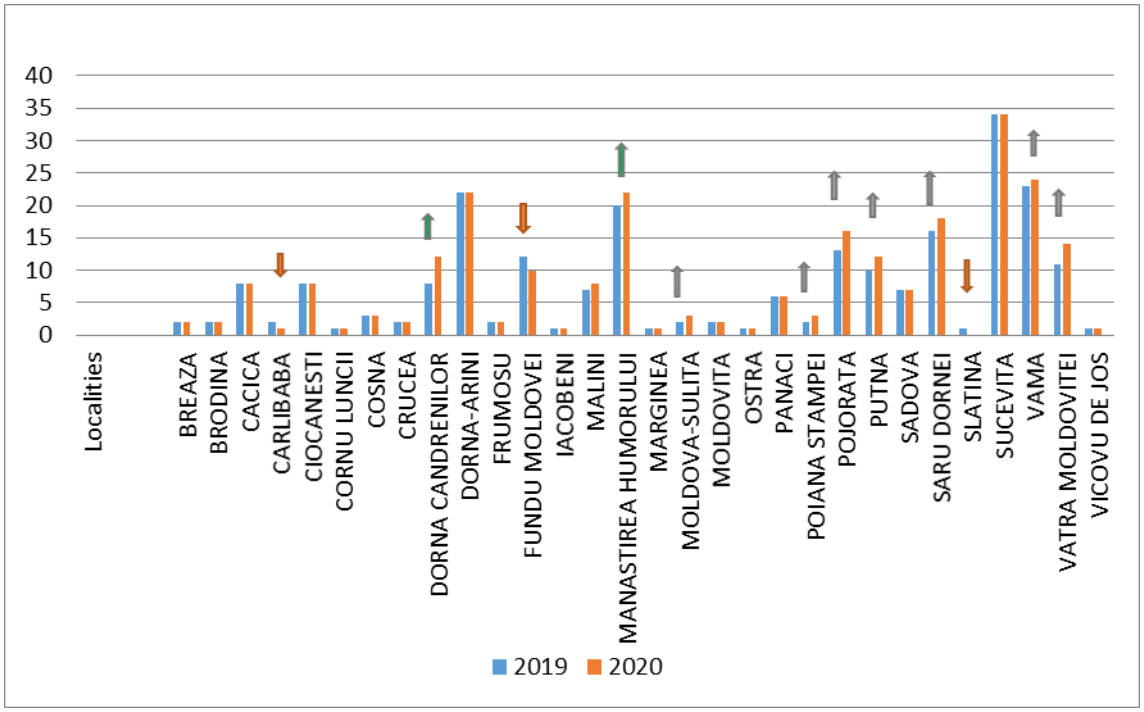

Figure.2 Tourist reception structures (sourse http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table)

Given the increase in 2020 in the number of accommodation facilities and the number of places they offer, it is necessary to analyze the total number of tourists arriving in this area in the last two years. The statistics show a change in the behavior of tourists in 2020, compared to the same period of 2019, motivated by restrictions imposed on the population to combat and prevent infection with the Sars Cov virus 2. In 2020, a smaller number of tourists was registered in the first months, registering in many localities zero tourists in April and May, motivated by the restrictions imposed by the authorities of Suceava county, period in which the quarantine was installed at the level of Suceava municipality and the metropolitan area, followed by an increase in the number of arrivals (June, July, August when the legislative relaxations appeared).

However, comparing the data with the same period of 2019, there is a decrease in the number of tourists arriving by 35%. From the first part of the study, we conclude that the year 2020 brought more reception structures and implicitly accommodation in this area, but the number of arriving tourists decreased. A possible cause of the increase in the number of reception structures in the mountainous rural area is the attraction of European structural and investment funds from 2014-2020, which led to the construction of tourist pensions and agritourism pensions. The second part of the study aimed to compare the number of reception structures existing at the end of 2020, in terms of data provided by INS [17], ANT [22] and specialized sites, thus resulting in a triple perspective.

From Figure 3. it can be observed that the data provided by INS and ANT regarding the number of existing accommodation structures in the rural area of Suceava, do not correspond to the number of reception structures promoted online. Due to its current trend of booking tourist spaces with the help of competent sites, we analyzed the number of accommodation structures with accommodation function that appear on various profile sites. In the virtual world, there are sites that serve as tourist guides, and in their top, there is www.turistinfo.ro, [19] according to the trafic.ro site [20].

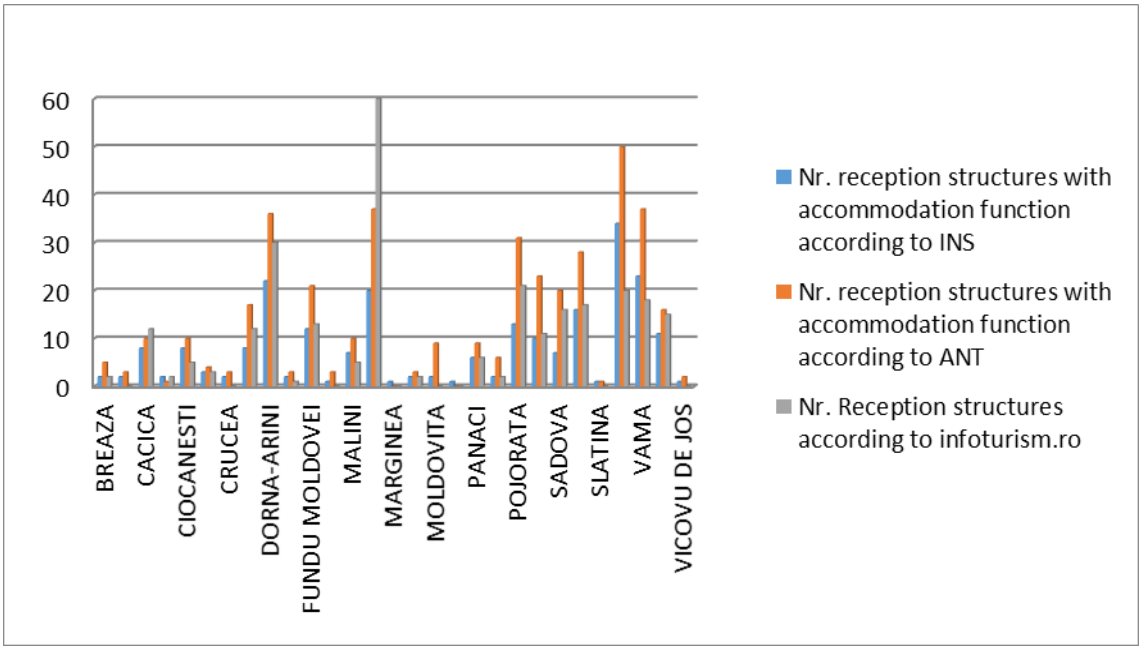

Figure 3. Number of reception structures in the Suceava rural area (Source: INS, ANT and infoturist.ro)

The site was created in a transparent and relevant manner (real pictures of the accommodation units and their addresses, room price, facilities, etc.). Turistinfo.ro makes available to each accommodation unit, based on a service contract, a space managed by the unit itself, for the publication of the tourist offer. It can be seen in the table with number 3, the discrepancy between the official data and the tourist promotion sites, from which it results that the official data are partial and incomplete. Moreover, in some communes in the Suceava mountain area, zero reception structures are declared on the I.N.S website, but on the A.N.T and the website www.infoturist.ro, there are promoted tourist reception structures with accommodation function. For example in Izvoarele Sucevei Commune according to the data provided by INS, there are no tourist accommodation places available, according to ANT there are 2 tourist reception structures totaling 18 places, and on the website www.infoturist.ro, there are 2 reception structures, classified with three stars each, having a total of 13 accommodation spaces with 26 places available. Which means that the reception structures on infoturist.ro are different from those mentioned by ANT, and their number is actually higher. The legislation in force in Romania stipulates that the reception structures under 5 accommodation places are not included in the statistics, or, on www.infoturist.ro, we find promoted and made available houses with 2 rooms (4 places), which results in a first difference in the number of tourist reception structures. We also found that in some localities, reception structures with accommodation function known locally and nationally, is not listed on the site www.infoturist.ro but the tourist offer can be seen on its own website or on booking.ro. [21] (ex: Tourist stop at La Filuță). The discrepancy between the figures provided by the official sources of information, respectively INS and ANT, can be explained by the lack of a common procedure in order to obtain the operation authorization and the classification certificate. These mandatory documents for the proper functioning of the reception structures are obtained from different institutions, hence the lack of transparency and poor collaboration between the two institutions. In the legislation in force, according to the Methodological Norms regarding the issuance of classification certificates, in article 2, point b) within the structures of tourist reception we find

apartments and rooms for rent in family dwellings, which can be classified, but the INS does not include this form of accommodation among the accommodation structures, or these structures appear reported by the ANT, or are promoted on specialty sites where the differences in the three data collection sources result. The non-declaration of the tourism activity of some tourist reception structures also leads to discrepancy between the three sources of information.The underlined elements of discrepancy implicitly lead to different data regarding the total indicator of overnight stays in the tourist accommodation structures.

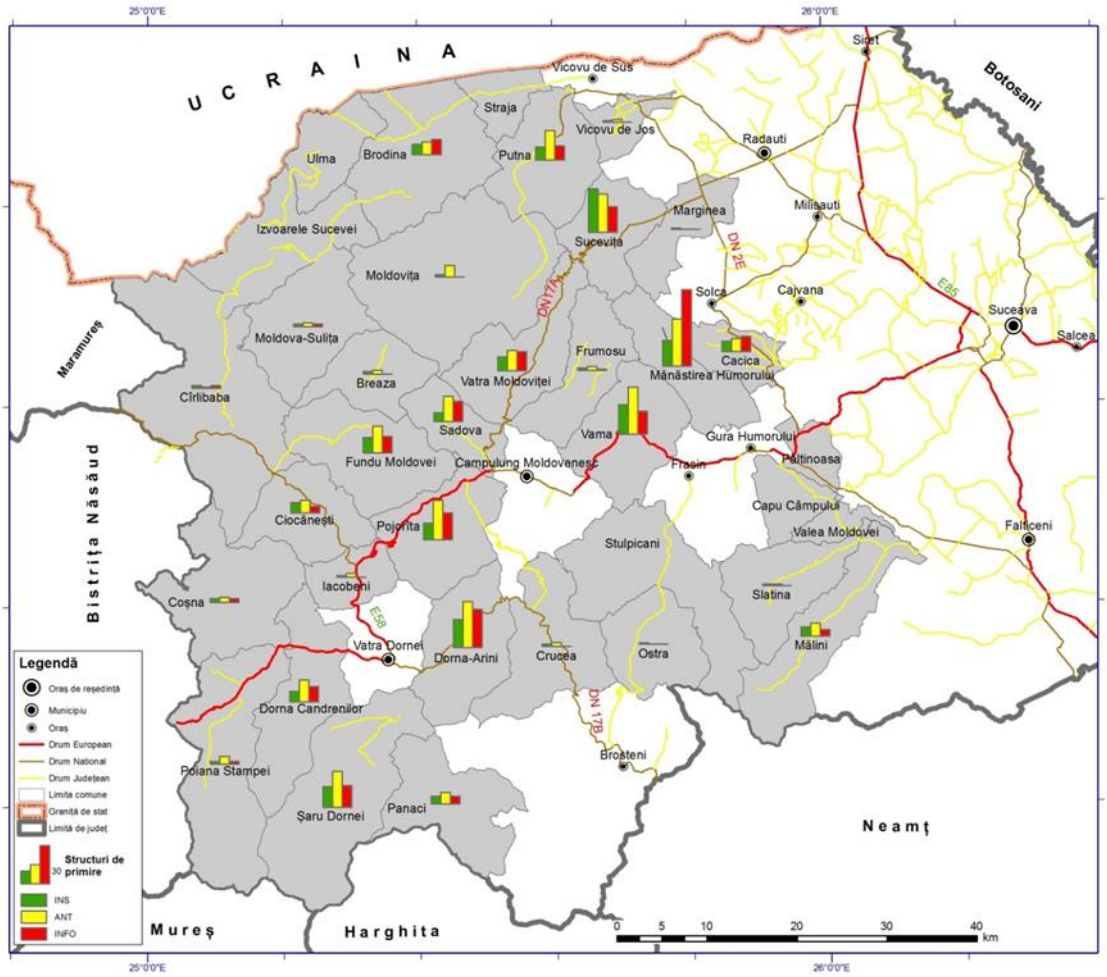

Figure 4. Reception structures in the mountain area (triple perspective)

CONCLUSIONS

The present study reveals that the year 2020 brought on the tourist market new reception structures and implicitly accommodation places in the Suceava mountain area, but the number of arriving tourists decreased. Based on data provided by official sources and specialized sites, can be observed in the mountainous area of Suceava, a discrepancy in the total number of accommodation structures at the end of 2020. The discrepancy between the official data and the tourist promotion sites, regarding the number of tourist reception structures denotes that the official data are partial and incomplete.

The legislation in force in Romania stipulates that the reception structures under 5 accommodation places are not included in the statistics, however, ANT and the

specialized sites promote tourist reception structures with 2 rooms (4 places), which results in a first difference in the total number of tourist reception structures.
Mandatory documents for the proper functioning of the reception structures are obtained from different institutions, unconditionally to each other, resulting in a lack of transparency. Within the tourist reception structures we find apartments and rooms for rent in family homes, which can be classified, however, the INS does not include this form of accommodation among the accommodation structures, but these structures are reported by the ANT or are promoted on specialized sites, which leads to differences between the three sources of data collection. The non-declaration of the tourist activity of some tourist reception structures also leads to the discrepancy between the three sources of information. In order to eliminate the discrepancies highlighted, the competent authorities must follow the same indicators, to have a reciprocal conditioning in the elaboration of the classification certificates and the operation authorization in order to lead to the same figures of the tourist reception structures.

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ANALYSIS OF THE RESTRUCTURING PROCESS OF THE HOUSING STOCK OF RĂDĂUȚI MUNICIPALITY BETWEEN 1990-2019

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ABSTRACT

This article aims to characterize the current situation of the housing stock on the territory of Rădăuți municipality as a result of the changes that occurred between 1990 and 2019 in its structure and characteristics and to synthesize a series of territorial disparities. The research aimed to highlight the general dynamics of the housing stock and capture the territorial changes that reflect the process of restructuring and regeneration that the city's housing stock has gone through in the last three decades.

To achieve the purpose of the study, in analyzing the dynamics of the housing fund in Radauti, the following indicators were taken into account: number and type of existing housing, number of existing housing by the form of ownership and source of financing, the annual number of completed housing, housing, age of housing. The territorial analysis aimed to highlight the expansion of the built fund (especially in residential areas), highlight the distribution of housing in the city, identify structural changes in urban space as a result of the urban restructuring process that began after 1990.

Highlighting the most significant quantitative and qualitative changes determined by the dynamics of the housing stock was based on the analysis, interpretation, and processing of bibliographic, cartographic, and statistical data. The graphic and cartographic representations obtained were the starting point for the subsequent analyzes and interpretations that allowed the characterization of the dynamics of the housing stock as well as the formulation of the study conclusions.

The research results show that although most of the housing stock in Radauti was built before 1990, the restructuring process is current and is achieved both by densifying the built space and by a peripheral expansion of residential areas. The trends that can be underlined in the evolution of the housing stock of Rădăuți municipality are the increase of the share of individual dwellings in the overall housing fund, the formation of new residential neighborhoods dominated by individual dwellings, as a result of the construction of the collective housing on the vacant spaces inside, the renewal of the existing housing stock, the emergence of problems related to access to urban utilities.

Keywords: housing stock, dwelling, dynamics, residential areas, urban restructuring

INTRODUCTION

Housing is an essential component of human life that takes place within the human habitat, being supported by a specific infrastructure (housing, utilities, landscaping outside the home, different services). Housing can be defined in various ways. At its most

basic level, housing is defined by the characteristics of the physical structure and the costs and construction of that housing. At a deeper level, housing "determines the mutual relationship between every single human being and surrounding physical and social space. " [1]

The structure of the housing stock in each country reflects a bit of its history and political choices [2], its dynamics are closely linked to the socio-economic context, and its restructuring takes place, in particular, to change the political regime. While the establishment of the communist regime contributed, in most Eastern European states, to the renewal and resizing of the housing stock, by building a large number of homes, its fall imposed a succession of economic changes that led to the disorganization of this sector of economic activity.

After 1990, Romania experienced a decade of economic instability and decline, the difficulties of economic recovery being related to the lack of structural reforms, the existence of an outdated infrastructure [3], and, especially, the resistance to change and anchoring in old communist practices. The relaunch of the activity of the housing construction sector, in each ex-socialist country, was related to the ability of states to overcome the transition period and to adapt as quickly and efficiently as possible to the requirements of the market economy. The experience of the 30 years since the fall of the regime in Romania, has shown us that, in general, state intervention in housing management has decreased progressively and the involvement of the population in the construction and maintenance of their homes has increased. Even if the principles of organizing urban space according to capitalist rules were adopted earlier, the pace of change in the built environment and residential differentiation occurred much later [4].

The most important general trends in the transition cities are the return of the importance of land rent and an increasing number of actors competing for space, renaissance of self-government, the increase of social and spatial differentiation, the transformation of employment structure, reshaping of townscape, and the physical transformation of the urban space [5].

After 1990, there were changes in the mechanisms regarding the construction and distribution of housing that led to changes in the structure of the housing stock and the characteristics of residential areas of Romanian villages and towns: mobility restrictions to large cities were removed, it was regulated the property right, the citizens acquired the freedom to build houses on their own, to choose the desired place of residence, the provisions restricting the construction of houses on the outskirts of the settlement were eliminated [6]. Contradictions between the inherited socialist urban patterns and newly established capitalist rules created tensions resulting in the restructuring of existing urban areas and the formation of new postsocialist urban landscapes [7].

Decentralization of state power, increasing the decision-making role of regional and local administrations, disorganizing the activity of the construction sector, reducing state involvement in financing housing construction and maintenance, the sale of state-owned housing to the population, lack of a regulated market for sale-purchase or rental of housing, these were just some of the changes that severely affected, in Romania, the dynamics of the housing stock in the first decade after the fall of communism. This period was marked, in all cities of the country, by the slowdown, even stagnation, of the pace of housing construction, most cities experienced, at different intensities, the housing crisis.

The transition to a market economy has been slow, and the recovery of the housing construction sector has experienced different rhythms from one county to another, from

one locality to another, depending on the capacity and availability of local authorities to identify housing problems and use the available financial resources to solve them.

The issue of ensuring adequate living conditions and the renewal of the housing stock is a topical concern in Romania, given that European statistics indicate that Romania ranks last in the EU in most indicators of housing reviewed. Romania is, after Bulgaria, the poorest country in the EU, but has the worst living conditions. The housing stock faces many problems in all localities of the country: the real estate market is deteriorating rapidly, public housing is insufficient (they hold less than 2% of the housing stock), the housing rental market is unofficial and unregulated, cities are experiencing uncontrolled expansion and with population losses, housing is among the most expensive, housing is overcrowded, at the same time there is the highest number of unoccupied housing, housing precarity has the highest value among EU countries [8]. Housing equipment is a major problem, especially in poor rural areas, where utility is difficult to provide. Informal or unhealthy living is still a relatively localized problem, but with obvious growth trends [9].

In this context, the analysis of housing problems is timely and relevant for any locality in Romania. The analysis of the process of restructuring the housing stock of small and medium-sized cities provides important information to all decision-makers in the community interested in the development of the local community (local authorities, planners, builders, architects, citizens). The diagnosis of the existing situation and the description of the factors that influenced the development and the renewal process of the housing fund represent the starting point for the elaboration of local development policies and the necessary steps for better landscaping for housing, according to locally identified needs. The research of the dynamics of the housing fund between 1990 and 2019 aims at the analysis of the changes produced in the structure of the housing fund of Rădăuți municipality. The approach to the change process focused in particular on the analysis of quantitative changes that are highlighted by statistical data. The territorial analysis focused on identifying the areas of extension of residential spaces and changes in urban areas. The study has a theoretical value, contributing to the enrichment of knowledge related to this topic, because, until now, this topic has not been addressed in the research conducted on the municipality of Radauti.

Figure 1. Location of the study area.

The municipality of Rădăuți is located in the northeast part of Romania and the northwest part of the Moldavian Plateau. It is located in the northern part of Suceava County, on the right bank of the Suceava River, in the depression of the same name in the Suceava Plateau.
The town is territorially delimited as follows: in the north - FrătăuțiiVechi commune; in the northeast - Dornești commune; in the east - Satu-Mare commune; in the south - Bădeuți communes and Volovăț; in the west - Horodnic commune, is located at an altitude between 260 m and 380 m, the mathematical position of the city being defined by the coordinates of 250 35 east longitude and 47051 northern latitudes.
The total area of Rădăuți municipality is 3,230 ha. As for the surface urban development in 2018, it was 1,360 ha, which represents 40.96% of the total area of the city. Within Suceava county, Rădăuți municipality is in second place after area and in third place in terms of population.

METHODOLOGY

The study was structured in two parts: the first part proposes the identification and description of some factors that influenced, as a whole, the development of the housing stock and its restructuring before and after 1990, the second illustrates the changes in the housing fund structure in the post-communist period by analyzing the main indicators the housing stock. The description of the framework in which it evolved, after 1990, Rădăuți municipality took into account the review of some aspects of political-administrative, demographic, economic nature that influenced, directly or indirectly, housing and the structure of the housing fund. Obtaining useful information for drawing this framework involved: consulting specialized studies, spatial planning strategies and economic development of the city; selection of relevant statistical data from the Tempo ONLINE database of the National Institute of Statistics; an information processing approach focused on interpretation and deduction, completed with methods of statistical-mathematical analysis and graphical representation of data using Microsoft Excel.
The analysis of the housing stock dynamics was based on the mathematical-computer processing of statistical data corresponding to the following indicators: total number of existing homes, number of homes completed during the year (by area of residence; forms of ownership, sources of financing); the existing living space related to the dwellings completed during the year and on the interpretation of the results. The statistical data for the mentioned indicators were taken from the Tempo ONLINE database of the National Institute of Statistics. The values of some derived indicators were calculated based on the data associated with the main indicators of the housing stock.
Highlighting the territorial dynamics of the built space and some characteristics of residential spaces was achieved by using the ArcGIS program. Existing data in the ANCPI database for the years 1900 and 2019 and data collected from the field were used.

RESULTS AND DISCUSSIONS

1. The premises for the development and restructuring of the housing stock of the municipality of Rădăuți

Housing is a process associated with human existence and, at the same time, a tool for socio-economic development that involves significant financial and material flows. Housing ensures both the well-being of the population (because it responds to an essential human need) and the development of the settlement as housing construction, provision of

services and utilities necessary for housing are activities integrated into the economic circuit that manages considerable financial flows that are oriented to both populations (income) and the community (as taxes).

The housing fund is defined as the totality of the existing housing units in a territory, regardless of the type of property: residential houses, specialized houses (homes for the elderly), apartments, service rooms, and other housing units in other buildings useful for housing. The elementary unit of the dwelling fund is the individual dwelling.

The dwelling (apartment) is the built unit consisting of one or more living rooms located at the same level of the building or different levels, provided, in general, with outbuildings (kitchen, bathroom, etc.) or with other service spaces, independent from a functional point of view, having a separate entrance from the staircase house, courtyard or street and which has been built, transformed or arranged to be used, in principle, by a single household [10].

The dynamics of the housing stock of Rădăuți municipality have been strongly influenced, over time, by historical, demographic, political, and economic factors.

Historical factors had a major influence on the formation and structuring of the housing stock in Radauti, they coincide with the main events in the history of the settlement, each stage of territorial and functional evolution through contributing to the structuring of urban space and, implicitly, to the creation and development housing stock.

The current characteristics of the housing stock in Rădăuți municipality were acquired during its historical evolution and reflect the different political and socio-economic contexts in which it was built. The establishment of the housing fund in Rădăuți is a process that began with the shaping of the initial nucleus of the settlement, more than 600 years ago, and which has continued until today, as a way of satisfying a fundamental human need. Given the age of the city, only the buildings and houses built in the last three stages of evolution have been preserved in the current structure of the built fund: from the period of the Habsburg occupation (late eighteenth century - early twentieth century), from the years of the socialist regime in the middle of the twentieth century until 1989) and the post-communist period (after 1990 - until now).

After 1920, Rădăuți underwent an important stage of restructuring and reconstruction to restore the built heritage destroyed during the First World War. In the first half of the twentieth century, the territorial expansion of the locality was favored by the agrarian reform of 1922. The agricultural land between Liceului Street (later „V. I. Lenin Street, now Calea Bucovinei) and Volovățului Street was divided into construction lots and distributed to the population [11], in a few years many individual houses were built here, the neighborhood still being preserved in the internal structure of the city.

The socialist period was marked by significant population growth (the population of the settlement increased from 18,780 inhabitants in 1965 to 23,580 at the end of 1980) [12] as a result of positive natural and migratory dynamics (favored by the adoption of a natalist policy in 1965 and the process of industrialization of the town). The need to provide housing for the newly established workforce in the city determined increasing the volume of investments to expand living space and resulted in the configuration of the new city. This area occupies the southern and southwestern part of the locality, it has kept a physiognomy specific to the socialist period and presents a systematized structure - predominantly rectangular with straight streets that intersect at right angles and enclose inside geometric spaces occupied by collective housing complexes: Bogdan Vodă, Călărași, Stadion and Hurmuzachi neighborhoods (built between 1965 and 1970); Hipodrom - Grănicer, Mihai Viteazul and Obor neighborhoods (1975 - 1980). After 1990,

the transition to a market economy led to the decentralization of spatial planning actions, removing the old rules and restrictions of systematization. Decentralization of the economy and administrative decisions have contributed to increasing the role of local government and the community in setting priorities, its own rules of development, and urban expansion. Until the year 2000, the restructuring of the housing fund of Rădăuți was carried out on a small scale, at the initiative of the owners, focused on the qualitative dimension and materialized through actions of the redevelopment of existing homes to modernize, repair, maintain them according to identified needs, ensure efficiency (changing windows, roofs, insulated buildings) and increasing their comfort by connecting to various utilities. Subsequently, under the influence of the revitalization of the national and local economy and housing models specific to Western Europe, the preference for individual housing became evident, the city experiencing a new stage of territorial expansion by capitalizing on vacant urban and agricultural land on the outskirts of residential buildings. At this stage, in addition to the involvement of the population, there was an increase in the number of specialized economic agents that entered the real estate market. They initially turned their attention to the existing undeveloped lots (in town and on the outskirts) and, later, to the old buildings, to obtain well-located land after their demolition. The restructuring of the housing stock in Rădăuți was the result of the process of capitalization of different categories of land for residential uses and was achieved by densification of the interior space; replacing old buildings with new, modern ones, and arranging new residential neighborhoods on the outskirts of the city (southwest, north, west, southeast).

In Rădăuți, the formation of residential areas began with the shaping of the initial nucleus of the settlement, in the 14th century, in the northern part of the settlement and has continued until today. The territorial extension of the settlement was achieved, predominantly to the south compared to the initial settlement and some extent to the east-west. Each stage of development of the settlement materialized in a new stage of territorial expansion, achieved by the appearance of new living spaces, located, usually to the south of the existing ones.

Demographic factors play a key role in measuring the demand for housing and, in part, in meeting the need for existing housing at the local level by building, buying, or renting housing. Population and efforts to ensure adequate living conditions play a key role in ensuring the quality of housing in a human settlement, as the quality of housing is a key element of a person's quality of life [13].

The demand for housing in the Rădăuți municipality has always been correlated with the dynamics registered by the number of inhabitants. The periods in which there were significant increases in the number of inhabitants (either as a result of a positive natural balance or as a result of the establishment of a larger number of migrants in the locality) determined a corresponding development of the housing fund.

The number of population and the structure by age groups contribute to the configuration of housing demand (housing is a basic need of the population) and to the sizing of quantitative and qualitative indicators of housing (degree of insurance of the population with housing; the average number of people/housing; the degree of agglomeration of the dwelling, etc.). The desire for the comfort of the population (expressed by the preference for certain characteristics of housing, neighboring space, and access to urban utilities and services) directs individual efforts, those of authorities and businesses to find the most appropriate solutions to increase the quality of construction, expand technical networks. and the diversification of services associated with the housing sector.

From the point of view of the population-housing ratio, the year 1990, which marked the transition from the planned demographic model to the western one (of the free decision in the sizing of the family) cannot be considered an absolute limit. The transition to the current demographic model has taken place gradually, a series of events occurring before 1989 have influenced the demand for housing after a few decades. The evolution of the population in Rădăuți was fluctuating, registering successive increases and decreases, depending on the values of the demographic indicators associated with the natural and territorial dynamics of the population. From the formation of the settlement until 1990, the population dynamics and the development of the local economy were two important factors that influenced the formation and expansion of residential areas. We mention this: the period 1774-1870, which was distinguished by a large number of arrivals (Germans and Jews) as a result of the policy of colonization carried out by the Austrian rule; period 1965-1989, which was characterized by a sharp increase in the number of population (from 18,780 inhabitants in 1965 to 30,454 at the end of 1989, according to the data provided by the National Institute of Statistics of Romania).

After 1990, the adoption of an indifferent demographic policy, the political instability, the decline of industry and mass redundancies, the financial difficulties, the lack of measures to protect the population were reflected in an obvious demographic decline caused by the dramatic decline in birth rates and increasing emigration. In the socio-economic context of the Romanian post-communist society, the opening of borders represented, for many citizens, an opportunity to find, outside the country, better-paid jobs, a decent living, and the possibility of saving for the construction of their own homes. Abroad, they came into contact with housing models in the Western Area, which contributed greatly to changing their housing preferences. The desire for comfort, space, intimacy associated with the financial power acquired during the years of work abroad, materialized in the desire to build individual homes, which imposed an upward trend in housing construction in Radauti (stronger since 2006) and determined in new stages of territorial expansion of the city. In conclusion, we appreciate that in the analyzed period the numerical evolution of the population was in an ascending trend, the number of the population increasing by 3,667 people (from 31,607 inhabitants in 1992 to 35,260 in 2020). To assess the degree of housing insurance of the existing population, we compared the average annual growth rate of the population with the average annual growth rate of the number of dwellings, an aspect highlighted in Figure 2.

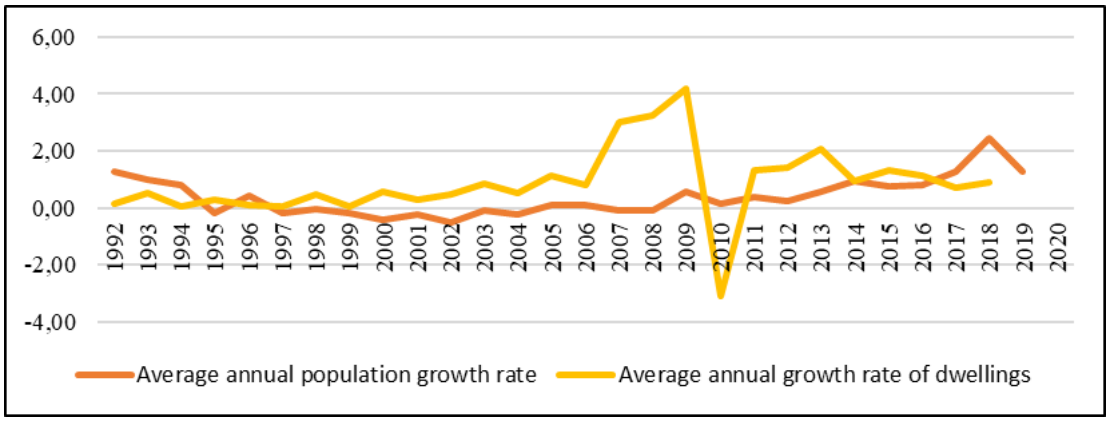

Figure 2 The evolution of the average annual growth rate of the population and the number of dwellings, in the municipality of Rădăuți, between 1992 and 2019
(Source: authors' processing of INSSE TEMPO statistics: POP107D, LOC101B)

We notice that in the municipality of Rădăuți, during the analyzed period, the average annual growth rate of the number of dwellings was higher than the increase of the population number, a positive aspect from the perspective of satisfying the demand for housing within the municipality of Rădăuți. Between 2006 and 2009, the growth rate of the number of homes built marked a significant increase from 0.81% to 4.18%, as a consequence of the growing demand for new homes, especially in separate individual buildings. The satisfaction of these preferences was financially supported by emigrants by sending large sums of money to the country, but also by increasing the number of private investors in the field of residential construction.

The changes produced, in the three decades of transition to the market economy, in the structure by age groups of the population have played a decisive role in sizing the demand for housing and satisfying it. During the studied time interval, the evolution by age groups of the population of Rădăuți followed, in general, the specific trend of the European space and was in the model characteristic of the ex-communist states (decreasing the share of the young group, increasing the share of the population years and the manifestation, more and more significant, of the demographic decline).

From the perspective of assessing the influence of demographic restructuring on the configuration of housing needs, another aspect to consider is the population dynamics by intermediate age groups, given that the demand for housing is different in age groups: is higher in the 20-30 age groups (young people starting a new household and separating from their families) and in the 30-40 age groups (increasing household size and new housing preferences) and is weaker in the level of the young group, aged between 0 and 15 years (children live with their parents) and the old group, over 60 years (most of the population already benefits from housing at this age). In this respect, the analysis focused on the comparison between the average annual growth rate of the number of the population (as a whole and for age groups between 20-30 and 30-40) with that of the average annual growth rate of the number of dwellings in the municipality Radauti for the period 1992-2018, elements highlighted in Figure 3.

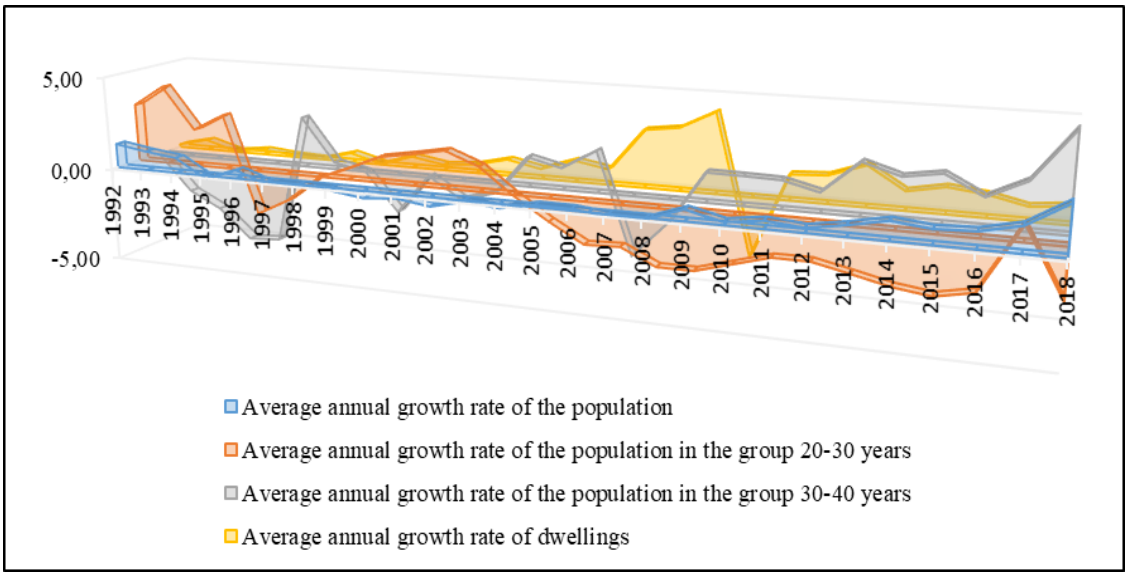

Figure 3. The average annual growth rate of the population, total and for the age groups 20-30 years and 30-40 years and the average annual growth rate of the number of dwellings in the Rădăuți municipality, between 1992 and 2018
(Source: authors' processing of INSSE TEMPO statistics - POP107D, LOC101B)

For the period 1992-2006, we observe that the intervals with a more pronounced growth rate of the population in the 20-30 and 30-40 age groups are not doubled nor followed by an acceleration of the average annual growth rate of the dwelling number, which indicates the existence of a strong housing crisis, in Radauti, at that time. In the period 2006-2011, although the average annual growth rate of housing exceeded the growth rate of the population aged 30-40, meeting the demand for housing for young people remained an unresolved issue in Radauti.

Structural change in local, regional, and national economies is a consequence of political change and puts pressure on urban development. These pressures interact with the changing nature of urban governance, the economic and political conditions in which the development of a city takes place, shape the process of restructuring the housing stock, the provision, and management of housing [14].

The development and diversification of economic activities took place throughout the historical evolution of Radauti, but they manifested themselves more strongly, with visible results in the structuring of the territory, starting from the 19th century, under the Habsburg occupation, continuing in the socialist and post-socialist period.

During the Habsburg occupation, the local economy developed significantly compared to the previous period. The Austrian authorities offered various facilities to immigrants to settle in the locality and undertook landscaping work which allowed the expansion of the land intended for housing construction, which stimulated the growth of the population and, consequently, the development of the housing fund. Since the end of the 18th century, the settlement enters an urban development phase, in 1819 it is raised to the rank of a fair, the built space of the city expands, the commercial-craft nucleus is formed (currently the historical center of the city) [15]. In addition to the administrative and commercial-craft function, the center of the settlement acquired, in the nineteenth century, a residential function, the floor of the buildings was used as housing, while the ground floor was intended for business. The housing function of the central area was significantly emphasized during the socialist period. The restructuring of the historic center under the vision of the socialist party began with the transformation of the spaces on the ground floor of the buildings into commercial spaces and continued the construction of the civic center. The modernization and systematization of the central part concerned especially the northern half of the historic center, where the old structures were removed and replaced with new buildings and blocks of flats whose physiognomy and functionality was adequate to the political and administrative principles promoted during that period. The floors of the buildings in the central area, once inhabited, were distributed on social criteria, to needy families, especially those of Roma ethnicity, other spaces being used as locations for state institutions.

The transition from the centralized economy, specific to the communist regime, to the market economy imposed the restructuring of economic activities. In the context of the restructuring of the industry, the large enterprises built-in Rădăuți during the socialist period, lacking resources and market, gradually diminished their activity and laid off, in stages, their employees. Some of the dismissed workers, settled in the city from neighboring rural areas, returned to their properties, others emigrated because, in the first years after the fall of socialism, the city experienced a sharp phase of economic decline, and job supply was very low. This situation led to an increase in unemployment, a decrease in household budgets, the main concern of the population was to provide money for the necessities of daily life and the payment of utilities. Thus, the costs of maintenance and modernization of housing, not being considered a priority, have passed, in many

cases, on a secondary level. As a result, many of the buildings in which the houses were located have deteriorated, others have been abandoned.

After 1990, the role of local government in making decisions about local community development increased. In the first years after the fall of communism, the steps are taken in Radauti by the local administration, although they were aimed at improving living conditions, accessibility of utilities, and diversification of urban services, however, involvement in housing restructuring can not be characterized as significant. Lack of financial means and coherent development strategies, limited experience in land management, political and economic instability, large numbers, and diversity of problems that needed to be solved are just some of the aspects that describe the context in which the city evolved in the early transition to democracy.

The restoration of the right to private property also had a great influence on the process of development and restructuring of the housing stock in the post-socialist period.

The transfer of the houses, through sale, from public property to private property and the restitution of the lands, greatly limited the possibility of the local administration to intervene in the management of the housing fund and to arrange the built urban space.

The revitalization of the economy contributed to the relaunch of the activity of the housing construction sector as a result of the adoption of the "demand-supply" principle, which boosted the entry of private entrepreneurs into the housing construction market, but also the voluntary involvement of the population in building their own homes.

The socio-economic transformations produced in the post-communist period and the deficiencies in the application of a set of urbanism norms favored and maintained the tendency of urban dispersion and heterogenization of the forms of housing. Thus, in the last three decades, residential areas have continuously expanded to the outskirts, to the detriment of agricultural land (in the south and north of the city, the built-up area has already expanded to the administrative territory of the settlement). In the last decade, we are witnessing a new trend of restructuring the residential space, that of capitalizing on free spaces in the built-up area (obtained by demolishing old buildings) for the construction of multi-story residential buildings.

2. Analysis of the dynamics of the housing fund within the municipality of Rădăuți, after 1990

In communist and post-communist Romania, the dynamics of the housing construction sector and its segments (private/public property, rural/urban housing, individual/collective, housing) reflects political, economic, and housing ideologies [16].

The process of restructuring the housing stock in Rădăuți was carried out both by rehabilitating and modernizing the existing housing stock, and by building new homes, either on the site of older buildings or vacant land inside or on the outskirts of the city.

Although dwelling is a fundamental need, over time, human needs related to housing have diversified by the elements of progress of society but especially with the particularities of human communities. If initially, the house was just a shelter, with the modernization of society, more and more attributes were assigned to it: space for relaxation, relationships, communication, space for recovery of work capacity, space for personal development, a place to retire from daily life, space with which the occupants are emotionally connected and which they arrange to respond as well as possible to their own needs and preferences.

The current situation of the housing fund in Rădăuți is the result of continuous evolution and restructuring, produced in different political and socio-economic contexts. but also of the reflection, in housing practice, of the political decisions taken in different periods

as well as of the housing preferences expressed by the population in recent decades, in particular. The research of the dynamics of the housing fund must take into account the fact that over 80% of the dwellings that make up the current housing fund of Rădăuți municipality were built before 1990.

The existing housing stock is modified annually, by including newly built homes, arrangements made to expand existing homes, change the destination of some spaces and transform them into homes and decommissioning others (demolition, change of destination). According to the statistical data provided by the National Institute of Statistics of Romania, through the Suceava County Directorate of Statistics, the housing fund of Rădăuți, in 1989, included 10,362 dwellings, and in 1990, 10,507 (another 145 dwellings were completed, most apartments under construction in the previous year, only 5 individual houses built from population funds) [17].

The dynamics of the housing fund at the level of Rădăuți municipality is represented in Figure 4.

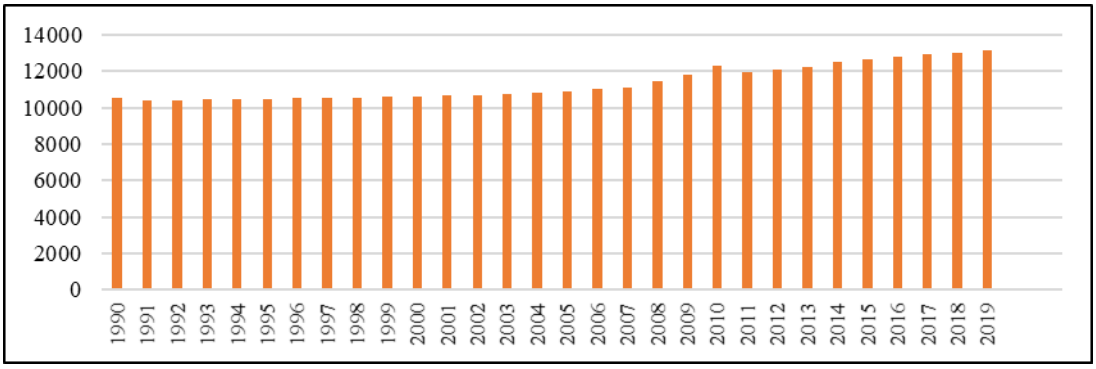

Figure 4. Evolution of the total number of existing dwellings in Rădăuți municipality (1990-2019) (Source: authors' processing of INSSE TEMPO statistics, LOC101B)

Statistical data indicate that, during 1990-2019, the housing stock of Rădăuți was enriched with 2.654 homes, which represents 1/5 of the existing housing fund, respectively 20.16%. Overall, for the entire analyzed period, the average annual growth rate of the existing number of dwellings was 0.84%, noting a slower period of growth until 2005 (the values recorded being very small, only 0.23%) and an acceleration period after 2005, the average values reaching 1.39% (a doubling compared to the previous period). The analysis of statistical data highlights the fact that, in the first ten years after the fall of communism, the renewal of the housing stock was done at a very slow pace, being completed only 156 homes. Most of the houses were built in Rădăuți after 2000, as a consequence of the recovery of the economic situation of the city and the increase of the population's income. Thus, in the last two post-socialist decades the number of dwellings built (2,560) exceeded the number of dwellings put into use in the last two decades of the socialist period (2,314) when the pace of construction was particularly fast. If during the communist period the emphasis was on the construction of blocks of flats intended to house the labor force that served the new enterprises of the city, after 2000, 90% of the houses built are represented by individual houses raised from the population funds.

During the analyzed period, the structure by forms of ownership of the housing stock of the city of Rădăuți changed by increasing the number of dwellings in majority private ownership from 88.5% (1993) to 97.5% (2019), simultaneously with the decrease of the number of dwellings in majority state ownership from 11.5% (1993) to only 2.5% (2019).

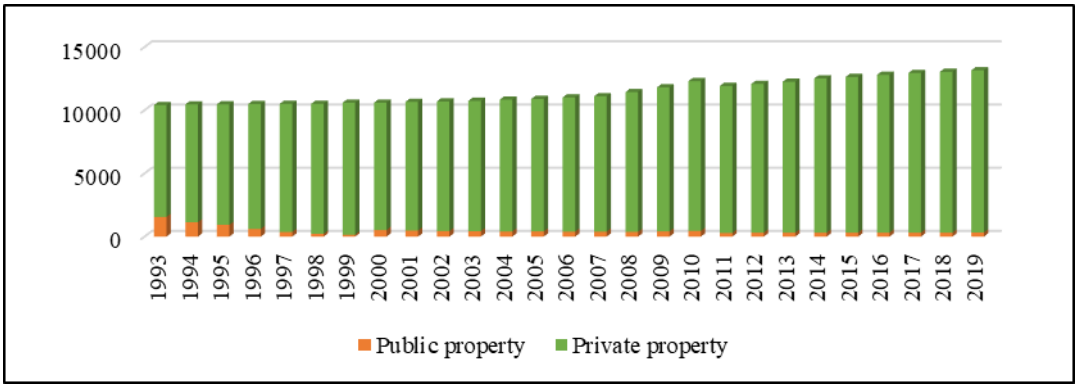

Figure 5. Rădăuți - Dynamics of the existing number of dwellings by the form of ownership (1993-2019) (Source: authors' processing of INSSE TEMPO statistics, LOC104B)

This was primarily due to the change in the legislation governing property and housing, and the transfer, by sale, of a significant number of dwellings (especially apartments) from state ownership to private ownership, starting in 1990.

Another indicator whose evolution provides benchmarks for characterizing the overall dynamics of the housing stock of Rădăuți is the number of completed homes during the year, its evolution is represented in Figure 6. During the analyzed period, we notice the fact that the annual rhythm of construction and completion of dwellings registers a rather fluctuating dynamic marked by decreasing, accelerating, stagnating, or slowing downtrends that follow one another quite quickly. Thus, in the first decade after 1990, marked by the restructuring of the industry and the decline of the construction sector, the growth rate remains slow, with slight fluctuations, now being recorded the minimum value of the period (4 homes completed in 1998). The interval 2000 - 2006 is characterized, for the first time after 1990, by a continuous increase of the number of dwellings completed annually, during this period also registering the maximum number of dwellings completed in a year, respectively 501, built-in 2010).

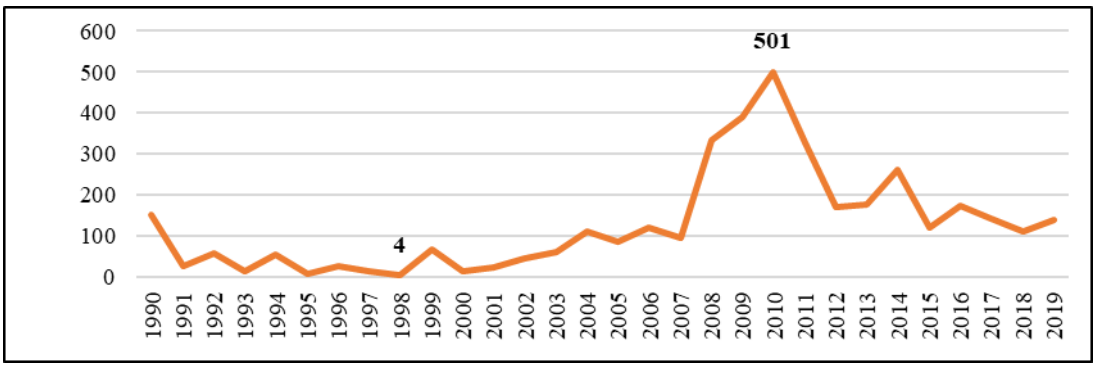

Figure 6. Rădăuți - Dynamics of the number of completed homes during the year (1993-2019) (Source: authors' processing of INSSE TEMPO statistics, LOC104B)

The dynamic is in a strong downward trend until 2012 when the number of completed dwellings barely reaches a third of the value recorded two years ago. Until 2019, the dynamics become fluctuating again and highlights recovery periods (2014, 2016) separated by periods of decline.

The situation of the financing sources used for the completion of housing constructions is represented in Figure 7.

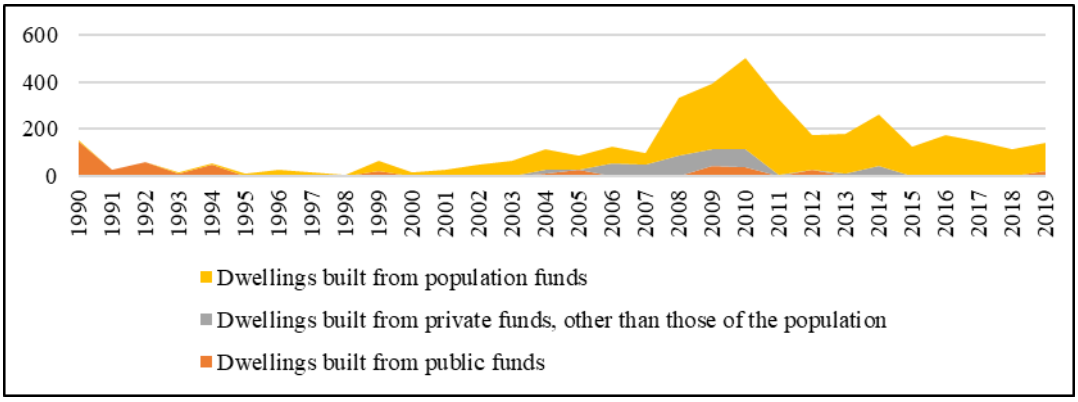

Figure 7. The dynamics of the number of completed homes during the year, in the municipality of Rădăuți, by funding sources (1993-2019)
(Source: authors' processing of INSSE TEMPO statistics, LOC104B)

At the level of Rădăuți, during the analyzed period, the living area doubled, 426,740 square meters were put into use after 1990, which represents 10.48% of the increase achieved in Suceava County.

Although the value of the average annual growth rate of the living space, calculated for the entire analyzed time interval, amounted to 4.15%, at the level of shorter time intervals, the fluctuations were quite large. Thus, between 1990-2000, the value recorded for this indicator was 0.66%, in the period 2001-2011, 4.65% (the highest value) and after 2012, the values decreased to 0.36% (lower values than in the first interval).

This reality can be correlated with the evolution of the economy in a national context, the restructuring of all sectors of the economy, the decline of industry and the housing construction sector after 1989, aspects that explain why Romanian cities were built very little in the first decade after the 1989 Revolution.

After 2003, the number of individual dwellings built by the population increased from its funds, this situation being the consequence of the improvement of the financial situation of the population (especially of people who emigrated to Western European countries), of the change of housing preferences under the influence of the Western model, but also of the privatization of the construction sector and the entry of the housing market by real estate developers.

After the crisis of 2008 and until 2010, housing construction is maintained, by inertia, on an upward trend as a result of the completion of housing whose construction had begun years before. The decline that followed after 2012 was largely influenced by the global financial crisis of 2008 and its aftermath: the bankruptcy of many companies, declining purchasing power of the population, rising construction prices, rising dwellings prices, more restrictive lending conditions, economic instability, etc.

The restructuring of the housing stock of Rădăuți municipality is reflected both by its quantitative dimension (dynamics of the main indicators of the housing fund, analyzed previously) and by its territorial dynamics highlighted in Figure 9.

From a quantitative point of view, we emphasize the fact that the housing fund underwent a significant process of renewal in the post-socialist period, 1/5 of the houses that make it up being built after the year 2000.

The analysis, for the period 1982-2019, of the territorial dynamics of the built fund of Rădăuți municipality highlights a series of defining features. Thus, we notice that the city registered positive territorial dynamics, reflected by the expansion and densification of the built space.

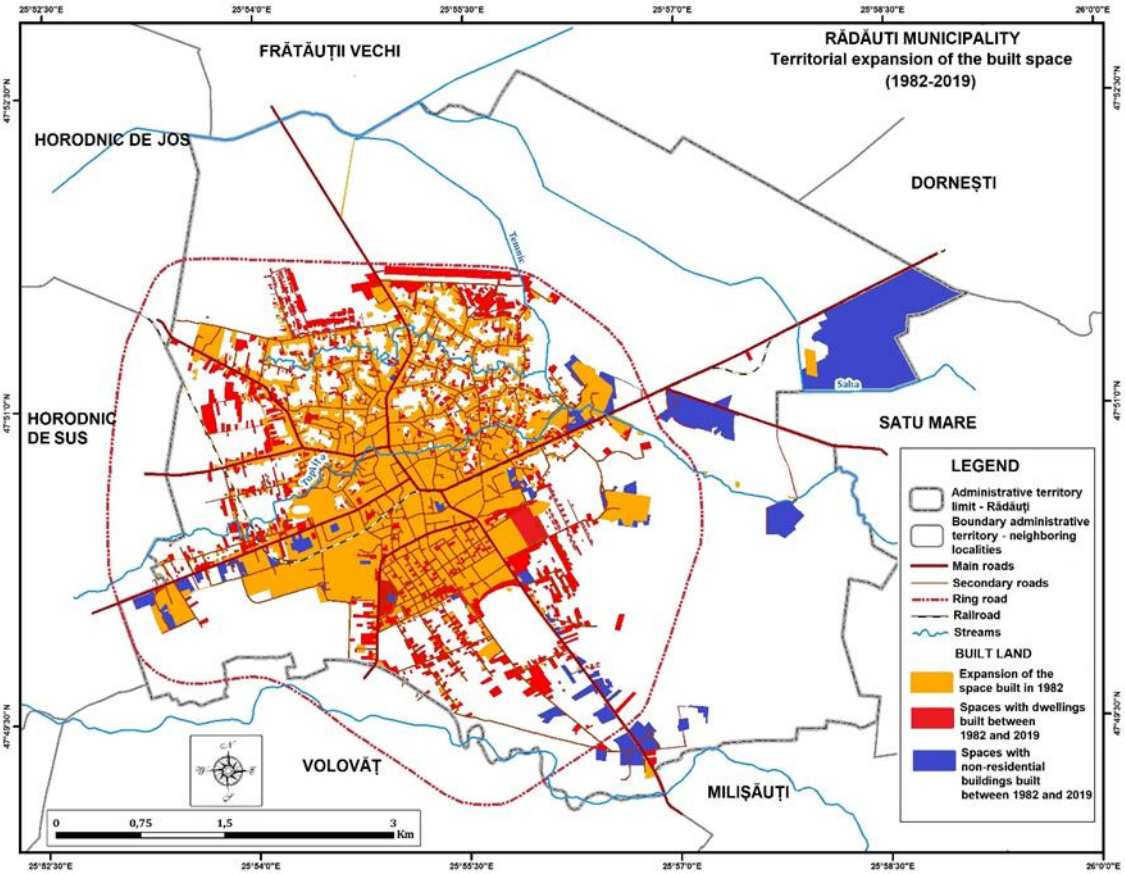

Figure 8. Restructuring of the built space of Rădăuți municipality between 1982 and 2019

An obvious reality, which can be deduced from the analysis of the map, is that the post-communist territorial expansion was achieved based on the expansion of residential areas. The extension of the built spaces to the peripheries took place in the southern, northern and western, and south-eastern areas of the city, while the densification characterized, mainly the eastern and south-western areas. If in the southern part of the city the structure of the built space includes, in addition to residential buildings (majority) and non-residential facilities, given the position along the road that connects Radauti to the county seat (the most important socio-economic axis of the city), in the northern and western area, the expansion was achieved exclusively through the development of residential spaces.

Another feature of the housing restructuring process is the increase in the height level of the built buildings and implicitly of the city profile. The old residential structures (represented by individual houses organized, usually on one level) have been replaced with new structures, represented by multi-level residential buildings (ground floor + 1-2 floors in the case of individual houses and ground floor + 3-5 floors in the case of collective buildings).

We also recall that the restructuring of the existing housing stock also had an important qualitative dimension. The intensification of the activity of building new houses in Rădăuți and the neighboring localities led to the appearance of a large number of warehouses and shops selling construction materials in the city, this fact is a premise for the redevelopment and modernization by the owners of the existing housing stock. Special attention was paid to the interior and exterior redevelopment, increasing the thermal

efficiency of buildings, but also the repair and maintenance of buildings and their connection to utilities to increase the comfort of living.
The economic recovery of Rădăuți was based on the development of services. Most of the companies established in Rădăuți after 1990, were businesses that started from small capital and developed, over time, by their forces. In 2014, according to the data of the National Office of the Trade Register, 1056 economically active agents were registered at the level of the municipality, of which 90.76% are micro-enterprises (they have a maximum of 9 employees). The diversification of services in the post-socialist period has determined an increasing demand for spaces for company headquarters, offices, spaces for activities. Most owners preferred to rent spaces for companies to operate, which consequently led to a change in the functionality of many buildings in the last three decades, the loss of residential function being another aspect of the restructuring of the housing stock of Radauti.

CONCLUSIONS

The fall of the communist regime determined the change of the political and socio-economic context in which Rădăuți evolved after 1990 and oriented the steps of the local administration and citizens towards finding efficient solutions to adapt the existing structures (human, economic, physical) to the new development context, to ensure the well-being of citizens, quality of life and housing.
The defining features of the housing stock were undoubtedly acquired during its historical evolution, but in its development and structuring with an important contribution, there were three stages: the period of the Habsburg occupation (late seventeenth century - the first part of the 19th century), the socialist period (mid-20th century - 1989) and the post-socialist period (after 1990). All these stages of development were reflected in the demographic, territorial, and functional development of the city and, implicitly, in the development of the housing stock and the incorporation in the residential areas of new structures organized according to the specific models of the respective periods.
The development and structuring of the housing stock were influenced by historical, political, economic, and demographic factors that acted in an integrated way, but with a different weight over time. Historical factors have had a major influence on the formation and structuring of the housing stock in Radauti, they coincide with the main events in the history of the settlement, each stage of territorial and functional evolution through contributing to the structuring of urban space and, implicitly, to the creation and development housing stock. Demographic factors play a key role in measuring the demand for housing and, in part, in meeting the need for existing housing at the local level by building, buying, or renting housing. Economic factors have been, in all periods, but especially after 1990, the support of the process of development and restructuring of the built fund. The revitalization of the economy contributed to the relaunch of the activity of the housing construction sector as a result of the adoption of the “demand-supply” principle, which boosted the entry of private entrepreneurs into the housing construction market, but also the voluntary involvement of the population in building their own homes.
The quantitative dimension of the housing fund restructuring is reflected by the dynamics of the main indicators of the housing stock (an increase of the total number of dwellings by 2654 units; an increase of the share of private property over dwellings 97.5% in parallel with a decrease of the share of publicly owned dwellings to 2,5%, doubling the existing living space in 2019 compared to the existing one in 1990). The qualitative dimension of the restructuring includes aspects related to the modernization of housing,

new exterior design, efforts to improve the energy efficiency of buildings, and the connection to utilities.

The territorial dynamics of the built fund of Rădăuți municipality highlights a series of defining features: positive territorial dynamics, reflected by the expansion and densification of the built space; the extension of the built spaces to the peripheries took place in the southern, northern, and western and south-eastern area of the city, while the densification characterized, mainly the eastern and south-western area; increasing the level of height of the buildings built and, implicitly, changing, in certain areas, the profile of the city; the diversification of the physiognomy of the residential areas as a result of the incorporation of some old and new structures; the increase of the heterogeneity of the built space and the models of the arrangement of the inhabited space.

In conclusion, we emphasize that the development of the housing stock of Radauti was a process associated with the overall development of the locality, which occurred under the interconnected influence of all categories of premises analyzed (historical, demographic, political, and economic) and the transition to democracy, decentralization, and adaptation to the market economy have been key factors in organizing and restructuring the housing stock in line with the needs of different periods.

Acknowledgment:

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CONTRADICTIONS OF THE IMPACT OF TOURISM ON THE SOCIO-SPATIAL DEVELOPMENT OF BELGRADE

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ABSTRACT

The aim of paper is sociological analysis and articulation od the influence that tourism exerts on social development and quality of life in Belgrade. Belgrade is becoming the city where two different and contradictory functions collide - functions of place of (permanent) residence (residential, educational, health, production, trafffic) and tourist function of tourist brand. In this way, two diffrenet poulation groups are formed - the population to which Belgrade is a place of residence, and tourists who spand their leisure time there, at the same time and in the same area. The tourist function gradually subordinates the rest, the city becomes a space for tourist consumption, a city of tourist spectacle and tourist pseudo-vents, and generates the production of social space adapted and subordinated to needs global tourism market. Starting hypothesis: the development of tourism in Belgrade is part of the pattern of socio-spatial de-development of the semi-periphery, and has ambivalent consequences - although it enhances economic growth, it also intensifies social destruction and negative structural changes such as socio-pathological phenomena (alcoholism, gambling) and sexist spectacles (strip clubs) as a systemic regularity, which represents a subordinate, heteronomous and institutionally invisible space. The city is implementing a promotion strategy as a place suitable for business and entertainment. A space is produced that is based on sexist stereotypes, vulgar sexual allusions that are mostly misogynistic. The consequence of the restructuring in the area is a decrease in the use value of the area of Belgrade. In the area of the Belgrade metro, there is a contradictory - fragmented heteronomous semi-peripheral spatial-functional structure, which enhances the development of the underdevelopment of the semi-periphery and the flexible accumulation of global multinational capital [16]. Flexible accumulation of capital through the tourism industry acquires a specific spatial and gender dimension, and cities have a special logic of spatial organization and content: there is an acceleration of commodification - subordination of the use value to the market, so that the urban space of Belgrade is treated as a turnover value on the tourist market. Sources of data: Data from primary and secondary sources.

Keywords: Belgrade, social development, tourist market

INTRODUCTION

Due to its rapid development and impact on the global and national economy, tourism today is considered a development interest. Moreover, tourism is the most massive way of spending leisure time in the modern world, in which there is a global explosion in the number of tourists. The World Tourism Organization is committed to sustainable and inclusive tourism, defining it as resource management by meeting economic, social and aesthetic needs while maintaining cultural integrity, essential ecological processes,

biological diversity and life support systems, creating well-being for society as a whole, taking into account the needs of tourists and their hosts [22]. However, the singularities of society have a great influence on the characteristics of tourism.

According to the Development Strategy of Belgrade, the principle of strategic development is competitiveness, the increase of financial resources, fiscal revenue collection, creating an environment for investment. A series of negative effects of uncontrolled commercialization of urban space of reduced quality and volume, the provision of public services and space, and increase of socio-spatial inequalities [19].

The pressure of international institutions and capital, within the strategy to attract investment, causes strengthening of the entrepreneurial capacity of local government, but at the same time it does not encourage those mechanisms of urban policy that are important for protection of public interest and vulnerable populations [19]. Belgrade development strategy also emphasizes economic goals, European integration goals and attraction of foreign capital, while long-term social goals are systematically neglected [16].

THEORETICAL APPROACH

In structural terms, Belgrade is a semi-peripheral city within the capitalist world-system. Semi-peripheral cities function according to specific principles, which are not the same as the multinational capital center. On the semi-periphery of global capitalism, there is a specific pattern, which in theory is defined as de-development or the development of underdevelopment. This process intensifies social destruction, creates a new, destroyed social structure, which increases poverty, social inequality, structural and chronic unemployment, lowers the quality of everyday life, establishes the dominance of the "survival economy", "dropout" of large population groups from the social and health care system [6]. It is, therefore, a negative social change, which implies a negative structural change of the periphery, which in economic terms can be described as an underestimation of human, institutional and infrastructural capital [14] .We define social development as a set of structural changes that are undertaken in order to find coherent and lasting solutions to problems, refers to changes related to improving the quality of people's lives, creating opportunities to meet people's needs, strengthening social security, improving the conditions of production and reproduction of life and prevention and suppression of social problems. According to the Belgrade Development Strategy, like most cities whose position within the global system is relatively unfavourable, it is oriented towards the global market and the interests of multinational corporations [23], i.e., towards the economic growth. Strategies that encourage economic growth as a goal and not as a tool that should ensure social development and better quality of life and realization of citizens' rights can rightly be called reductionist and functionalist, and defined goals can be said to be illegitimate and politically incorrect. Removing obstacles to market development and achieving competitiveness is often reduced to deregulation [19].

Long-term goals, such as social development, are neglected. Such a development plan generates a chaotic model of development [20], "neglecting the social dimension" [19]. "Negative social consequences of restructuring" [19], as well as radical differentiation of economic, social and spatial structure [19] .The result of such processes is the neglected social dimension [19] and a radical differentiation of the economic, social and spatial structure [19] . Of particular importance for this paper is the fact that the city uses the "strategy to promote urban spaces for consumption as places suitable for business and entertainment" [19], which produces negative effects - uncontrolled commercialization

of urban space, reduced quality and volume of public services and spaces, and the increase of socio-spatial inequality [19]. Theorist Guy Debord, who criticized the spectacle in modern society, stated that it is the spectacle itself that creates consumerism. The spectacle is encouraged as passive entertainment, instead of active leisure time, and alienation is also associated with passive entertainment. Moreover, the spectacle produces pseudo-needs [9] .The role of the spectacle is to cause alienation, which encourages economic expansion, whereby the consumer becomes a consumer of illusions, which emphasizes the degradation of use and the triumph of market value [12] .

At the beginning of the 21st century, it is fair to say that the sphere of tourism is largely spectacularized. Neo-Marxism emphasizes the contradictions that arise between economic growth and social development, which post-socialist cities are especially prone to. This particular thesis is the starting point of this paper.

Hypothetical framework

Capital has alienated labour from workers, but it has also alienated leisure time from citizens, all with the aim of accumulating and producing capital under the pressure of globalization. The structural transformation of society has produced a new role for tourism within the spectacle society. In modern society, the conditions of production, social relations, social and spatial structure have changed. A new form of production was generated - intangible production, and a new form of control - control through the cultural and tourism industry. The tourism industry, as well as the alcoholic beverage industry, the gambling industry and the sex spectacle industry, accumulates capital through alienation in tourism, during free and leisure time. New spaces of alienation and accumulation of capital, spaces of consumption of tourism contents, tourist manifestations, tourist tours were also generated. The consequence of such economic growth is the generation of social issues, addiction, misogyny.

Also, there is a decrease in the use value of Belgrade. Within the Belgrade metropolitan space, there is a contradictory - fragmented heteronomous semi-peripheral spatio-functional structure, which enhances the development of the underdevelopment of the semi-periphery and the flexible accumulation of global multinational capital [16].Urban space of semi-peripheral Belgrade and the tourist space cannot be understood outside the capitalist relations that produce it, because the organization of the tourist space is a product of the flexible geography of capitalist production, i.e. “Geographical Marginality”. The urban contradiction of Belgrade includes the fragmentation of the social space of Belgrade into, on the one hand, commercialized - touristized, and on the other hand, institutional, while developing the commercial, tourist business space of the post-Fordist New Economy. Flexible accumulation of capital through tourism industry acquires a specific spatial and gender dimension, and cities get a specific logic of spatial organization and content. There is an acceleration of commodification - subordination of the use value to the market value, so the urban space of Belgrade is treated as turnover value on the tourism market.

A space is produced that is based on sexist stereotypes, vulgar sexual allusions that are mostly misogynistic; commodification of urban space, within the tourism field, endangers the function of leisure time, violates gender equality and causes violence against women, and causes a patriarchal and anti-civic space based on misogynistic understanding of gender roles in society. Pornography in tourism is a direct tool for exploitation, subjugation and humiliation of women.

Indicators

Indicators of economic growth (tourism capacity, increase of tourist arrivals and overnight stays, income from tourism, foreign exchange inflow from tourismSocial risk indicators: 1. indicators of the development of the gambling industry (institutionalization of the gambling industry in Serbia, assessment of the share of gambling industry income in total tourism revenue, assessment of income from the gambling industry, gambling industry network: gaming house - betting house - casino, number of employees in the gambling industry; negative effects of gambling); 2. indicators of alcoholism in tourism (alcohol consumption, alcoholism and diseases; tourist events, tours and games that promote fast drinking through entertainment); 3. network of facilities where sex spectacles are organized. Data sources: Data from primary and secondary sources. Data from primary sources are original, directly and first-time collected data for the purposes of studying this issue. Data from the following institutions were used: the Statistical Office of the Republic of Serbia, the Tourism Development Strategy, the Belgrade Development Strategy, the tourist organization of Serbia, and the research on the tourism economy. Data collected indirectly - data available on internet presentations.

The collection, processing, analysis and synthesis of data was performed by the author of the paper during January 2021.

Data analysis methods: analysis of data from primary and secondary sources, as well as critical data analysis.

RESULTS AND DISCUSSION

Tourism industry

Being a very dynamic branch of economy worldwide, the tourism industry is compatible with Belgrade's efforts to "be competitive with European capitals" [21], whereby this branch of economy is experiencing growth in Belgrade as well.

Tourism is a segment of the aspiration of the city of Belgrade to "be competitive with European capitals" [23], and the tourism industry of Belgrade is perceived as an emerging industry.

Tourism and accomodation capacity

Data from three different sources are used to describe the above capacity:

- According to the data of the Business Registers Agency, the Ministry of Finance and Economy and the Secretariat for Economy and Tourism , over 5,500 companies and entrepreneurs operate in the field of tourism and accommodation in the area of Belgrade. As of December 31, 2012, the accommodation and tourism infrastructure was as follows: over 5,500 companies and entrepreneurs operate in the field of tourism and accommodation in the area of Belgrade. The infrastructure includes 45 hotels, 4 of which are 5-star hotels, 18 of which are 4-star hotels, 14 are 3-star hotels, 8 are 2-star hotels and 1 is 1-star hotel; there are also 16 hotel garnis, 9 of which are 4-star hotel garnis, 5 of which are 3-star hotel garnis and 2 are 2-star hotel garnis; there are also 4 dependances, 1 motel, 1 camp. As many as 475 units of categorized private accommodation, which have 1,001 beds, around 130 uncategorized accommodation facilities (inns, boarding houses and around 80 hostels), 271 travel agencies and around 2,500 restaurant-type accommodation facilities (TOB estimate).
- According to the Development Strategy, Belgrade has (as of 2015) 142 accommodation facilities, 7,846 rooms and over 15,344 beds. There are mostly hotels (52) and hostels (35

facilities), followed by hotel garnis (29) and inns (15). However, hotel accommodation in Belgrade makes up only 16.8% of hotels in Serbia. Based on the number of beds, hotels in Belgrade make up 27% of the total capacity of beds in Serbia. From the aspect of inflow of foreign tourists, former Yugoslav republics (Montenegro, Croatia, Slovenia, Bosnia and Herzegovina) have the highest inflow, followed by Bulgaria, Greece, Hungary, Italy [21]. According to the tourism development strategy between 2016 and 2025, as of December 2015, Serbia had a total of 358 hotels, motels, boarding houses and tourist resorts and 30,417 of beds. The hotel market in Belgrade is as follows: in 2016, there were 86 hotels, 51 of which were hotels, 34 hotel garnis and one apartment hotel. Belgrade has every fourth categorized hotel (86), every third accommodation unit (6,331) and almost every third bed (9,193) [7]. The analysis of income from tourism shows the following: Revenue from tourism in 2017 in Serbia amounted to 1.2 billion euros (almost 1.5 billion dollars), and the capital earned about 750 million from it, which is around 60% of total revenue, according to the data available to the TOB, and according to the data from the NBS[9] . The total foreign exchange inflow from tourism in 2015 amounted to USD 1,048 million. Between 2007 and 2015, foreign exchange inflows from tourism increased by 97.4%, with an average annual growth rate of 108%.

Tourist arrivals and overnight stays

According to research on tourist arrivals and overnight stays in Belgrade (Table 1), there has been an evident increase in foreign tourist arrivals and overnight stays after 2000 [15]

Table 1. Tourist arrivals and overnight stays in Belgrade.

	Tourist arrivals			Overnight stays		
Year	Total	Domestic	Foreign	Total	Domestic	Foreign
2000	795 817	707 340	88 477	1 418 188	1 204 302	213 886
2005	674 785	397 677	277 108	1 366 337	775 754	590 583
2010	618 454	223 046	395 408	1 319 629	509 807	809 822
2015	740 957	143 223	597 734	1 584 849	366 458	1 182 391
Source: [15]						

Based on studies on tourist arrivals and overnight stays in Belgrade (Table 1), a significant increase in foreign tourist arrivals and overnight stays can be seen, which would be the primary goal after 2000 [15]. Namely, as the table shows, there were 88,477 foreign tourist arrivals in 2000, while already in 2005 that number increased about three times - and reached 277,108. It kept growing and in 2010 this number amounted to 395,408, while in 2015 there were over half a million arrivals - 597,734 to be exact. According to the data by the Statistical Office of the Republic of Serbia (Trends), out of a total of 4,750,000 overnight stays in 2019, Belgrade had one quarter or 1.1 million, whereby the majority of visitors were foreign tourists (84.5%) of the total number of overnight stays: only mountain resorts (1,300,000) had more overnight stays, spa resorts had the same number of overnight stays as Belgrade – 1,100,000. However, there is one difference - in mountain and spa resorts, the vast majority of overnight stays were realized by domestic tourists - in the mountains 84.4%, in spas 87.9%. The remaining 1,250,000 overnight stays were allocated to other tourist destinations (750,000), Novi Sad (250,000) and other destinations (250,000).

[9] http://www.politika.rs/sr/clanak/395271/Beograd/Od-turizma-zarada-oko-750-miliona-evra

Pathological phenomena and addiction as a segment of the tourist industry

Attracting capital and creating an investment environment [23] has also attracted to Belgrade the capital that is accumulated through the sale of alcohol, gambling and striptease spectacles

Alcoholism

Estimates by WHO show that around 2 billion people worldwide consume alcoholic beverages, 76.3 million of whom have been diagnosed with alcohol abuse or dependence [23] . As a negative effect of these habits, suicides occur, as well as unplanned and unprotected sex, unplanned pregnancies and an increased risk of HIV infection, sexual abuse: around 183,000 rapes and sexual assaults, 197,000 robberies, 661,000 severe assaults and 1.7 million attacks each year [8] . Europe is also seeing an increase in suicides, homicides and other alcohol-related accidents [24], including the connection with more than 60 types of diseases and injuries [24]. In developing countries with low mortality rates, alcoholism is the leading risk factor for diseases and it is the third largest risk factor in developed countries [24]. The social consequences relate to the "connection with poverty and malnutrition" [24].

According to the Institute for Mental Health, alcoholism is the most wide-spread addiction in Serbia and, after depression, it is a mental disorder that contributes the most to global disability. "The number of alcohol-induced disorders represents 10.8% of the total number of diseases in the region" [11] .One third of the adult population consumed alcohol during 2006: around 4% of the adult population is at risk of "heavy drinking", with a significantly higher percentage of men (5.7%) than women (0.4%) [11] , according to WHO, European research on drug and alcohol use among young people [13].

Alcoholism is primarily the habitual behaviour of men. In the twelve months preceding the European research on drug and alcohol use among young people, 82.1% of men and 62.4% of women consumed alcohol; excessive drinking once a week or more often occurs in 6.7% of men and 0.6% of women; risky patterns of alcohol abuse are present in 22.1% of men and 4.6% of women; harmful alcohol use is associated with 10.6% of men and 1.7% of women.

Intoxication (strong influence of alcoholic beverages, which includes inability to walk, difficulty speaking, vomiting, inability to remember past events) [13] is present in young people - at least once in their lives it happened to 51.8% of young men and 33,8% of girls. "Binge drinking" of excessive drinking (excessive drinking episode, which occurred within a short period of time) occurred to as many as one third of students, significantly more young men, who had five or more drinks in a row one month prior to the study [13]. The results of the National Survey on Lifestyles among Serbia Population - Use of Psychoactive Substances and Gambling [12] show that alcoholic beverages are the most common psychoactive substance used: in the population between 18 and 64 years of age, in the last 12 months as many as 70% consumed alcohol [12]; the majority have beer [12]; as much as 50.3% of alcohol is consumed by 7.5% of consumers [12] ;the average amount of alcohol consumed is 6.5 times higher in men than in women [12]. The research estimates that excessive drinking (1.5 l of beer, 0.6 l of wine, 0.18 l of hard liquor, on a single occasion at least once a week or more often in the past 12 months) is consumed by 3.7% of the population, mostly men. Therefore, it is estimated that there are 580,000-664,000 high-risk alcohol consumers, three quarters of whom are men; harmful drinking is present in 25,700-318,000 people, most of whom are men [12]. Negative effects of alcohol use (at work, studies, in private life, in traffic) exist in 10% of the population within the last 12 months. This figure is much higher when it comes to the negative effects

caused by someone else's drinking - almost every other survey participant experienced such negative effects [14].

Part of tourism marketing includes open advertising of alcohol-related events, such as Wine Routes, Beer fest Belgrade, Serbian Wine Festival Lazarevac [18]. In Belgrade, there is an event that promotes beer - Beer Fest Belgrade: the current advertisement for this festival reads – "This year we get an ID card". Namely, the festival has existed for 18 years [18]. Tourist tours, which offer "Binge drinking" through entertainment are organized under the name pub crawl (or bar crawl) or more freely speaking - alcohol excursions (organized drinking while visiting several bars-pubs over the course of one night) [18]. In Serbia, after 2000, pub crawl is organized in Belgrade - Belgrade Pub crawl, as part of European tours, it has a website, and is advertised as part of the tourism identity of Belgrade, or even as one of the walking tours in Belgrade. Part of tourism marketing are alcohol games, ("Drinkopoly" – similar to the game "Monopoly"; "Beer pong" – similar to "ping-pong"; "Don't get drunk game" – similar to the Parcheesi game; "Magic word" and "King's cup" [18].

Gemblification of tourist space

The development of Belgrade as a tourist city goes hand in hand with the development of gambling houses and casinos. The network of gambling houses and casinos is seen as the gemblified urban space of Belgrade, which includes specific values and norms, which produce socio-pathological phenomena which are sexist, anti-family and anti-civic. The gambling industry in Serbia was institutionalized and legalized after 2000, in the same period when the growth of foreign tourist arrivals began. Called the Games of Chance Organization, organizing gambling is treated as a type of entrepreneurship, regulated by the Games of Chance Act from 2004. The fact that the Directorate for Games of Chance was established within the Ministry of Finance, which also has an electronic register, speaks for itself about its status in the country. According to the data from this directorate, as of 14/01/2020, there are 31,305 slot machines in Serbia, and 2,110 betting sites. According to the Gambling Organizers' Association, Serbia is the 19th in Europe in terms of the number of legal betting houses in relation to the number of inhabitants. Data on gambling tourism revenue are scarce, but there are estimates that it was about $ 500 million in 2015 [17].

Number of employees in this field is very high: the data by the Statistical Office of the Republic of Serbia from January 31, 2020 show that as many as 10,616 people are employed in the field of betting and gambling, which is, compared to other sectors, significantly more than in the Serbian oil industry, in coal industry, in libraries, archives, museums and galleries, in creative, artistic and entertainment activities; almost twice as many employees as in Smederevo Ironworks, three times more than in Srbijagas; same number as employees as is the case in scientific research and development field and in mining. The number of employees in gambling industry is like one third of the employees in agriculture, in the exploitation of oil and gas. Apart from the number of employees, its structure is also very specific: as many as one third have a university degree, with hundreds of IT professionals with the highest references. Due to the strong connection between gambling and betting with program support software, it happens that talented students of analytics, statistics and software engineering are awarded scholarships [17].

There is also cooperation with marketing experts. The network of companies that organize games of chance in Belgrade consists of as many as 525 facilities owned by 24 companies. These facilities are located throughout the entire city, and are often located near schools [17] . Most of them are gaming houses and betting houses, but there are also five Casinos

in Belgrade (Grand Casino Belgrade, Aleksandar, Admiral Klub, Fair Play, Hotel Slavija), whose target group are high-income individuals. Fair Play Casino was the first one established, back in the time of transition and the turbulent 1990s (1993) at Terazije. Admiral Klub Casino was founded in 1994 in Belgrade. It has casino table games for and slot machines. With the conversion of space purpose, the former Hotel Jugoslavija, located in the center of Belgrade and built during the youth work actions, is now the Grand Casino. The Grand Casino organizes spectacular events, such as a poker tournament, several times a year. It is very paradoxical to organize a tournament during the holiday of solidarity, which is related to the struggle of women for equality - a tournament for women, which is held on March 8th. The Carnival is organized every year as well, with international cuisine dishes, and a music program with some of the most popular musicians performing (Lena Kovačević, Bojana Stamenov, Bijelo Dugme Band for the 40th band anniversary). They organize luxury events such as:

- old car exhibition ("24 Hours of Elegance - Concours d'Elegance and Luxury Salon", from Southeast Europe and Serbia) under the patronage of the Auto Museum Belgrade;
- -exhibition of luxury items (Luxury Salon) with the participation of the owner and editor of MONSIEUR [1] magazine, directors of multinational companies (textile industry (fashion houses COSTUME NATIONAL [2], SCIAMAT [3], CERRUTI), representatives of the international distributor of luxury alcoholic beverages (Pernod Ricard) [4], representatives of the tobacco industry Tobacco International (JTI), automotive industry (Grand Motors);
- an exhibition of over 100 diamonds (including a heart-shaped yellow diamond worth half a million euros) by the Israel Diamond Center (IDC), whereby the exhibition was opened by members of the global political and economic elite personally - the Israeli ambassador and the company's founder

The former Hotel Slavija, worked as the Casino of Hotel Slavija - Havana Gambling - covering as much as 600 m2 of space. The opening ceremony was attended by playboy girls, as well as the cultural elite - famous TV hosts and artists. On the other hand, gambling is defined as a growing mental health condition and gambling massively destroys the health of the population. The Institute of Public Health estimates that there are 14,000-33,000 pathological gamblers in Serbia, with every third high school student being a gambler. According to the data by the Day Hospital, gambling produces poverty (risk of homelessness, falling into a debt with usury rate), collapse of marriage and family, violence against women and children. However, we would here emphasize that the problem is not perceived as socially and systemically caused, it is rather medicalized and psychologized. A protocol on cooperation was signed between the Grand Casino and the Belgrade City Assembly: an SOS center and a telephone line intended for pathological gamblers were established. Data on gambling as a factor in attracting tourists are scarce, but they show that tourists come to Belgrade from countries where gambling is prohibited (Israel, Turkey, Greece) [17].

Strip clubs at the city centre

A segment of commercialized space includes sexist strip clubs, which consists of a dozen strip clubs [5] (Strip Club Black Rose VIP, Black Rose, Night Club Romansa, Strip Club Eldorado, Strip Club Crystal, Strip Club Moulin Rouge Exclusive, Strip Club Moulin Rouge, Strip Lotus Club, Red box, Dark Angels). This network of strip clubs makes up the sexist urban space of Belgrade, where there are misogynistic values and norms, androcentric needs and interests, and gender-discriminatory positions and roles: this

space is based on symbolic violence against women, where they are perceived as sexual objects who should entertain men, on their sexual exploitation, humiliation and belittling. Recruitment ads can be seen on the internet presentation of these clubs, inviting female students to come and earn pocket money. All of these strip clubs are located in the central parts of the city, located in the very city center or on its very edge.

These locations are in very risky proximity to a number of national and city institutions: faculties, high schools, music schools, cemeteries, academies of sciences (Fire Station, New Cemetery, Bajlonijeva Green Market, Urban Institute of Belgrade, Embassies and consulates - consulate of Germany) as well as political institutions (National Assembly of the Republic of Serbia, Assembly of the City of Belgrade, Constitutional Court, National Bank of Serbia, National Employment Service), education institutions (secondary schools such as medical high school, Stankovic music school, Lujo Davičo ballet school), health care institutions (Clinical Center of Serbia, ER, University Children's Clinic, Institute of Rheumatology, Department of Psychophysiological Disorders, Department of Mental Health), Higher Education and Science institutions (Serbian Academy of Sciences and Arts, Faculty of Geography, Faculty of Philosophy), Churches (Saborna crkva - The Cathedral Church of St. Michael the Archangel, St. Mark's Church, The Temple of Saint Sava, The Church of St. Alexander Nevsky, Library of the Serbian Patriarchate), cultural institutions (National Museum, National Theater, National Library of Serbia, Pedagogical Museum, Ethnographic Museum, Yugoslav Cinematheque, Slavija Theater, House of Đuro Jakšić, Monument of Gratitude to France).

CONCLUSION: TOURISM PRACTICE - A TOOL TO PRODUCE GLOBAL CAPITALISM AND SOCIAL RISKS

In accordance with the research objective, theoretical framework was developed in this paper in order to study the contradictions in tourism, in the context of critical neo-Marxism theory. Moreover, a system of indicators has been defined as well. Arguments were presented that confirmed the assumption that the development of tourism in Belgrade is part of the pattern of socio-spatial development of underdevelopment semi-periphery, and has ambivalent negative effects - although it increases economic growth, at the same time it intensifies the processes of social destruction and negative structural change: tourism industry, alongside with the gambling industry and the sex spectacle industry, accumulates capital through alienation in tourism during free and leisure time. In that way, new spaces of alienation and accumulation of capital, spaces of consumption of tourist contents, tourist manifestations, tourist tours were also generated. The contribution of this paper refers to the conceptualization of theoretical and hypothetical framework and indicators to study and link economic growth to the tourism industry, and to research the social risks it generates, in the form of addiction and social issues at the level of family, marriage, position of women. The potential of this paper is a positive impact on a clearer understanding of the contradictory role of tourism, entertainment and leisure on the accumulation of capital and the well-being of citizens.

Tourist capacity has increased between 2012 and 2015 (the number of hotels has doubled - from 45 to 86; the number of beds increased 15 times - from 1,001 to 15,193). Tourism revenue in 2017 was $ 750 billion; while foreign exchange inflow has doubled. Tourist arrivals and the number of overnight stays of foreign tourists has increased six times between 2000 and 2015 (arrivals reached over half a million; the number of overnight stays increased from about 200,000 to about 1,200,000). However, the city’s tourist offer largely includes the gambling industry, as well as events, tours and games that encourage

extreme alcoholism, as well as strip clubs. At the same time, research by global, European and Serbian institutions show that alcoholism, after depression, contributes the most to global disability and a large number of social problems. It is estimated that the number of high-risk alcohol consumers in Serbia is between 580,000-664,000, three quarters of which are men; while harmful-problematic drinking exists in 257,000-318,000 people, most of whom are men. The gambling industry, once illegal, has been institutionalized and legalized in Belgrade since the end of the 20th and the beginning of the 21st century. It employs a very significant number of people whose level of education is favourable and includes experts from the most modern fields.

The gambling industry operates freely in 525 facilities owned by 24 companies, with 31,305 slot machines and 2,110 betting sites, and five Casinos, which organize luxury spectacles with global fashion, alcohol, tobacco, automotive, luxury jewellery brands participating. On the other hand, gambling is defined as a growing mental health condition and it is estimated that there are 14,000-33,000 pathological gamblers in Serbia, with every third high school student being a gambler which is a worrying fact. Sexist spectacles, with a misogynistic overtone, are part of the tourist offer supported by the city, in which women are understood as sexual objects for the entertainment of men, during which sexual exploitation, humiliation and belittling of women is performed. The facilities in which this type of spectacle is performed are located in the very city center, in close proximity to the most important state and city institutions. In that way, the fragmentation of the social space of Belgrade occurs. Flexible accumulation of capital through tourism industry acquires a specific spatial and gender dimension which accelerated commodification, that is, there is the subordination of the use value to the market value on the tourism market. Commodification of urban space endangers the function of leisure time, violates health, well-being, gender equality, thus strengthening the influence of the tourism industry on the production of space subordinated to the needs of the global tourism market and the accumulation of capital during leisure and free time.

Acknowledgement

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CULTURAL - RELIGIOUS TOURISM IN DOBROGEA, ROMANIA – SPECIFIC AND TENDENCIES

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ABSTRACT

The monuments of religious culture spreading within the areal between the Danube River and the Black Sea, that means within the historical province of Dobrogea, represent a great attraction for all those who are interested in getting closer to the first Christians on the territory of Romania. Our study is based upon the analysis of the important historical monuments that exist in this province, on the behavior of the tourists visiting them, as well as on the attitude of the residents in the sense of sustaining the development of the religious tourism. On the methodological perspective, there are followed many aspects, as there is made the empirical analysis of the questionnaires applied to the residents and tourists as well. The results highlight differentiated attraction of the tourists towards the monuments that preserve the traces of the first Christian martyrs, of the religious monuments bearing outstanding spiritual value as compared to the ones destined to religious service only. Their old age and spirituality contribute to the amplification of the pilgrimage phenomenon and to the increase of the numbers of touristic visits, especially for the tourist coming for the first time in those places. The role of the residents should get bigger and bigger in maintaining this phenomenon, which is a thing which people are less conscious about. Therefore, the tourism- purposed infrastructure does not have the same upheaving evolution. The two elements, the religious attraction relying in the number of tourists who visit the religious monuments of Dobrogea, on the first hand, and the accommodation structures, the public food service providers, as well as the number of employees functioning in the tourism sector of the referred province, on the other hand, they both present different evolution trends.

Keywords: religious monuments, tourism, Christian martyrs, Dobrogea, religion

INTRODUCTION

The cultural patrimony represents a possible touristic resource. Cultural tourism is that form of tourism which emphasizes the cultural resources in a certain geographical area from a touristic viewpoint [19], [7], [5], [8], [7]. The valorization of touristic monuments will always represent one of the greatest attractions. Monuments keep the memory of their

creators alive. A variety of comparisons are drawn between the religious, cultural, historical and geographical diversity [2], [6], [9], [12].
The attraction towards cultural tourism is becoming more and more obvious, especially when it comes to discovering the cultural values from a certain geographical area such as Dobrogea, where certain events, marked today through of religious monuments, took place. [1], [3], [10], [4]. All these material prints are attractive today for the tourists interested not only in religious monuments but also in cultural values [13], [16, [18]. Educational or school tourism represents another form of tourism which can offer the necessary information in order to create a complete image of a geographical area, such as Dobrogea in Romania, where, by means of game playing, this past can become known and understood. The whole image can be obtained through detailed research carried on specific historical monuments [18], [20]. From this point of view, religious monuments emphasize the presence of personalities from early Christian times. Religious monuments complete the entire cultural aspect of a given space [14], [17]. The life of a community is hard to imagine without a religious life [11]. The materialization of beliefs is reflected in this study by means of these monuments (Figure 1).

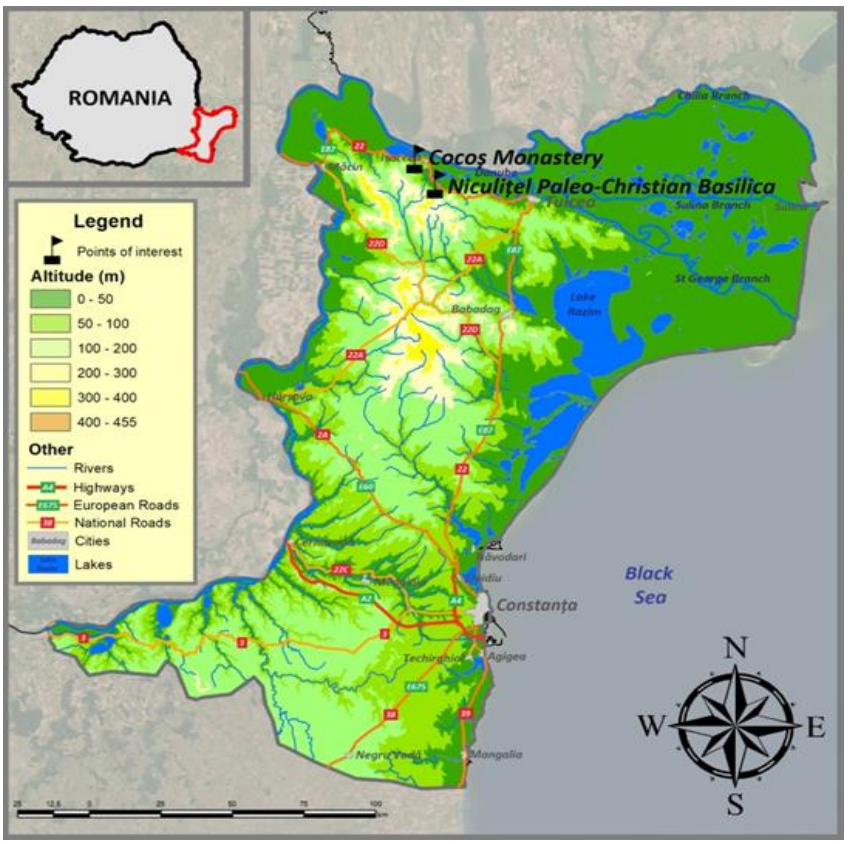

Figure 1. Map showing the location of the Paleochristian monument from Niculitel and of the Cocos Monastery in Dobrogea, Romania

METHODOLOGY

The methodology followed a series of steps. First of all, there was an analysis of the cultural-historical monuments included in the list of patrimony monuments, published in 2016 by The Ministry of Culture and the National Patrimony of Romania. Out of these monuments, the Paleochristian Monument from Niculitel was selected as it is considered to be of major importance following the discovery of the crypt in which the material traces

of the four martyrs were discovered, that is, the relics of those who contributed to spreading Christianity in Romania, in its early stages. Another step was a chronological presentation of the discovery of the bones of the first Christian martyrs in Dobrogea, Romania as well as the fact that they were moved to the nearby Cocos Monastery. The last step encompasses some of the answers provided by the visitors and the tourists who reached the two important monuments. After the empirical analysis of the interviews and discussions carried with those who have visited the two monuments, we could notice an understanding on their part of the role played by these Christian martyrs, as well as the amenities to the Niculitel monument.

RESULTS AND DISCUSSIONS

An analysis of the first Dobrudjan historical monuments implies the existence of the first Christian martyrs and the presence of religious buildings which have a special architecture. Romanians emerged in history as a Christian people. An old tradition, still circulating today, tells that Saint Andrew, the Apostle, proclaimed the word of the Gospel in the South-Eastern parts of Romania, especially in the area near the Black Sea where the first local church and the first Episcopalian centre were built in the 4th century AD, located in Tomis (today's Constanta). The archaeological research which has taken place in Dobrogea up to now, has brought to light 36 Paleochristian edifices dating from centuries IV – VII AD. Twelve of these were built in the 4th century AD [11]. Cultural-religious tourism could represent an attractive form of tourism in Dobrogea. Here was the first Christians recorded, here they suffered the repercussions for supporting Christianity. Historical religious monuments are well-used. The material traces which can be valorized as touristic attraction nowadays can also be included in a touristic circuit whose identification and promotion elements could be „the first Christian martyrs"[15], [16]. The Paleochristian basilica with crypt from Niculitel is a historic monument located in the North-Eastern part of the village of Niculitel, at the bottom of Piatra Rosie Hill, no 1, Museum Street. It can be found at about 10 km from the Noviodunum Roman Camp and 29 km from Tulcea (Fig. 2 and Fig. 3).

Figure. 2. The Paleochristian Basilica – patrimonial symbol

Figure.3.The façade and the entrance to the Paleochristian Basilica from Niculitel

The rich archaeological patrimony that the village of Niculitel displays, was enriched in 1971 by the discovery of the martyr basilica built on top of a crypt where there were the relics of fours saints Zotikos, Attalos, Kamasis și Filippos (throughout time, the names of these saints have become Romanized - Zotic, Atal, Camasie și Filip, but the inhabitants of Niculitel use their Greek names), protected by a wooden funeral scraper. This unique and extraordinary artefact, less known to the general public, represents the oldest Christian scrape preserved and known to the world so far. It is exhibited in the History and Archaeology Museum from the „Gavrilă Simion" Institute of Eco-Museum Research from Tulcea. In September 1971 a highly-important discovery was made, which further emphasizes the seniority and force of the Dacian-Roman Christianity. This is a Paleochristian Basilica, which has three vessels and a semi-circular apse (altar), discovered in Niculițel, Tulcea county (fig. 4 and fig. 5). The villagers smashed the truncated spur on top of the dome and small portions from its brickwork, deteriorated part of the inner tomb because of the sliding of sawdust. Archaeological excavations took place in an inhabited area, at the intersection of two pedestrian walkways. The value of this basilica lies in its crypt with martyr relics (martyrdom), which has a square shape (3,70×3,40) and is made from brick and sawdust – placed under the altar; inside the crypt a wooden scrape was found in which there were the relics of four martyrs; inside, on the left-side wall, a Greek inscription was scratched on the wet sawdust: „Christ's Martyrs"; and on the right-side wall there is once again the word „martyrs" as well as their names: Zotikos, Attalos, Kamasis and Filippos [11].

Over the next years, as archaeological research continued, remains from the bodies of other martyrs, whose names are unknown, were discovered under this crypt. On a limestone slab there is an inscription, with the following lines: „Here and there (there is) the blood of the martyrs". For the first time, in the Paleochristian vocabulary martyrs are considered saints at Niculitel. Archaeologists and theologians who dealt with these discoveries from Niculitel could not set the date and time when these six martyrs suffered. Most of them consider that they were martyred in the nearby village of Noviodunum (today, the town of Isaccea), either during the persecution of Diocletian, around 303-304 A.D., or during the time of emperor Liciniu who took several measures against Christians, between 319-324 A.D. [11].

Figure. 4. The inside of the Niculitel Museum and the crypt where the relics of the first Christin martyrs were discovered.

Figure. 5. Detail– the crypt where the relics of the four Christin martyrs were discovered

In the second half of the 4th century A.D., a basilica was built on top of the place where they had been buried, so as to honour them every year. It may be either this Paleochristian religious place – or a monastery that might have been built later - which gave the village the name Mănăstirişte, encountered in a few medieval sources. In time, a lot of difficult occurrences came over the place, such as wars, enslavement, and desolation brought about by many invading peoples, which also led, among others, to a decay of the Noviodunum citadel, as well as of many other wealthy settlements and churches in Dobrogea.
At the same time with the amenities brought to the Paleochristian monument from Niculitel, the relics of the four Christian martyrs were moved to the Cocos Monastery (fig. 6 and fig. 7). The number of people visiting these two monuments is growing with every year that goes by. As a result of the discussions with the people who visit these places, most of them express their satisfaction regarding the degree of embellishment and restoration of the Niculitel Monument, considering it „the most successful restoration of a Dobrudjan monument". The efforts made to preserve it are equally appreciated and so is giving the possibility to make these important monuments of Christianity in Romania known to those who succeed in visiting them, as they are inter-connected: one in which the relics of the four Christian martyrs were discovered and the second one in which they are preserved. Each of these two monuments represents a real source of information when it comes to knowing the history of Dobrogea, that anyone might be interested in.

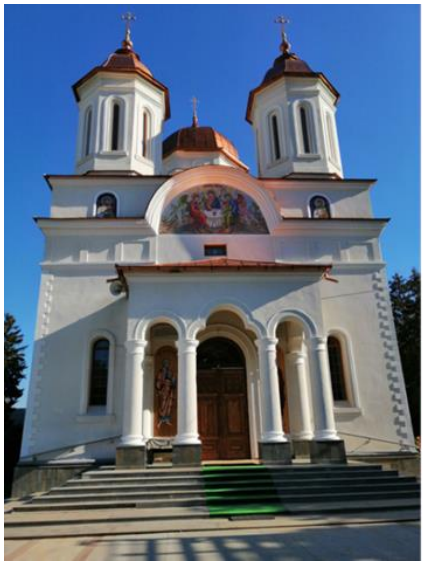

Figure 6. Cocos Monastery, the Western façade, the entrance

Figure 7. The relics of the four Christian martyrs – the inside of the Monastery

The museum creates an elegant, aerated and pleasant inner space. The perimeter gallery destined to the flow of visitors, maintains a permanent visual contact with the monument, and the permanent display of Paleochristian objects, coloured photographs and slides complete the visit of the entire Paleochristian ensemble. Such monuments support the idea of getting to know history, culture in general and religious culture in particular. Dobrogea is a historical Romanian province with a rich cultural patrimony offered by the multitude of ethnic groups living here, whose specific monuments might contribute to the development of local cultural tourism [19], [15].

CONCLUSIONS

The existence of historical and cultural monuments can have a beneficial effect on those who visit these places and on the lives of the inhabitants. A sustainable economic activity must start from the premise that it brings additional quality to their lives. In this case, in the entire Dobrogea, the region between the Danube and the Sea, the cultural patrimony and the religious monuments especially might represent a real source of attraction. Cultural tourism represents one of the real forms of tourism which might come across as one of the economic alternatives in Dobrogea.

The Niculitel basilica brings originality, uniqueness and specificity to the national and universal culture. At a national level, this monument is very important in our history, because it is here where the first relics of martyrs from the Paleochristian era, discovered on the territory of Romania, were kept. Today, their relics are placed to be honoured in the church belonging to the nearby Cocos Monastery.

The martyrs' crypt is very well-preserved which allows for tourism to take place, being accessible to those interested in visiting it.

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ECOLOGICAL AGRICULTURE – INCOME AND FOOD SOURCE FOR BIG CITIES. CASE STUDY MĂGURELE – BUCHAREST, ROMANIA

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ABSTRACT

Agriculture represents a vital area in the life of all communities, not only of urban ones but also of rural ones. The town of Măgurele is situated in the south-western part of Bucharest Municipality with which it borders directly. Being a former village, in this town people are still engaged in agriculture, and the agricultural produce harvested in Măgurele supply the food markets in the western and and southern parts of the capital. Our study has the objective of presenting the importance of this field of economic activity, trying to emphasize the importance of its role in the life of the small urban community in Măgurele. The research also aims at presenting the financial contribution of agriculture for the local farmers, trying to establish the increase in population income due to agricultural activities. The research methodology had as a first stage the analysis of the questionnaire applied to a sample of 217 people residing in the town of Măgurele who are engaged in organic agriculture, part of them using modern means while the other part uses traditional means. A second stage was represented by grouping the respondents in age groups and means used in agricultural production. Finally, agricultural productions over several years were analysed taking into account the age groups. Results show that agricultural production of farmers in the group age 35-55 who used modern agricultural means and techniques was higher on surface unit, thing was also visible in the higher income as compared to the agricultural production of farmers over 55 years old who use traditional means and techniques which was lower on surface unit and therefore the income obtained was lower. Overall, the population income obtained from agriculture rose, even if not significantly, but in the current circumstances any additional income is auspicious. Analysing the evolution of agricultural production in the past years it can be ascertained that the transition to organic agriculture is on an ascending trend. The research is currently in the beginning stage, but in the future we aim to track the progress of the phenomenon and its socio-economic impact on the study area.

Keywords: economy, urban, geography, Bucharest, ecology

INTRODUCTION

The agricultural sector is one of the most important sources of income for small rural and urban communities, contributing to the diversified and highly branched economic development of communities, allowing the population to be engaged in lucrative processes that could generate main or secondary income [1][8][11]. Also, agriculture can

be a secondary activity for people who own a business, for people in retirement, people with an agricultural profile (who have completed agricultural universities), allowing a general character and accessibility for all socio-economic categories. human and socio-professional [2][5][9]. Due to the importance of agriculture at the economic level of any society, this is an activity that will not show decreases in intensity, being necessary to obtain internally (nationally) agricultural products [3][10]. For the locality of Magurele we are talking about a secondary activity, being in a process of transition to the tertiary and quaternary sectors, wanting to penetrate the enterprises on the field of services, offering permanent incomes, not seasonal ones like agriculture [4][6][7]. Also, an important element for the development of the agricultural fund of Magurele is the presence of an extremely vast territorial space, the possibility of expansion in the southern part of the city offers positive development prospects of this sector, in terms of increased export accessibility (through the presence of Bucharest Ring Motorway), but also through increased labor force capacity.

Figure 1. Magurele city location map (nationally and locally

The research was carried out through a physical questionnaire campaign, which was carried out during the period of maximum agricultural intensity of 2020, carried out over a period of seven days, directly in the city of Ilfov. Through the direct discussion with the human component, statistical data can be obtained, regarding the elements of human and economic interest, and through conversations with them, qualitative opinions can be obtained regarding the development of the agricultural sector on the territory of the Ilfov city. The challenges launched by the SARS-CoV-2 virus pandemic did not prevent agriculture from developing, still being an important element, so that the questionnaire campaign was much easier to carry out, by directly questioning the population in the process of obtaining agricultural products. . The questionnaire campaign obtained a total

of 217 unique questionnaires, which were selected and centralized to obtain statistical data, using the Microsoft Office bundle, especially Microsoft Excel. By creating an application questionnaire, the study obtains the necessary authenticity and intervenes directly in the mentality, attitude and behaviors of the people involved in the agricultural sector.

RESULTS

The questionnaire campaign revealed that 60% of the respondents have agriculture as their main sector of activity, obtaining majority revenues from the sale of agricultural products obtained, mainly on domestic markets and markets in Bucharest. This category of respondents obtains the highest incomes among the surveyed respondents, investing time and financial resources to technologize the agricultural process, expand the agricultural fund, but also to employ the population in personal lands, in order to obtain increased monthly income. 33% of the respondents have agriculture as a secondary activity, not being directly involved in physical work, but only landowners or entrepreneurs, or qualified personnel (based on the completion of a university with an agricultural profile). Only 4% of the respondents have agriculture as a hobby, mainly the owners of small agricultural lands or large yards, and 3% of the respondents are not introduced at all in the agricultural process. (Figure 2).

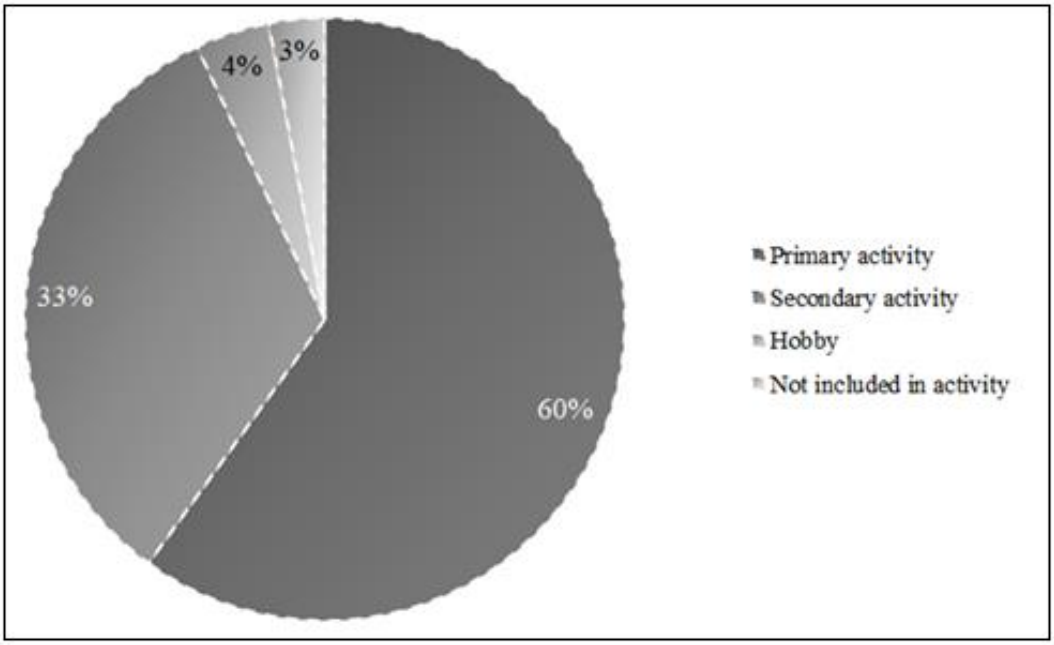

Figure 2. The importance of the agricultural sector in increasing individual incomes (according to the sample of the questionnaire campaign)

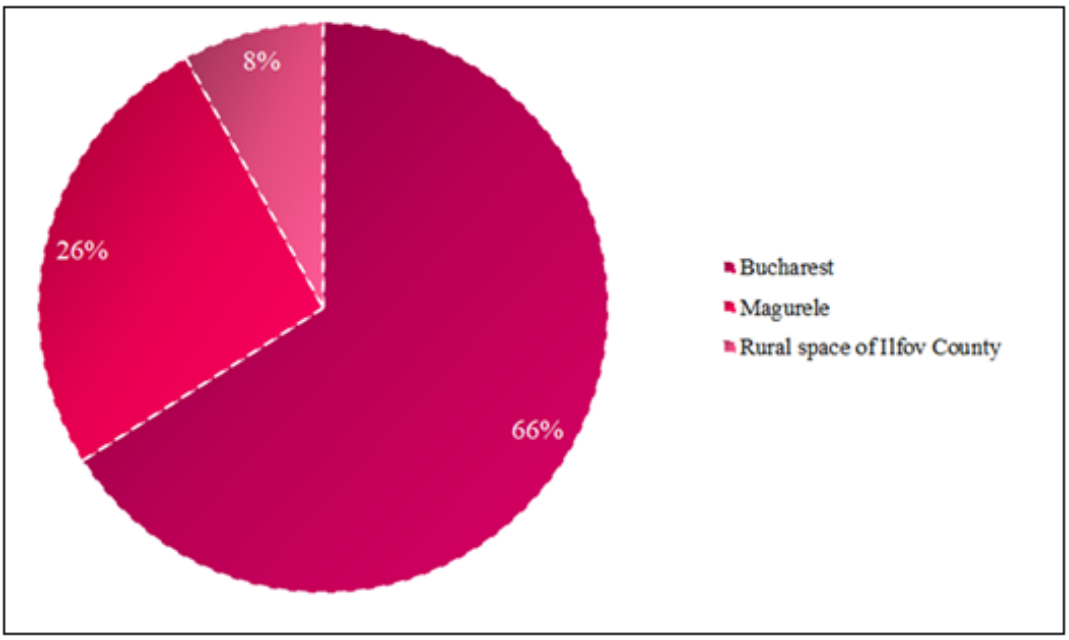

Figure 3. Marketing areas of agricultural export products
(according to the sample of the questionnaire campaign)

66% of the farmers surveyed in the questionnaire campaign sell their products on more important markets in Bucharest, through an increased potential to sell products, but also through easy accessibility to this economic space, no huge travel costs required . Mainly, the farmers who move to Bucharest are between 18 and 55 years old, wanting to obtain active incomes from the agricultural sector. 26% of respondents sell products locally, this category being the correspondent of farmers over 55 years, while only 8% of respondents sell products in rural markets of Ilfov County, considering that the agricultural potential in the area is much higher, selling only due to private partnerships. (Figure 3)

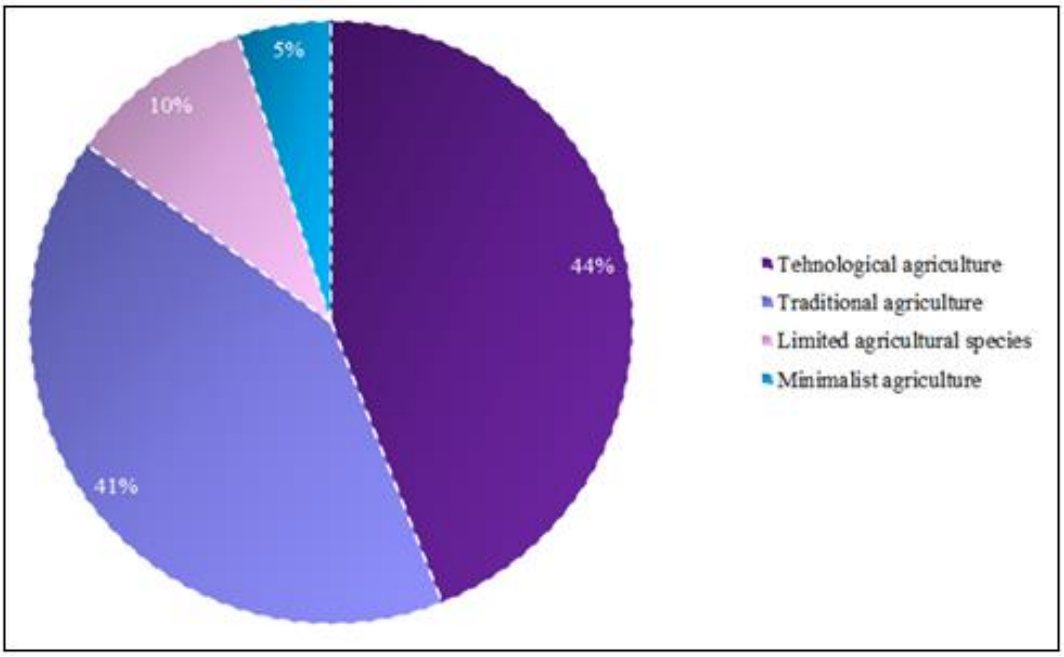

Figure 4. The main ways of developing the agricultural sector
(according to the sample of the questionnaire campaign)

Global technological development also proposes changes in the agricultural sector, and 44% of respondents consider elementary technology in obtaining agricultural products, as it facilitates physical labor, reduces daily working hours and reduces the need for investment in labor, but 41% of farmers believe that the technology is not necessary in the agricultural sector, they want to do the work on their own, only with the help of traditional equipment (such as tractor, irrigation systems). 10% of respondents opt for a limited agriculture in terms of number of crops, wanting only to obtain secondary incomes, without high costs of purchasing seeds or labor, channeling energy to completely necessary crops, and 5% of them have a minimum agriculture, carried out in personal yards, obtaining only one or a maximum of two agricultural crops in extremely small quantities, for personal use. (Figure 4)

Also, 56% of the respondents involve their family in the process of obtaining agricultural products, agriculture representing a family inheritance, especially for young males who do not want to migrate to Bucharest. 34% of the respondents carry out agriculture in personal form, either individually on less extensive lands, or in the form of agricultural enterprises, with a number of employees, not being directly involved in agricultural physical work. 10% of the respondents are employed in agricultural companies in Magurele. (Figure 5).

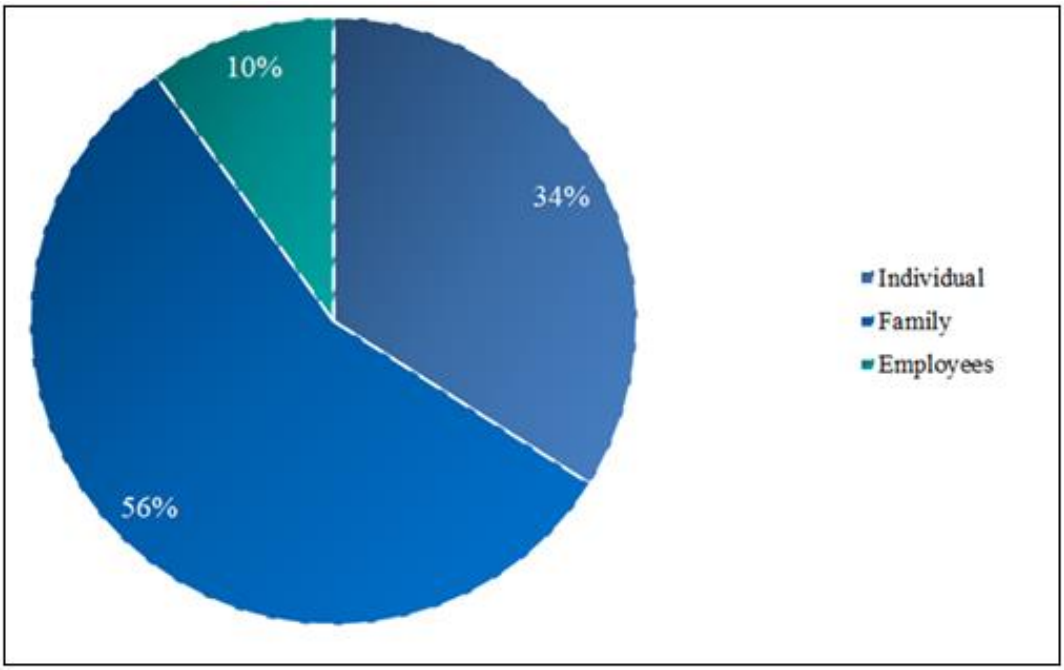

Figure 5. The main ways of carrying out the agricultural process
(according to the sample of the questionnaire campaign)

The questionnaire campaign reveals that a large part of farmers choose to use agricultural products in their own households, accounting for over 50% of all respondents, while 78% of respondents aim to achieve agriculture to export products to local markets or markets from Bucharest. 32 of the respondents opt for the commercialization of the products from their own households, in an unorganized form, carrying out the sales only to the persons within the community who need certain agricultural products. It is important to mention that seven of the respondents did not want to provide details on the use of agricultural products obtained by them. (Figure 6).

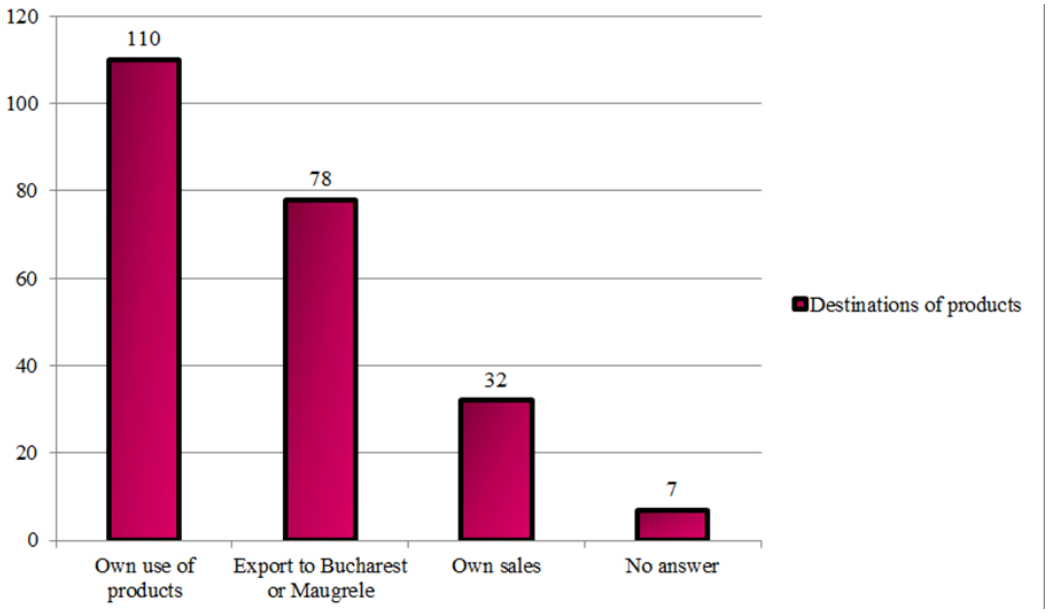

Figure 6. Use of products obtained from the agricultural sector
(according to the sample of the questionnaire campaign)

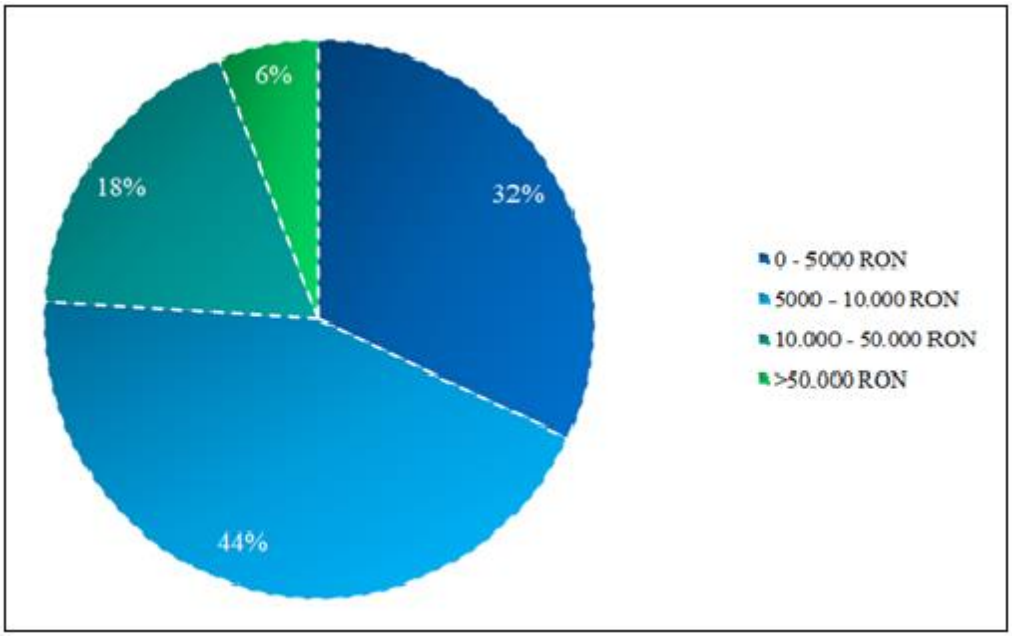

Figure 7. Average monthly income obtained from the agricultural sector
(according to the sample of the questionnaire campaign)

The average monthly incomes in the agricultural sector are dependent on the time, space and intensity from which the respective activity benefits, as well as on a beneficial administration. 77% of the respondents obtain average monthly incomes below RON 10,000, discussing respondents who have agriculture as a secondary activity or hobby, but also the elderly who produce agricultural products, but do not sell on more financially useful markets, preferring the local plan. 18% of the respondents get over 10,000 RON per month, with a maximum of 50,000 RON, this category being the correspondent of farmers who have exclusively agricultural activities, large spaces, have made massive investments and have a high degree of technology. 6% of the respondents obtain over RON 50,000 from the agricultural sector, this category being the correspondence of the

respondents who run important agricultural enterprises, with a high number of employees and exclusively agricultural capital. (Figure 7)
It is important to mention that 41% of the respondents have an experience of 6-10 years in the agricultural field, being the dominant category of the indicator (corresponds to the respondents of 18-35 years), followed by the category of respondents with a minimum experience of 10 years, with a presence of 39% (corresponds to respondents aged 35 to 55). 14% of respondents have a maximum experience of 5 years in the agricultural sector (corresponds to the youngest respondents), while only 6% of respondents have an experience of over 20 years in the agricultural sector, especially among respondents over 55 for years. (Figure 8).

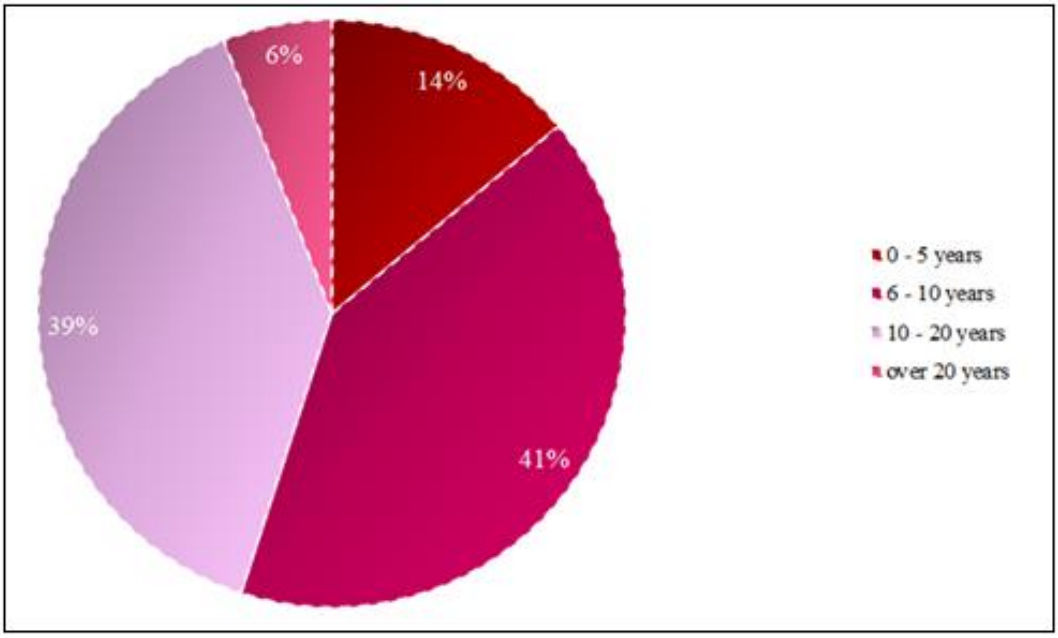

Figure 8. Level of experience of respondents in the agricultural sector

CONCLUSIONS

The research reveals that agriculture is one of the extremely important economic activities for the city of Magurele, despite the fact that it is an urban community, the relocation from rural to urban is still in a process of transition. It is important to mention that the economic direction is directed towards the development of the tertiary and quaternary sectors, while agriculture is a legacy for most respondents or a habit. The objectives of the study were met, discussing an identification of the dominant agricultural category, namely people between 35 and 55 years and a relatively high degree of involvement of the population in the agricultural sector, but in a continuous decline. The study also reveals that agriculture may still be a major source of income for respondents, despite the fact that the trend is secondary. The agricultural sector will remain permanently an activity at least secondary to the Ilfov area, in terms of extensive agricultural land, despite the fact that the general trend is to sell agricultural land to real estate developers or the development of homes that can be sold at much higher costs, which can provide peace of mind in case of giving up this field. At the same time, the study manages to combine elements of authenticity with important theoretical elements, thus continuing the specialized literature in the geographical and agricultural field, offering new potential directions for the development of these branches.

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COATS OF ARMS AND ZOOMORPHIC AND MYTHOLOGICAL MOTIFS IN THE MOGOSOAIA PALACE, ROMANIA

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ABSTRACT

The study aims to highlight coats of arms (except for the heraldic coat of arms of Wallachia), zoomorphic and mythological elements carved or engraved in stone, printed on leather, painted on paintings or documents at the Brancoveanu Palace in Mogosoaia, Ilfov County. Regarding the actual description of the different coats of arms and ornaments, we have taken into account the normatives and primciples of the heraldic science. In elaborating this study, we have considered the interest that these heraldic compositions, animal and mythological ornaments could arise in specialists, teachers, students, pupils, but also for tourists who may visit this building. We have considered that such testimonies used by the forerunners, symbols through which they expressed their thoughts and aspirations, could serve to a better understanding of some historical phenomena. Our study is a call for the detection, restoration (on a case-by-case basis), analysis and introduction within the scientific circuit of many more similar artifacts, which are still unknown to the general public.

Keywords: palace, Mogosoaia, coats of arms, animal ornaments, heraldry

INTRODUCTION

The Brancovenesc palace from Mogoșoaia (fig. 1) constitutes a great tourist attraction, where tourists can contemplate the construction, the exhibits or they can enrich their knowledge and level of culture. Located at about 15 km from Bucharest, the building was built by Constantin Brancoveanu, the ruler of Wallachia, for Stefan, his second son, and was completed, according to the marble inscription above the door of the east gazebo, on September 20, 1702 [1], [5], [6], [7], [8], [9], [10], [17]. At the palace, tourists can discover the architecture, the painting, the sculpture, the coats of arms, family seals, the garden and they can possibly analyze other material traces that refer to this impressive objective.

I have described and reproduced the heraldic coat of arms of Moldova, the coats of arms of the Cantacuzins and of Metropolitan Antim Ivireanul, the dolphins, lions, mascarons and other heraldic compositions (without the heraldic coat of arms of Wallachia) which are preserved in this palace and which, due to the fact that they faithfully reflect the period in which they were created, can contribute to highlighting the artistic activity of the craftsmen involved such as sculptors, engravers, heraldic painters and can be a rich source

of documenting regarding the painting and sculpture from the Middle Ages and the modern era.
This presentation is part of the series of events meant to praise Constantin Brancoveanu, especially since, a few years ago, by the Romanian Government Decision no. 1,167 / 2013, the year 2014 was declared the "Year of Brancoveanu", to commemorate the 300th anniversary of the martyrdom of the family of Brâncoveanu.

Figure 1. The Palace from Mogosoaia (eastern side).

METHODOLOGY

Regarding the method used to develop this study, we have gone through the following steps: 1. Identification of the Brancovenesc Palace from Mogosoaia where there are heraldic compositions of Moldova, of the Cantacuzino family, of the Metropolitan Antim Ivireanul and others; 2. Visiting this edifice, researching and photographing the heraldic artifacts, the animal and mythological ornaments, no matter if they were reproduced on stone, leather, paper or any other material; 3. Analysis of the different versions of coats of arms existing in the palace, taking into account the heraldic normatives and principles; 4. Notifying the interested public about these testimonies of the past, by various visits, events, works or specialized studies, as well as by promoting, for tourism purposes, the coats of arms, family seals, zoomorphic ornaments and the representative signs of the institution that owns them.

RESULTS

A. On the ground floor of the building there is a fireplace that has, at both upper corners, carved in stone, a double composition (fig. 2) that includes the heraldic coat of arms of Moldova [13], [15] in the central part, namely: oval shield, loaded with a bull's head, rendered frontview positioned, with a six-pointed star between its horns (fig. 3).
The same heraldic composition (fig. 5) appears on a stone column (fig. 4) located in the palace garden, in the northern part, close to the building.

Figure 2. and **Figure 3.**. The chimney with the heraldic coat of arms of Moldova (in the central part).

Figure 4. and **Figure. 5.** The stone columns and heraldic coat of arms of Moldova (in the central part).

B. The frame at the entrance door located on the eastern side, close to the base of the access stairs to the gazebo (fig. 6), has at both upper corners, carved in stone, a double composition that includes the coat of arms of the Cantacuzino family [10]: oval shield, with laurel leaf border, on which there appear brooching, in the four cardinal points, four cross-shaped flowers, loaded with the bicephalous eagle, rendered frontview positioned, with open wings, having an open crown above the heads, with five fleurons and holding in the right claw the scepter ending in a lily flower, while in the left it holds the sword (fig. 7).

Figure 6. and **Figure 7.**. The coat of arms of the Cantacuzins in the upper corners of the entrance door frame from the eastern side.

The same heraldic composition (fig. 9) appears, with small modifications [13], [14], [15], at the top of the cellar entrance (with a crown with three fleurons above the heads) (fig. 8); again, at the upper part of the door frame (fig. 10), as well as at the end of the staircase upstairs (not included in the shield, holding the sword in the right claw, while the scepter in the left claw, having two male characters as supports, both rendered in profile, facing each other, in squatting position, with hair up to the shoulders, with a long coat up to the ankles, holding with one hand a trumpet which he was blowing, keeping the other arm next to the body) (fig. 11); in the form of a console [5], [6] supporting the ends of the vault arches in certain rooms in the palace (fig. 12), upstairs (not included in the shield) (fig. 13); the middle of the western part of the Elchingen Villa (fig. 14), located in the eastern corner of the palace courtyard, on the left side of the entrance (fig. 15), built during

the second half of the 19th century by Nicolae Bibescu, the owner at that time of the Mogoșoaia estate (not included in the shield and without a crown above the heads).

Figure 8. and **Figure 9**. The entrance to the cellar of the Mogoșoaia Palace, having above the coat of arms of the Cantacuzino family.

Figure 10. and **Figure 11.** The door frame at the end of the stairs located upstairs the palace and the coat ofarms of the Cantacuzino family.

Figure 12. and **Figure 13.** The representative coat of arms of the Cantacuzino family sustaining the ends of the vault arches in certain chambers of the palace.

C. On the seatback of a chair (fig. 16) in an upstair chamber, there appear the following heraldic composition, imprinted with golden colour on leather support (fig. 17): a 15th century almond- shaped Italian type shield (buckler), with thin border, crossed over by a band of battlements, bearing two knurl wheels at the upper part, while two fangs at the lower part; the shield, sitted on vegetal ornaments, is being sealed by a head helmet with grids

Figure 16. and **Figure 17.** The chair covered in leather and the representative coat of arms imprinted on its seat back

D. On a wall upstairs there is suspended the copy of the hierarchical deed of the Metropolitan Antim dated July 20, 1715 (fig. 18), written in Romanian, in Cyrillic characters. In the document, the high prelate mentions how he built the Monastery of All Saints in Bucharest, which should be in his opinion the example to follow as established by a settlement with 32 heads [2], [11], [12], [16], [18]. The frontispiece of the solemn document (fig. 19), of rectangular shape, on a gold background, comprises, in the middle, an oval shield, with a golden border, with a green plain, over which there broches the silver building of the Antim Monastery, with the roof and the golden crosses, surmounted by a golden cruciferous globe that has a laurel wreath above it, which is made of the same metal, held with one hand each by two angels, with haloes, wings and golden clothes, with the other hand each holding a green palm-tree branch (symbol of regeneration and immortality) [3] leaning on the shoulder, rendered in kneeling position on a purple cloud. The blue sky is dotted with golden stars with six rays each. At the top of the shield, on a golden background, there is Jesus, coming out of the clouds, which are also purple; Jesus appeared flanked, near the head, by the letters: IS - HS (rendered in Cyrillic characters and written in red). The shield is included in a golden oval garland, adorned on the edges with golden baroque motifs; the background between the garland and the shield is black, loaded with golden acanthus leaves and eight other smaller, round shields, with a thin golden border, comprising at the top the attributes of the dignity of a metropolitan - on a red background, a green plain, over which there brooches the cross and the crutch, both placed in a jumper, both tied, towards the extremities, by the cords (ribbons) on the flanks of the prelate's hat that surmount the miter. The other seven shields include elements that are each accompanied by the seven capital letters, gilded, which make up the name of Antim, written with Greek characters: ANΘIMOC. So the shields are loaded as follows: the one on the top left - red, with a golden eagle (symbolizing courage, value, flight to heights); the one on the top right side - red, with a golden bat (signifying revival, kindness); the one on the left - red, with a golden jackal (symbolizing justice); the one on the right - red, with a golden hawk (meaning warrior spirit, noble and just) [4]; the one on the bottom left - red, with a golden bee (symbol of diligence, effort, hard work and order) [4]; he one on the bottom right - red, with a golden snake (symbol of penetration, knowledge, immortality, fecundity and prophecy) [4]; the one below includes the emblem of the Metropolitan Antim: on a red background, a golden snail, positioned in a pale, on a green plain, flanked by two green palm-tree branches protruding from its shell, having between the horns a star of the same metal.

Figure 18. and **Figure 19.** The hierarchical deed the “hrisov”of the Metropolitan Antim and the heraldic composition in the frontispiece

The snail indicates periodic regeneration, death and rebirth, the theme of eternal return. The gastropod also signifies fertility, movement within permanence, the return of spring

after winter, faith, humility [3], [4].The garland has, as supporters, two golden modilions, on a green background, and as tenants, two melusines (symbolizing traditional knowledge and culture) are holding the modillions with both hands [12].

E. In a room upstairs, in a painting (fig. 20), there is painted the coat of arms of the Metropolitan Antim [16]: shield, with a thin golden border, with baroque ornaments on the flanks and on the upper edge, with two small concavities on the flanks and with the red tip in brace, loaded with a silver snail, positioned in the pale, with the shell on a green plain and having a gold star with six rays between the two tentacles. The shield has on the flanks two palm-tree branches that cross below. The shield is surmounted by the miter that has above the prelate's hat the corded cords of which are wrapped, in the middle of them, around the cross and the crutch that protrude from the upper edge. Around, the initial golden letters: A - I / M - U (Antim Ivireanul / Metropolitan of Ungrowlachia) (fig. 21).

Figure 20. and **Figure 21**. The coat of arms of Antim Ivireanul painted in a painting

F. On the railing of the loggia in the western side [7], [8], [10], [17] consisting of six stone columns (two employees) that support five arches in a brace (fig. 23), there are, apart from the heraldic coat of arms of Wallachia, on the flanks, between columns 1-2 and 5-6, executed by piercing, two dolphins (fig. 22), and between columns 2-3 and 4-5, also executed by perforation, two mascarons (fig. 24).

Figure 22. Figure 23. and **Figure 24**. Western loggia adorned on the railing with dolphins and mascarons.

G. At the base of the stone columns of the frame at the entrance door (fig. 6) located on the eastern side, close to the base of the access staircase to the gazebo, there are two lions [17] (fig. 25). Two other lions (fig. 26) [13], are placed on a pedestal at the base of the stairs from the lake. A lion, similar to the previous ones (fig. 27), appears sculpted at the base of the stone column [17] (fig. 4) located in the palace garden, in the northern part, close to the building. A lion, shown as sleeping (fig. 28), is placed on a pedestal placed on the western side of the cuhnia (kitchen) located in the eastern corner of the palace courtyard, on the right side of the entrance. A lion, similar to the one above, is placed on

the western side of the Elchingen Villa (fig. 14) located in the eastern corner of the palace courtyard, on the left side of the entrance.

Figure 25., Figure 26., Figure 27. and **Figure 28**. Lions sculpted at the Palace of Mogosoaia

H. On the northern side of the palace there is a monumental gate (fig. 29) whose pediment is a statuary group, damaged in some places, rendering the goddess Minerva in the center [8] (fig. 30).

Figure 29. and **Figure 30**. Gate with a pediment decorated with a group of statues with the goddess Minerva in the center.

I. Culture in all its forms is the one that stands out, especially in the construction of historical monuments. They are points of attraction, transmitting today, on a case-by-case basis, evidence of the progress of culture expressed in architecture, painting, sculpture, heraldry and other auxiliary sciences of history. According to those presented above, in this case, the Brancovenesc Palace from Mogosoaia is attractive; it has, among others, coats of arms, emblems, representative family signs or seals that, through the symbolism of the components, individualize those by whose order they were created, or their owners.

CONCLUSIONS

Privileged witnesses of the historical currents, as they were defined by the scholarly researcher Yves Metman (between 1969-1980, chairman of the International Sealing Committee), seals and coats of arms reflect, in vivid images, social life in its complexity, bringing to the attention of generations deeds and actions which enrich the knowledge of past social processes. For specialists, historians and tourists, heraldry is not only a simple way to broaden our cultural horizon, but also a means to receive and know the mentality of a lost world, to understand and interpret the historical process reflected by each heraldic symbol.

Constantin Brancoveanu, the founder of the Mogosoaia Palace, Metropolitan Antim Ivireanul, the Cantacuzins were prominent personalities in the cultural world, and the heraldic compositions, created in the era in which they lived, were closely related to their position, character, thoughts and aspirations. Enriching or consolidating knowledge about

heraldry remains within the reach of those interested in this interesting auxiliary discipline of history.

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EXPANSION OF SATELLITE TOWNS' RESIDENTIAL AREA IN THE CONTEXT OF HIGHLIGHTING THE POLARIZING ROLE OF BIG METROPOLISES. CASE STUDY: MĂGURELE, ROMANIA

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ABSTRACT

Satellite towns occurred as a natural response at the metropolises accelerated development and their residential area is continuously expanding. The town of Măgurele is a satellite town of the Municipality of Bucharest being situated in its south-western part. In the past years the town of Măgurele has undergone an extensive transformation process, fact which attracted a numerous population. Our study aims at emphasizing the peculiarity of Măgurele development in the context of highlighting the polarizing role of Bucharest Municipality. Moreover, the research has the objective of presenting the causes and the socio-economic consequences of the residential area expansion in Măgurele town. The research methodology had as a first step the application and analysis of questionnaire on a sample of 220 people who moved to Măgurele town between 2008 and 2020 in order to identify the causes which led to this. A second step was represented by the analysis of statistic data referring to the residential space and identification on site of the newly-built districts. Results show that the considerable expansion of Măgurele residential area was carried out by the movement of a relatively high number of young population (under 40 years old) coming from Bucharest Municipality. The causes which led to this situation are multiple ranging from Bucharest overcrowding to people's wish to live in a cleaner air environment. Furthermore, the status of scientific centre that Măgurele has received in the past years was also identified as a cause of residential area expansion. Our research is only in the beginning phase but we aim to observe in the future the phenomenon and its socio-economic implications.

Keywords: migration, sociology, geography, economy, urban

INTRODUCTION

The concept of bedroom cities (or dormitory communes) is often found in the vicinity of capital cities, but also large cities, taking place in the form of an annular strip around the polarizing urban center [2][10][11]. Most of the localities arranged within this sleeping ring, present an artificial development, extremely sudden and with a branched disposition of the territory, through very fast increases of the housing fund, in a way in which the organization is not the main element of development [1][7][12]. Through the possibilities of territorial extension to the outside, they can become urban centers proper, they can develop economic relations as diversified and beneficial for both centers, facilitating the

flows of information, labor or investment between the two centers [3][9]. Bucharest is the most important city in the regional and national plan, with a population of approximately three million inhabitants today, continued indirectly in the area of Ilfov County, an area it controls economically, offers migration trends and promotes real estate activity in them, as the costs are lower, the bedroom centers being located along an important road axis within the municipality [4][8]. By relocating the population from the direction of Bucharest - bedroom centers, their population will increase considerably, important resources and sums will be invested within the territorial reality, increasing the real estate, tourist and investment interest. Magurele is one of the extremely interesting bedroom centers of the capital, by its location along the ring road, which surrounds the capital, sectioning the town into two distinct areas [5][6] Due to its proximity to Bucharest, Magurele is not only a sleeping center for part of the population relocated to the peripheral area, but is also a center of the Quaternary sector, through the National Research-Development Institute for Physics and Nuclear Engineering "Horia Hulubei" and the numerous patents of Romanian science, including the famous laser from Magurele.

Figure 1. Magurele city location map (nationally and locally)

The research proposes an identification of the motivations, needs, behaviors and attitudes of the people who made the relocation to Magurele, in the period 2008 - 2020, through a representative sample of 220 people, developed on a general character, regardless of socio-human category, financial level or age, the only niche of the questionnaires being guided to the need of the respondents to have moved to the locality recently. The study proposes to identify the main reasons for the campaign to permanently move to Ilfov, wanting to identify the dominant financial category of respondents, the most significant age category in the migration process, but also data of interest in the migration process. . The questionnaire campaign was conducted exclusively online, through groups on social

networks related to the city of Ilfov, selecting only the questionnaires of residents who previously lived in Bucharest. The data were obtained in a period of a month and a half, especially in the spring - summer of 2020, supplemented with statistical data provided by the National Institute of Statistics, on the increase of housing in the analyzed period, but also statistical data with regarding the population growth in the city of Ilfov. The centralization and selection of data was done with the help of the Microsoft Office bundle, especially Microsoft Excel for creating graphics.

RESULTS

The questionnaire campaign reveals that the chosen sample permanently fueled the migration process on the axis Bucharest - Magurele, discussing a relocation of at least eight respondents annually, discussing an upward growth trend, through a historical maximum of thirty-four new residents, for 2017. The premises are positive, regarding the increase of the number of residents from Magurele locality, discussing about an extremely easy access way to enter the capital, but also through a very short distance and extremely relevant economic possibilities. (Figure 2)

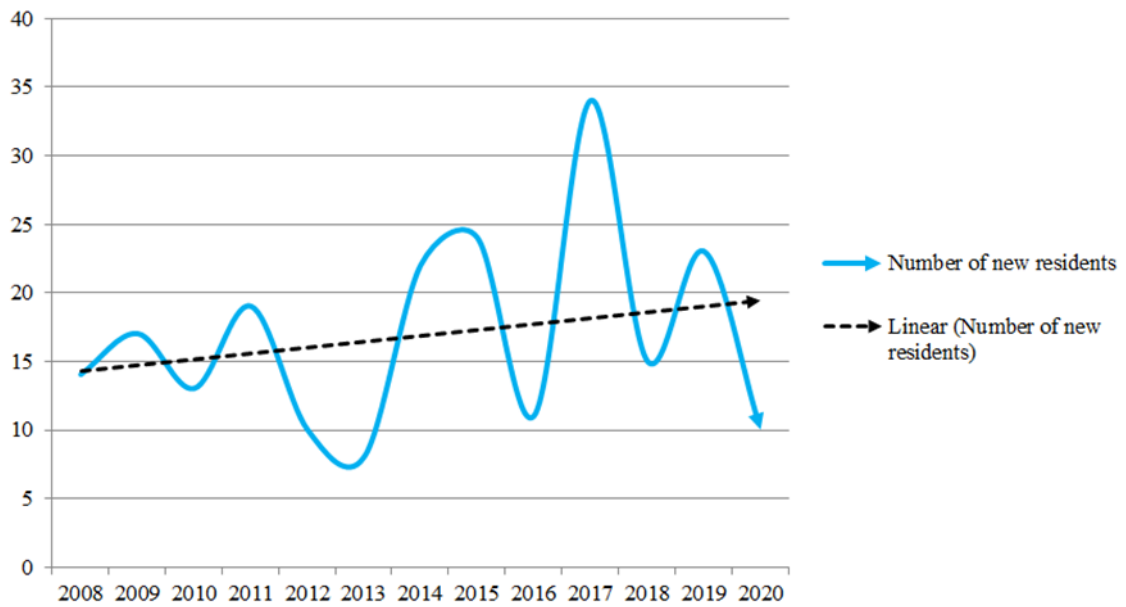

Figure 2. The year in which the relocation of the residents on the axis of Bucharest - Magurele took place

The main category of respondents is represented by residents who have their own housing, either purchased from personal sources or purchased through the government program "First House", launched by the Romanian Government, followed by multifamily housing (blocks), which are inhabited rent, 22% of respondents prefer this type of housing. 19% of respondents prefer to live in single-family homes (houses), while only 14% of residents have purchased a home in a multi-family block, either from personal sources or through the government program mentioned above. The lowest category of respondents is that of the sample living in personal or relatives' homes, obtained by inheritance or donation, or by living with other family members. (Figure 3).

Only 19% of 46% of respondents live in the form of a marriage, discussing mainly new families who have opted for the government's home purchase program, but also families who have opted for their own home purchase, followed by housing in the form of a couple, most respondents wanting to move to marriage in the near future. 21% of respondents

live individually and privately, in the form of owned or rented housing, while only 9% of residents live permanently with other family members. (Figure 4)

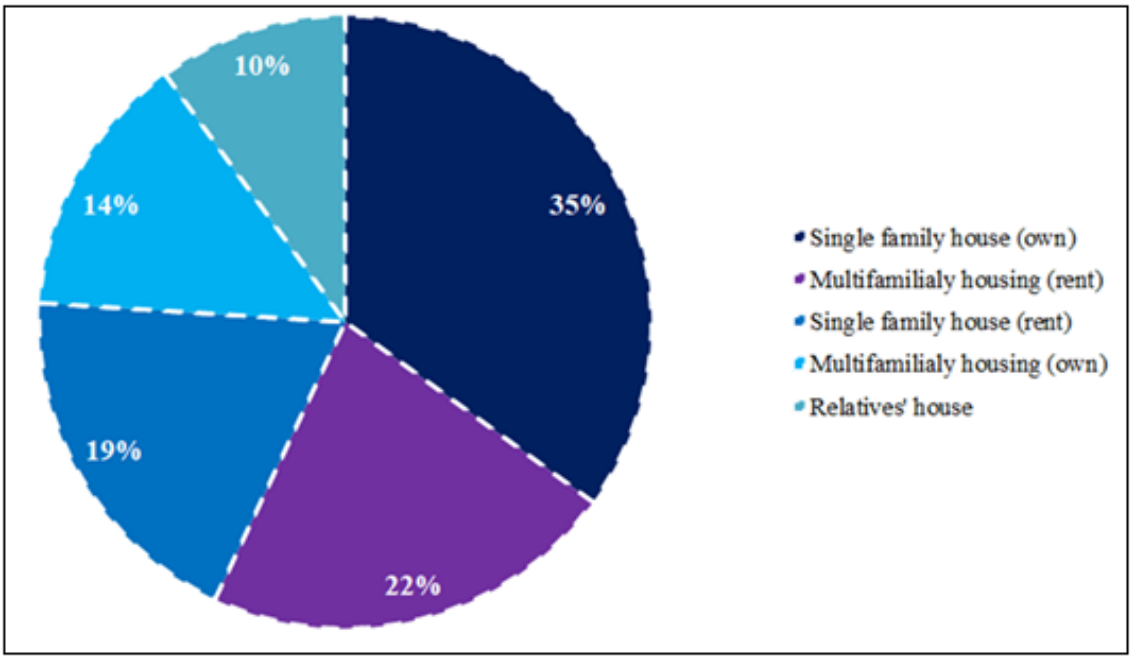

Figure 3. Types of houses of the respondents from Magurele locality

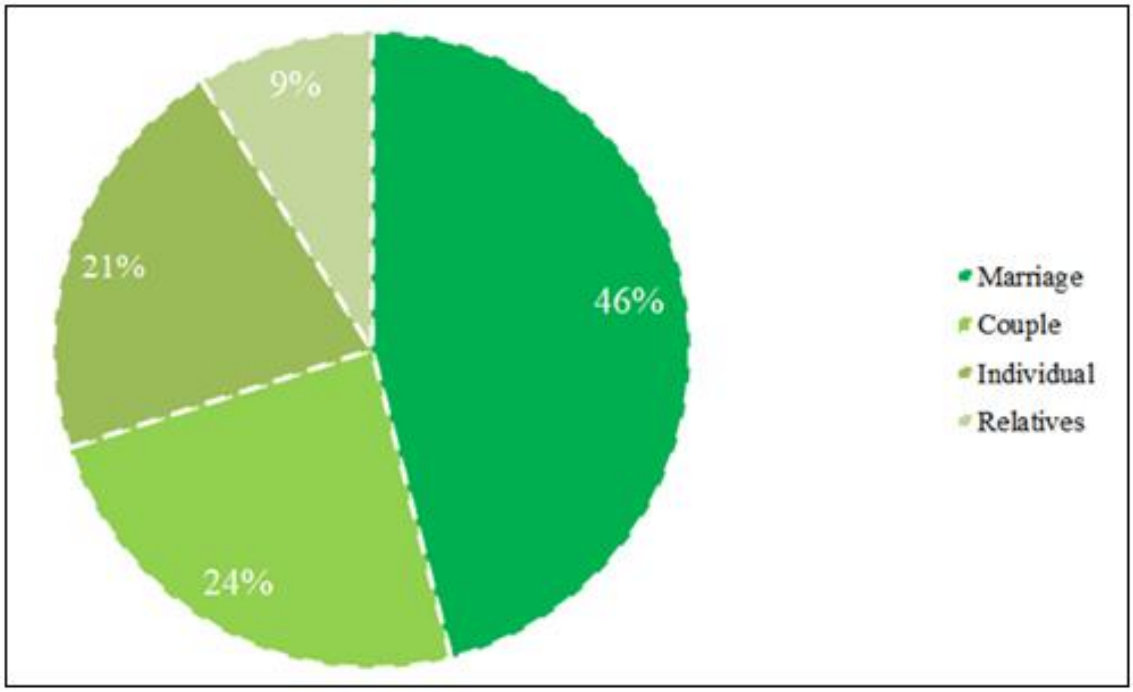

Figure 4. The way of living of the respondents from Magurele locality

Through the possibility of purchasing housing for a period of thirty years, newly married couples jointly choose to purchase housing through government programs, totaling 41% of all respondents, followed by an important category of residents who have chosen to create their own purchase loan , in one of the important banks of Romania. respondents were able to purchase a home from their own savings, most of them being people who

own at least one medium-level business. Also, the lowest category of the indicator is that of the respondents who obtained a house for free, by inheritance or donation, living in them individually or together with their own family. (Figure 5)

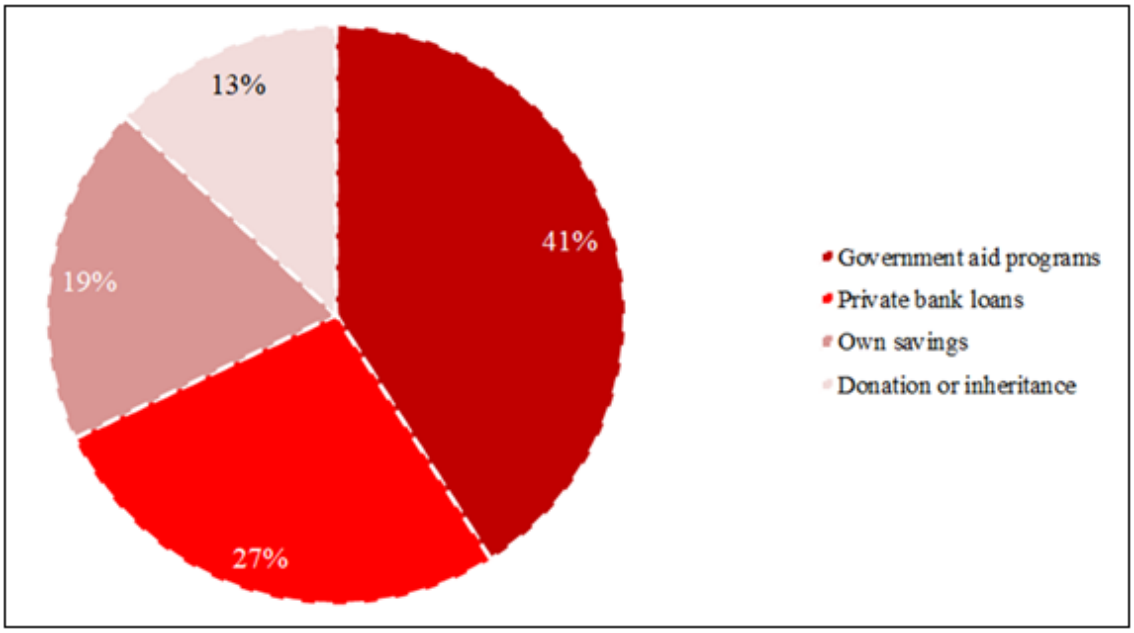

Figure 5. How the respondents acquire the houses in Magurele

The dominant economic sector of the respondents of the questionnaire campaign is the tertiary sector, discussing an important presence of the Magurele population in the services sector, followed by the Quaternary sector, in terms of the presence of numerous scientific centers in Ilfov, with a share of 30%. The industrial sectors and destined to the lucrative physical activities represent only a quarter of the total of the respondents, these working mainly in the Bucharest industrial platforms located in Sectors 5 or 6. (Figure 6) The main motivation of the respondents is the purchase of a house, in terms of financial accessibility and accessibility to the Bucharest area, followed by family reasons, such as the appearance of a child or the establishment of a family, by a percentage of 15%. 25% of the respondents wanted to migrate to Ilfov locality based on employment in the vicinity of the locality or within it, the category being representative for people engaged in the quaternary sector. 24% of respondents considered that urban stress, generated by Bucharest, is above normal values, wanting to migrate to obtain a general peace, away from congested road traffic, people or other personal problems. Only 4% of respondents migrated to the city of Magurele in order to obtain a house, free of charge (donation or inheritance). (Figure 7)

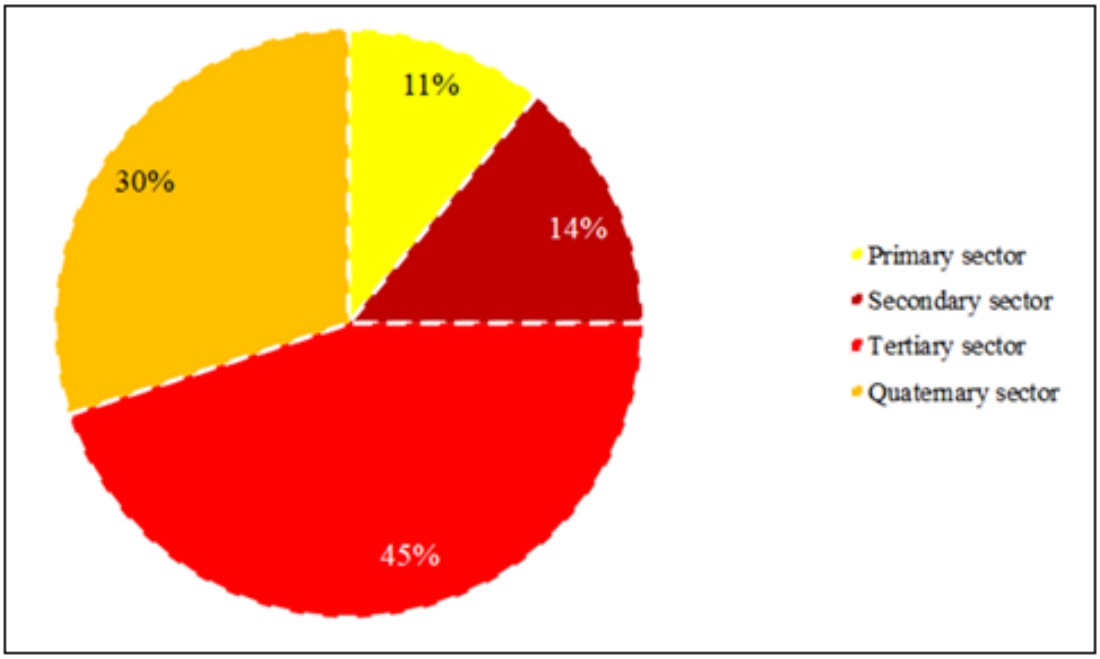

Figure 6. The economic sector in which the sample of the questionnaire campaign is engaged

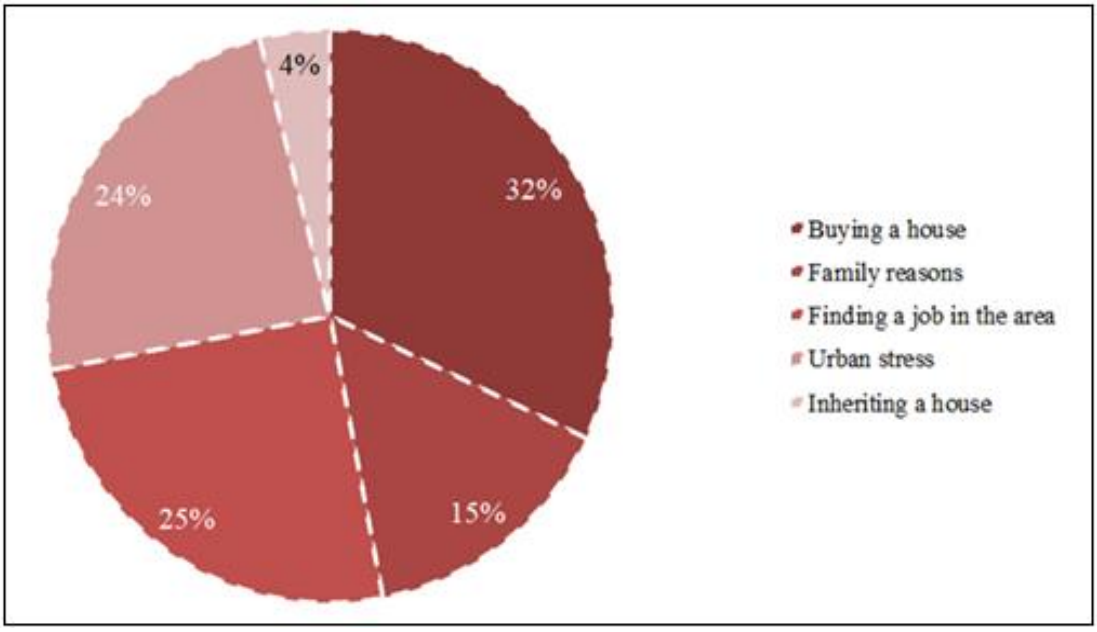

Figure 7. Motivation of the respondents to migrate on the axis Bucharest – Magurele

The number of new homes in the city of Magurele is experiencing a permanent and staged increase, with the appearance of at least 75 new homes, especially single-family homes that have been introduced in the government's housing acquisition program for newlyweds. The growth is guaranteed by a territorial extension and a location that allows the development along the National Road Bucharest Beltway, but also in the southern part of Magurele, by the presence of an important agricultural fund, which could be transformed into a much more beneficial real estate fund, in terms of the fact that agriculture is still an important economic sector for the city of Ilfov. (Figure 8)

The evolution of the population is ascending, increasing during the analyzed period with approximately 3300 new inhabitants, most of them coming from Bucharest, the increase

being correlated with the increase of the housing fund capacity and by increasing the accessibility on the axis Bucharest - Magurele city. The positive trend offers positive premises regarding the future of the Ilfov city, the growth guaranteeing the necessary economic, social and entrepreneurial development. (Figure 9).

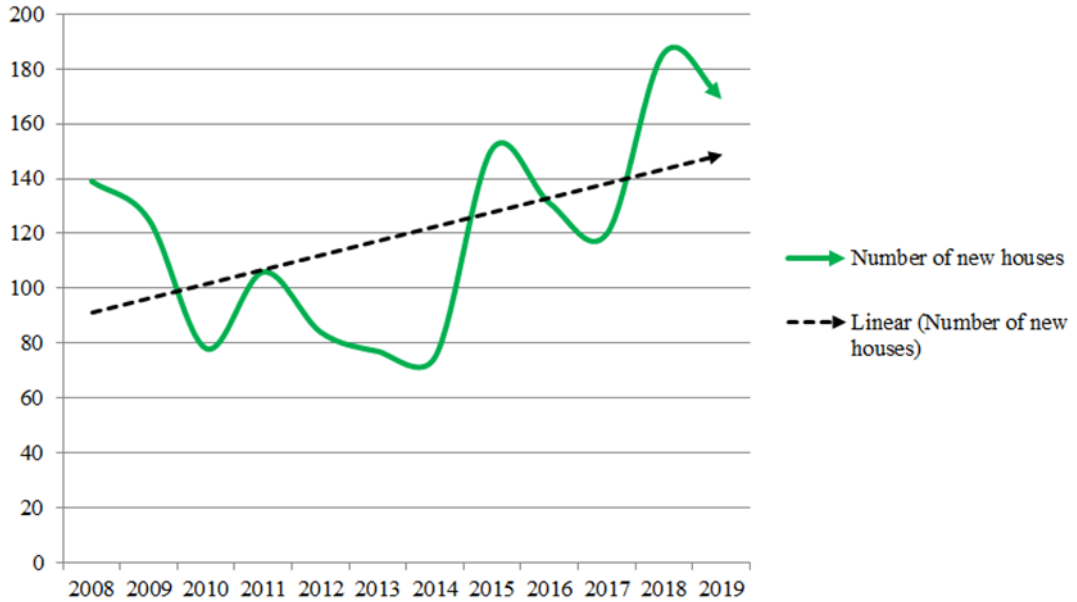

Figure 8. Evolution of number of new houses in Magurele (2008 - 2019)

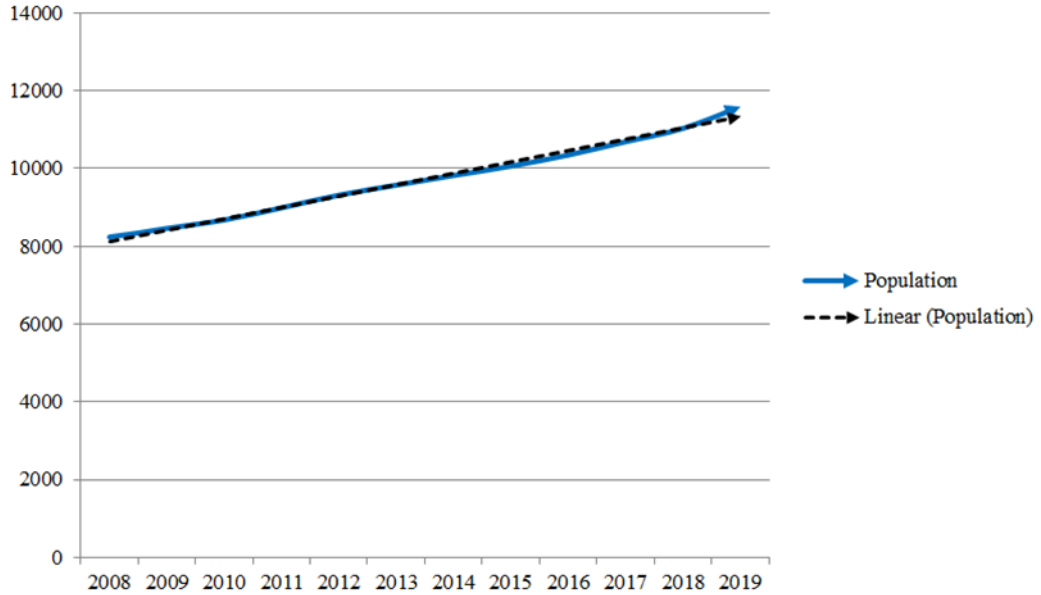

Figure 9. Evolution of the number of population of Magurele (2008 - 2019)

CONCLUSIONS

The city of Magurele is one of the most important dormitories in Bucharest, through the increased possibility of territorial expansion, the desire of the population to get involved in real estate, increased interest from potential immigrants, but also through positive economic prospects and aimed at success . The economic and social relationship between Magurele and Bucharest offers benefits for both localities, discussing permanent

exchanges of information, labor, resources and products that can be sold on both economic markets, but also extremely beneficial investment exchanges. The research meets the initial objectives, establishing that most respondents produced migration based on family reasons, based on financial and transport accessibility with Bucharest, but also based on the fact that Magurele has important individual economic prospects, through the important development of the tertiary sector and quaternary inside the locality. Also, the study confirms that the population of Magurele is constantly growing, and the housing stock is in a process of territorial expansion, adapted to the territorial reality of Ilfov, offering important perspectives on population growth and investment in the locality. . The questionnaire campaign was a success, as the purpose of the study was to raise awareness among residents about the need for objective analysis of personal living possibilities, weighing all variables that could lead to a migration to the outskirts of Bucharest, in view of the fact that urban stress and the desire to develop the family in a quiet and unpolluted space are necessary in thinking about the future.

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GEOGRAPHICAL DISTRIBUTION OF PEDIATRIC CANCER IN ROMANIA

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ABSTRACT

Cancer in the young population is less common than in the adult population, however, cancer is one of the leading causes of death among children. Most of the time the cause of the development of cancerous tumors is not known, so prevention is not exactly possible. The survival rate among children increased significantly in Europe and the US until the 1990s (80%), stagnating after this period, mainly due to the inability of the medical system to make progress in treating cancer.
In Romania, the survival rate in pediatric cancer reaches 69%, 10 percent lower than in Western European countries. For this analysis, a database with national coverage was used, reported at the level of the territorial administrative unit, regarding the types of cancer, for the total cases age category 0-18 years, female and male. This study aims to identify those geographical areas where extreme values have been recorded and to draw premises on the role of the geographical factor in the appearance and development of cancerous tumors among the young population, up to 18 years.

Keywords: cancer distribution, spatial modeling, GIS methods

INTRODUCTION

Cancer is the leading cause of death among young people everywhere, after deaths caused by accidents, with approximately 300,000 new cases diagnosed with cancer in the 0-18 age group each year. The most common types of pediatric cancer are: leukemia, brain and spinal cord tumors, neuroblastoma, lymphoma, bone cancer and rhabdomyosarcoma, they can't be prevented or screened. Although there are child-specific cancers, in rarer cases, they develop adult-specific cancers [1], [2], [3], [4]. Access to the medical system or the existence of a high-performance health system makes a major difference in terms of oncological mortality among children. Over 80% of pediatric cancers are cured in high-income countries and up to 20% in many low- and middle-income countries. Therefore, many of the deaths are caused by the lack of an early and accurate diagnosis and the lack of treatment because of financial reasons [5], [6].
A first step towards the effective treatment of as many cases of pediatric cancer as possible, is the implementation of public policies that support low- and middle-income countries, through early diagnosis and the adoption of effective treatment.
In support of these public policies come the Geographic Information Systems that allow the modeling of statistical data to report a simplified situation of this global phenomenon. Most of the time, medical reports are analyzed from a statistical point of view without discussing the spatial component [7], [8]. To do this, the data are spatially modeled,

geographic information systems can create sets of spatial models in an automated manner, allowing to do specific analysis. Geographic Information Systems are one of the tools used in implementing public policies capable of collecting, storing and processing a huge volume of statistical data with spatial reference [9], [10], [11], [12].
Medical data and the development of related GIS technologies make a significant contribution to research, minimize data processing time, help perform detailed analyzes, and spatially identify carcinogenic concentrations.

RESEARCH METHODOLOGY

To make this scientific material we used a database provided by the Ministry of Health, with national coverage reported at the level of territorial administrative unit for the period 2008-2017. The number of cancer cases for the 0-18 age group was reported in the total number of people, total, female and male.

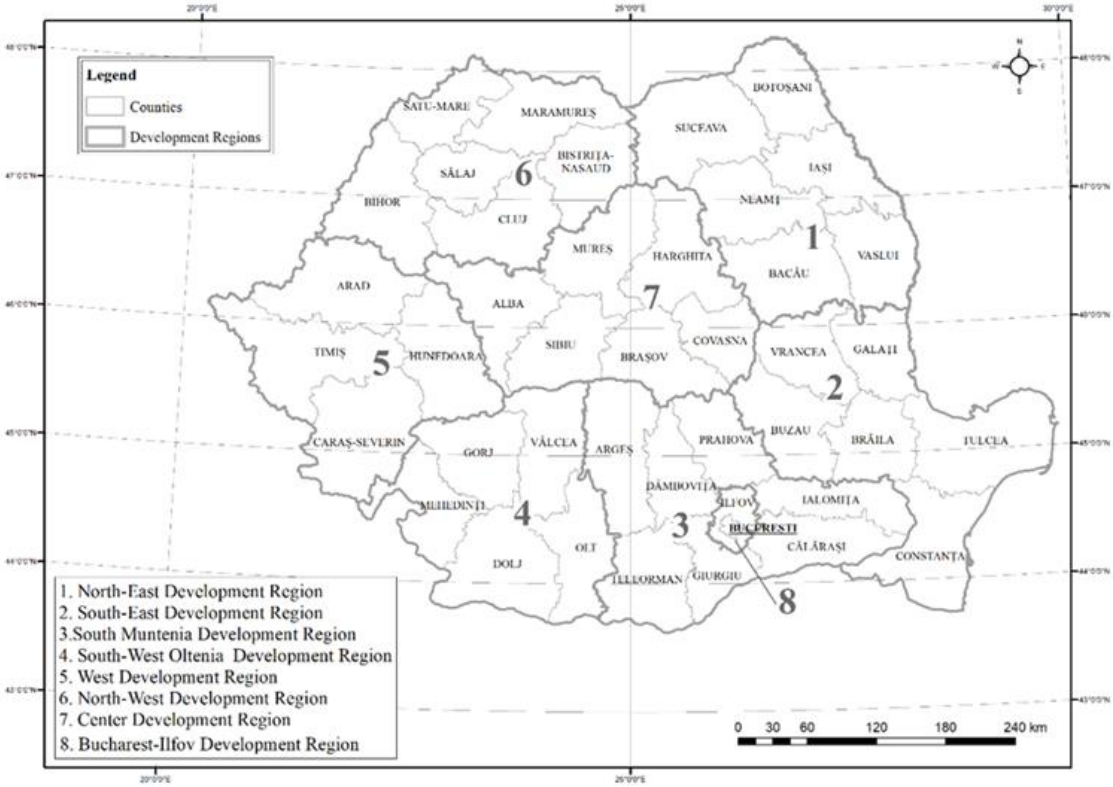

Figure 1. Development regions and counties of Romania

To make the spatial models, several steps were followed, starting with the processing of medical records using a relational database system RDBMS-Postgres SQL, thus generating the database used in this material, a database that allows multiple records. The processing, aggregation and pivoting time depends a lot on the hardware configuration used. Following these steps, the data is exported in tabular form in Microsoft Excel compatible format, so that it can be used later in spatial modeling programs. The data are represented by weight, number of cases of cancer related to the average population.
In the last stage, the spatial models are made using the ArcGis software, assigning to each territorial administrative unit the value that corresponds to it. The results are expressed as a percentage and classified into 5 ranges represented in gray tones, high values with light

tones and low values with dark tones to black. Thus, the pediatric cancer was represented at UAT level for the period 2008-2017.

RESULTS

In the following figures (from fig. No. 2 to fig. No. 11) was represented the geographical distribution of pediatric cancer for the age group 0-18 years, as a percentage, for the period 2008-2017 in the form of spatial models.

Analyzing the 10 spatial models as well as the database used for these representations, several localities were highlighted, either localities with extreme maximum and minimum values, or localities with negative or positive evolutions.

Therefore, the localities in which maximum values were registered above the last threshold of 10 ‰ in one or more years are: Ulmu locality from Calarasi county registers in 2008 a value of 33.41 ‰, 20.86 ‰ in 2009, having a downward trend, reaching 3.82 ‰ in the last year analyzed. Svinita locality from Mehedinti county registers 12.88 ‰ in 2008, 12.04 ‰ in 2009, following the same evolution as of the previously mentioned locality, reaching 0 ‰ in 2017. Another locality with values above the last threshold is Bunesti locality from Brasov county which registers 12, 78 ‰ in 2008, 7.28 ‰ in 2010, decreasing to 0.73 ‰ in 2017. Mihailesti locality from Giurgiu county registers a percentage of 11.49 ‰ in 2008, 1 , 06 ‰ in 2014 and 0.26 ‰ in 2017.

Another category of localities that attracts our attention is the one where the first years analyzed recorded an incidence of 0 ‰, having an accentuated evolution from one year to another. The locality of Boianu Mare from Bihor county registers an incidence of 0 ‰ in the first three years analyzed, reaching 29.66 ‰ in 2017, with a constant evolution after the 3 years without cancer cases. Recea-Cristur locality from Cluj county registers 0 incidence in the years 2008, 2009, 2012, 2014 and 2015, with a maximum in 2017, 12.28 ‰. Another locality highlighted is Buesti from Ialomita county with 0 ‰ incidence in 9 consecutive years and 10.75 ‰ incidence in 2017. In Sacel locality from Harghita county a similar phenomenon happens, values from the first threshold or 0 ‰ incidence are maintained, reaching maximum in 2017, 9.59 ‰.

What we can observe both from the cartographic representations and from the statistical database is the fact that the evolution of the incident is not exactly ascending or descending, it shows sudden fluctuations, increases or decreases either with isolated locations or specific areas with the same features.

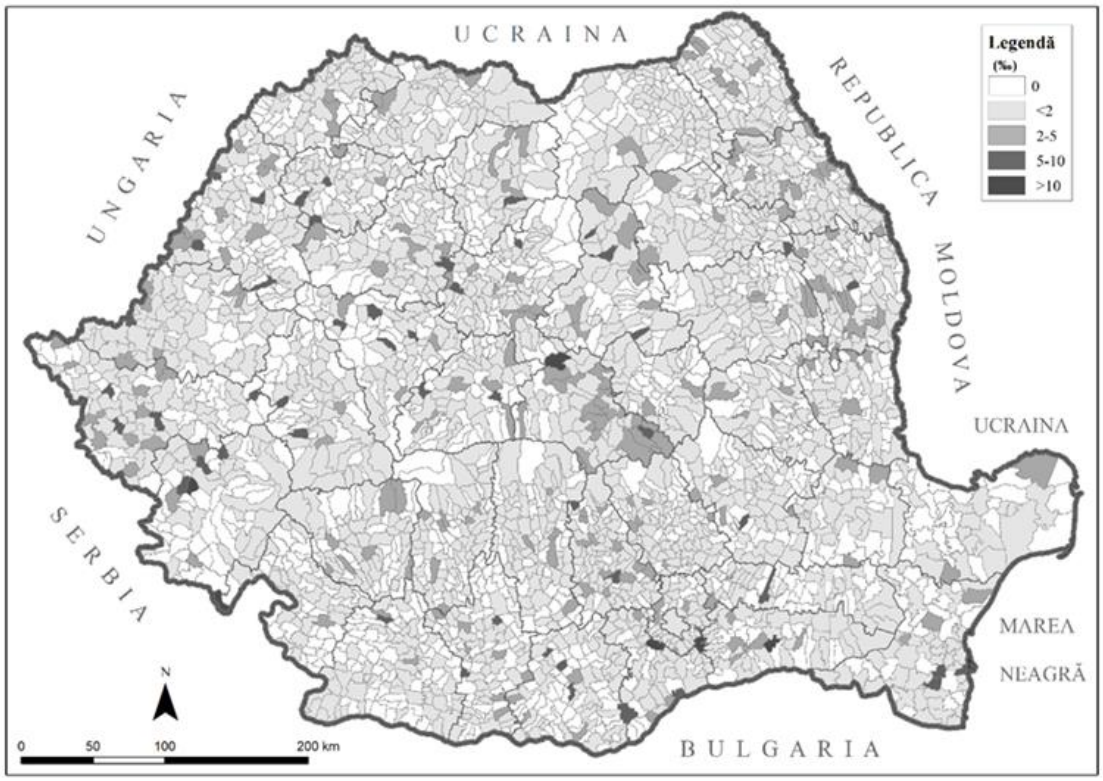

Figure 2. Geographical distribution of pediatric cancer -total (‰) year 2008.
Source: Ministry of Health

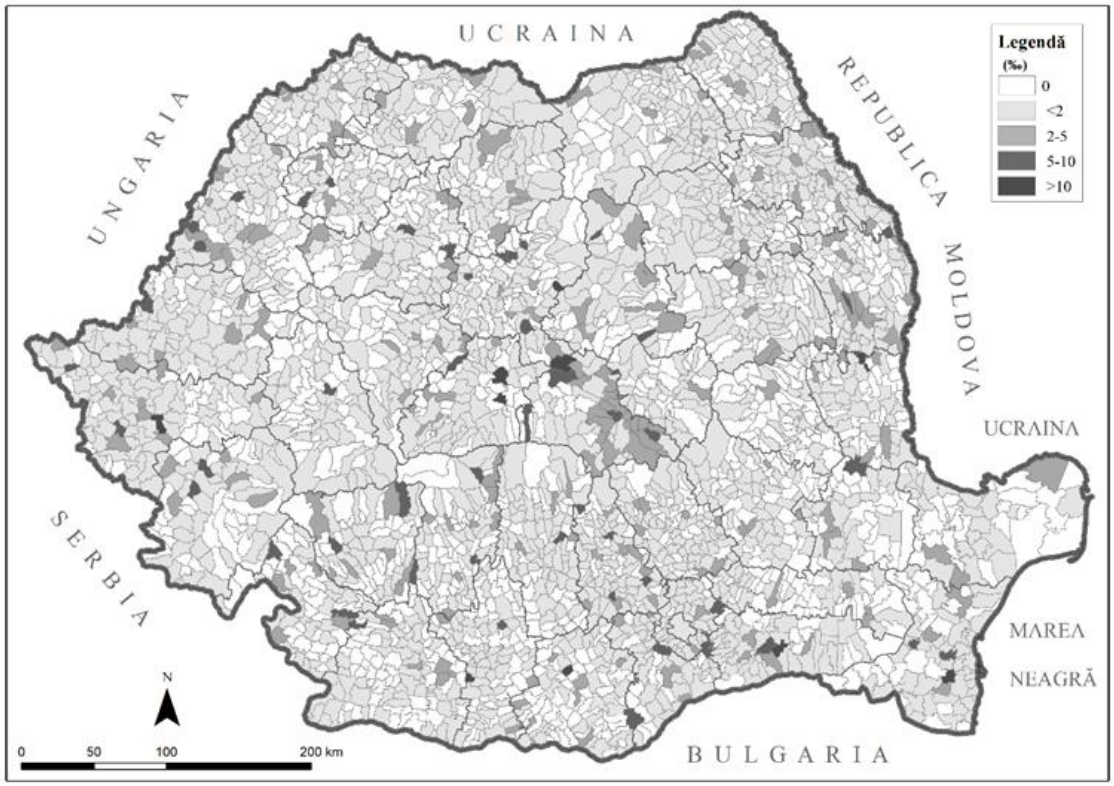

Figure 3. Geographical distribution of pediatric cancer - total (‰) year 2009.
Source: Ministry of Health

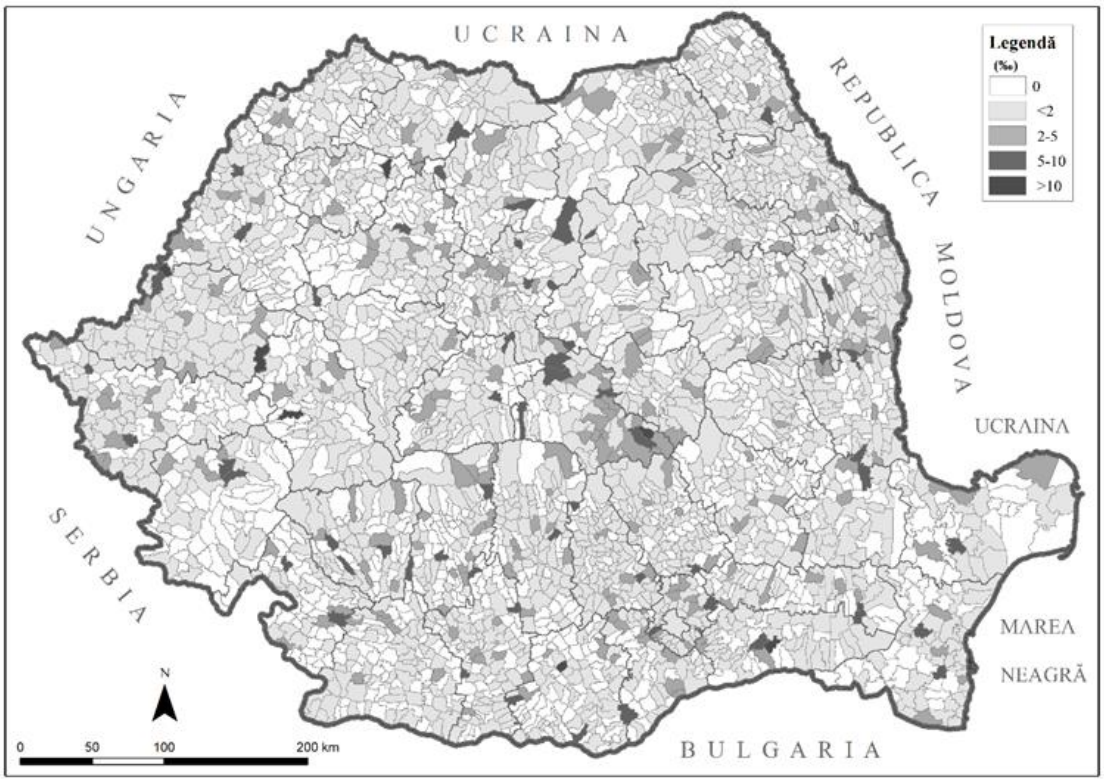

Figure 4. Geographical distribution of pediatric cancer -total (‰) year 2010.
Source: Ministry of Health

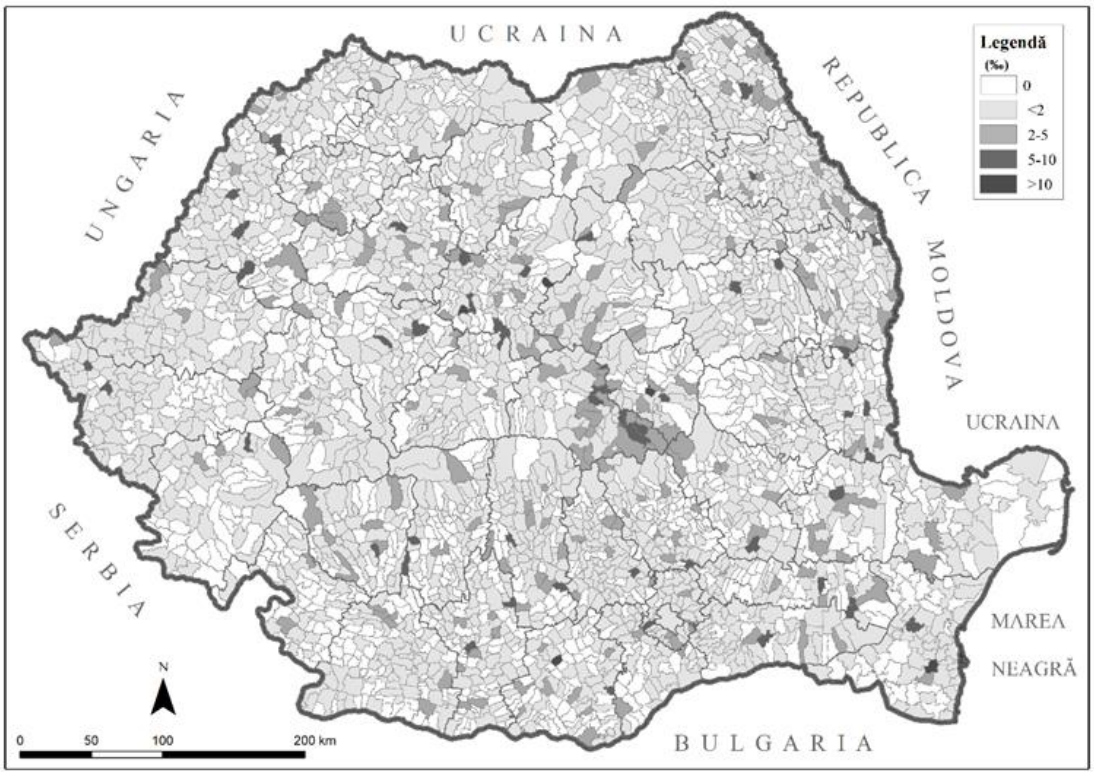

Figure 5. Geographical distribution of pediatric cancer -total (‰) year 2011.
Source: Ministry of Health

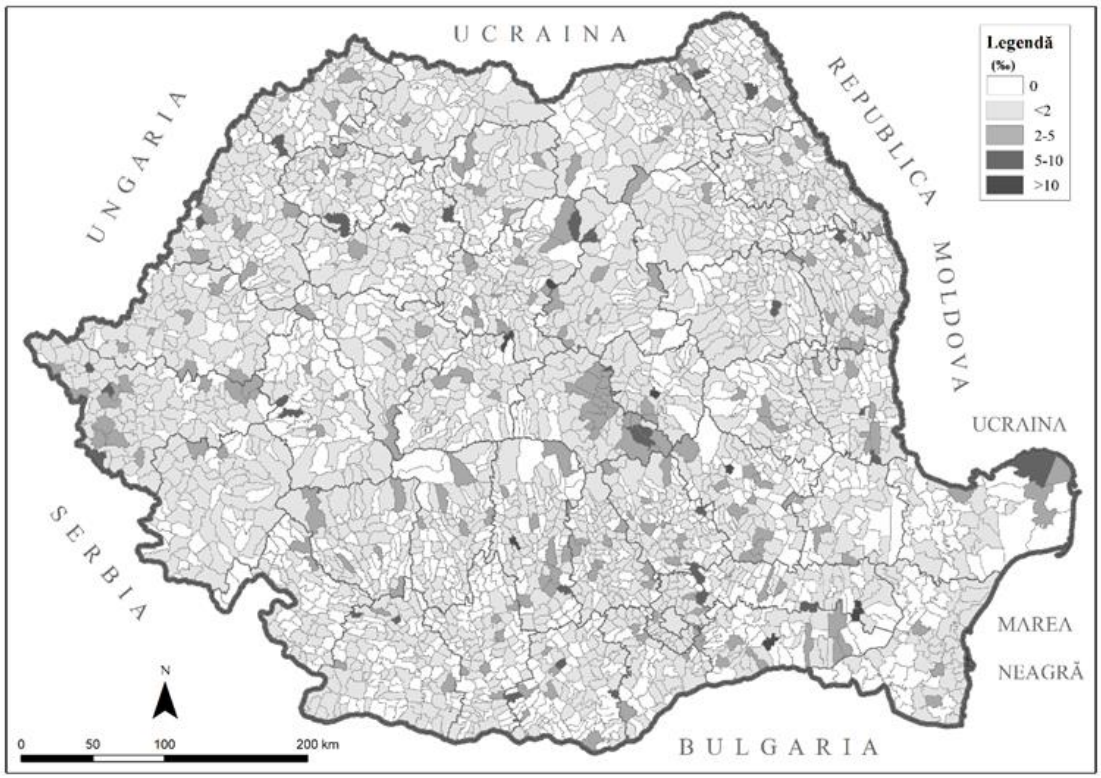

Figure 6. Geographical distribution of pediatric cancer -total (‰) year 2012.
Source: Ministry of Health

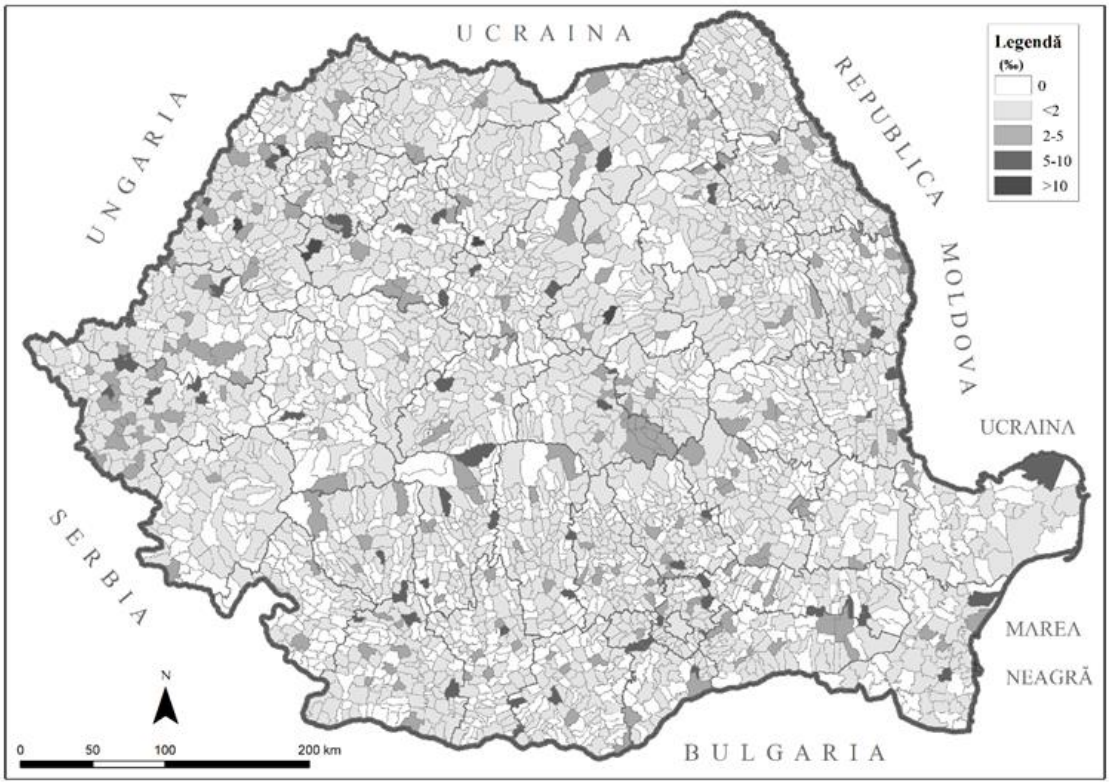

Figure 7. Geographical distribution of pediatric cancer -total (‰) year 2013.
Source: Ministry of Health

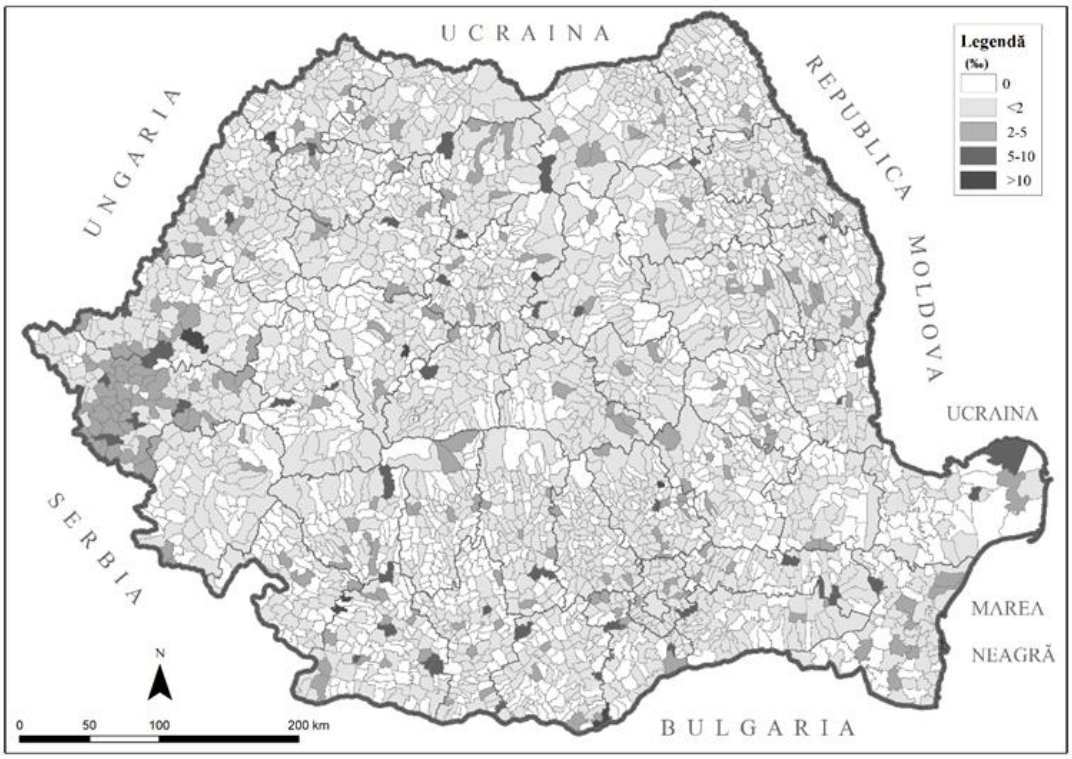

Figure 8. Geographical distribution of pediatric cancer -total (‰) year 2014.
Source: Ministry of Health

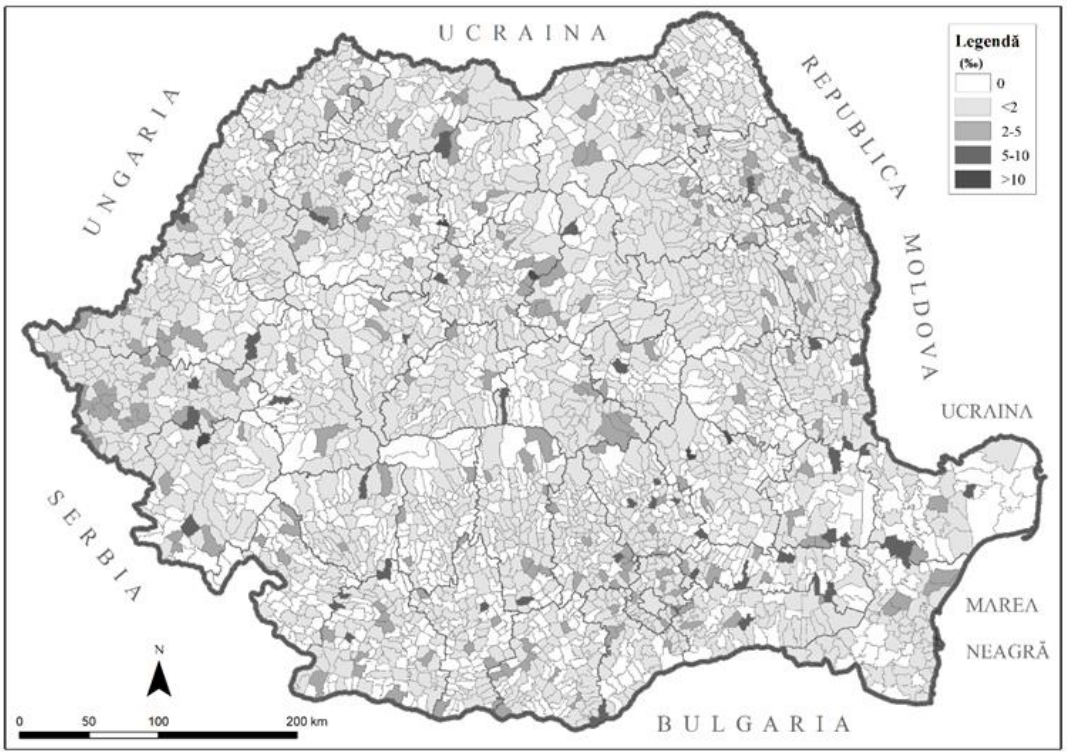

Figure 9. Geographical distribution of pediatric cancer -total (‰) year 2015.
Source: Ministry of Health

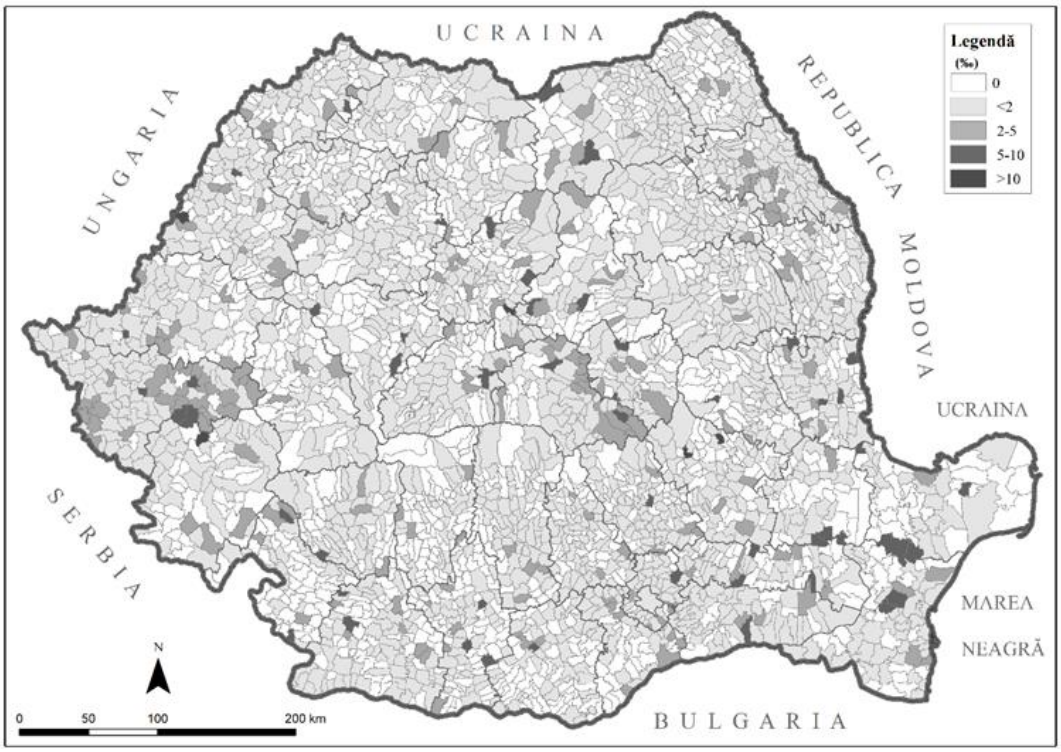

Figure 10. Geographical distribution of pediatric cancer -total (‰) year 2016.
Source: Ministry of Health

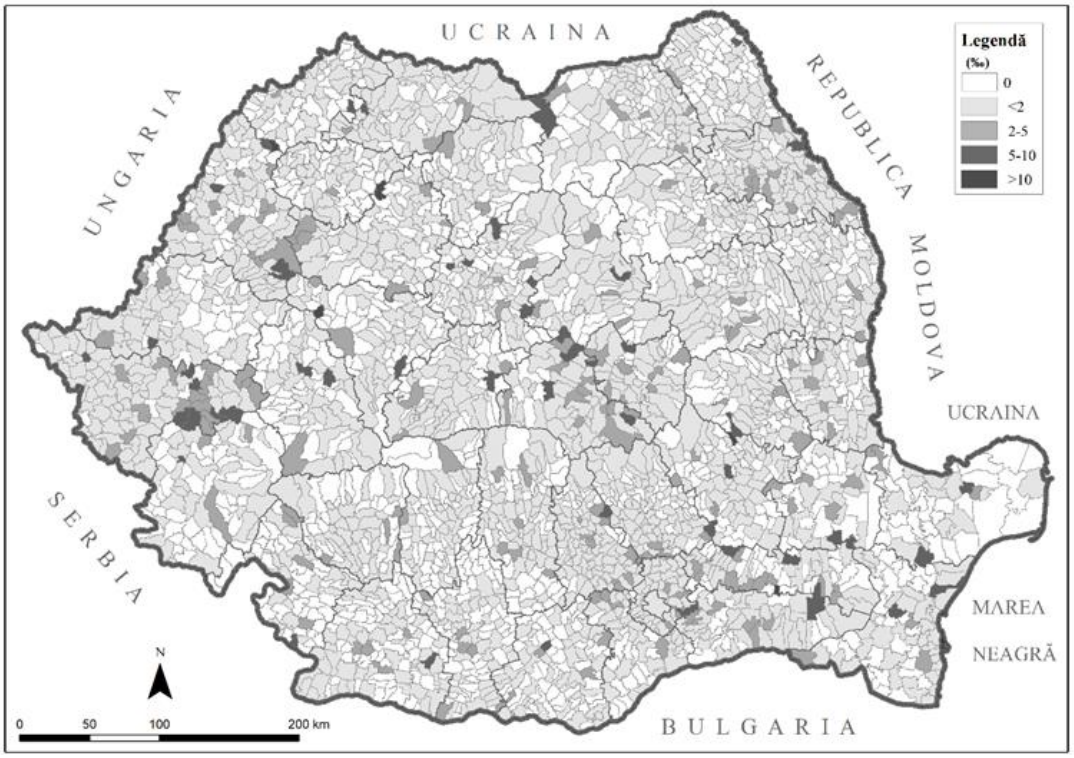

Figure 11. Geographical distribution of pediatric cancer -total (‰) year 2017.
Source: Ministry of Health

CONCLUSIONS

Analyzing the literature, we noticed that the lack of relevant data is a general problem, not having relevant data at a detailed level implies irrelevant results. For a better understanding of this phenomenon and making of public policy or to support the existing ones, it is necessary to know the space in which this phenomenon takes place, to know the geographical specificity of the areas with extreme values and to try to establish the common elements of these geographical areas. This study represents the first approach to the pediatric cancer situation in Romania from this point of view, which will be followed by a more detailed research. The extreme maximum values tend to be located near large industrial areas heavily polluted, especially during periods of maximum capacity.

DISCUSSIONS

As mentioned earlier, the survival rate for pediatric cancer has increased significantly since the 1990s worldwide due to advances in medicine, but has stagnated for various reasons, one of which is the discrepancy between countries' incomes, development and prioritization of medical system. In Romania, as well as in neighboring countries such as Bulgaria, Hungary, the Republic of Moldova (Eastern Europe), the survival rate of the young population is about 70%, 10 percent less than Western Europe.

In order to be able to take measures in this directive, it is necessary to implement defining public policies to support those affected, and for this we need to know the incidence of existing cases and new cases, a first step is made by associations such as the association "Dăruiește Aripi" which wants to develop a National Register of Pediatric Oncology. [13], [14].

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HERALDIC AND VEXILOLOGICAL COMPOSITIONS IN TOURIST PRESENTATIONS OF HERITAGE MONUMENTS - CASE STUDY SFANTUL GHEORGHE-CEL-NOU CHURCH FROM BUCHAREST

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ABSTRACT

The tourist presentations have the role of attractig attention due to the uniqueness of the information provided. Heraldic compositions are quite appealing and can become important elements in the discourse of a tourist presentation. Our study aims to highlight the coats of arms and the flag embroidered, sewn, engraved, painted, sculpted, cast or moulded, woven, objects that exist at the St. Gheorghe-Nou Church in Bucharest, the place where, among others, there are buried the rulers of Wallachia, Constantin Brancoveanu (1688-1714) and Ioan Mavrocordat (1716-1719). The funeral service of the poet Mihai Eminescu took place at this church, which is famous as a monument of Brancoveanu art in the Romanian capital-city. For the preparation of this study we have researched the church building, the bell, the frontispiece, the inscription, the perforated railings of the front porch and the staircase at the back entrance, the tombstone of Constantin Brâncoveanu's tomb, the scraper cover lid of the tomb containing the relics of Constantin Brâncoveanu, a few tetrapodes, the iconostasis, the carpet, the tablecloths, the curtains and the special curtain (the church flag) inside it. Regarding the actual description of the different types of coats of arms and the flag, we have complied with the heraldic and vexillological norms. We have taken into account the interest that these testimonies may arise in tourists, pilgrims, teachers, pupils and students alike, especially since the vexillological and heraldic sources can serve both to a better understanding of some historical phenomena and to distinguishing the symbols by which the ctitors and artists expressed their thoughts and aspirations. Our study is an impetus for the detection, analysis and placement in the scientific circuit and other sources of this kind, still unknown to tourists and to the general public.

Keywords: St. Gheorghe-Nou, coat of arms, flag, heraldry, vexillology, tourism.

INTRODUCTION

At Sfântul Gheorghe Square, at the zero kilometer of Bucharest city, there has been guarding, for centuries, the church called Sfântul Gheorghe-Nou (The New Saint Ghorge

Church), an important monument of Romanian art and wit, that is dedicated to the patron saints: Saint George the Great Martyr [2], Saint Hierarch Nicolae, The Holy Martyr Saints of Brâncoveni and the Holy Pious Parascheva. Constantin Brâncoveanu, the ruler of Walachia / Ţara Româneasca (1688-1714), built, between 1705-1707, the Sfântul Gheorghe-Nou Church [3] on the place of an older edifice founded during the 16th century by Dobruş Banul [2], [9], [11], [18]. St. Gheorghe-Nou Church imitates, to greater proportions, the model of the church of Hurezi Monastery [11], "the pearl of Brâncoveanu style architecture" [2], being the largest building founded within Brâncoveanu ruling period [8], [12] from the capital-city of Romania. In a different perspective, the craftsmen from Hurezi Monastery [4], [15] who also worked to build the Church of Sfântul Gheorghe-Nou, were: Istrate - wood carpenter, Manea - bricklayer, Pârvu Mutu - painter [2], [17] and Vucașin Caragea - stonemason [10].

The church was consecrated on June 29, 1707, on the feast of the Holy Apostles Peter and Paul, in the presence of Hrisant Nottara, the patriarch of Jerusalem [2]. In the church, there is yet the tomb of Constantin Brâncoveanu [1], [2], [6], [7], [9], [11], [17], [20], although, during his lifetime, he had prepared a splendid white marble sarcophagus at the Monastery Hurezi where, according to the will of the ruler, his earthly remains would have to be rested [19]. In the summer of 1720,under favorable circumstances, Mrs. Marica, the widow of Constantin Brâncoveanu, displaced the ruler's remains in Bucharest city, where she deposited them with great respect in a specidfically - built tomb inside St. Gheorghe- Nou' s Church [2], [8], [17], near the tomb of the fanariot Mr. Ioan Mavrocordat [1], [11]. In 1729, the lady Marica Brâncoveanu was also buried with her martyr husband, in the same church of Saint Gheorghe-Nou [2].

At this church, pilgrims, tourists, pupils, students, teachers can discover architecture, painting, sculpture, religious art, a flag (religious flag), coats of arms and other traces, materials that all refer to the objective worth visiting. I have described and rendered the heraldic and vexillology insignia and particular symbols preserved at this church, which have been embroidered, engraved, painted, cast, woven, sculpted on the building and on the objects from outside and inside it (positioned, for the most part, from right to left and in counterclockwise direction). We did not insist on their importance as historical sources. We insisted on the description, reproduction and symbolism of the flag and coats of arms, which may contribute to highlighting the artistic activity.

METHODOLOGY

Regarding the method performed in this study, we went through the following steps: 1. Identification of the Church of St. Gheorghe-Nou in Bucharest where there is located, or which owns such heraldic and vexillology compositions; 2. Visiting the building and researching these testimonies, whether they were reproduced on the frontispiece building, of stone, wood, metal, marble slabs, carpets, curtains, tablecloths or any other material; 3. Analysis of the coats of arms and the church flag in accordance with heraldic norms and vexillology; 4.

Bringing these sources to the attention of the public concerned, through various specialized studies, events, visits, but also by promoting, for tourism purposes, heraldic, vexillology, as well as for the importance and remembering of the institution that owns them.

RESULTS

A. On the vault on the frontispiece of the church (where Constantin Brâncoveanu, as well as his four sons, the counselor Ianache, too, and Jesus Christ in a position of glory (fig. 1), are all painted), at the base of its arch, on one side and on the other, there is painted twice in two round shields, with golden borders, on a red background, the heraldic coat of arms of Wallachia: on the left, the bird, rendered in full and in front –viewed position, with wide - open wings and flying downwards, standing with its feet on a mountain, with its body facing to the right side, his head turned to the left, holding a cross in its beak, and to the right, the same bird, only shown with the body towards senestra and the head facing right side, all golden. Above the two shields there appears twice as well, in other shields similar to the first, the coat of arms of the Cantacuzino family: the bicephalous eagle [5], crowned with an open crown, holding in his claws the insignia of power: on the right the mace, to the left the sword, all golden (fig. 2).

Figure 1. and **Figure 2**. The vault on the frontispiece of the Church of St. Gheorghe-Nou from Bucharest, including, at the top, the heraldic coats of arms of Wallachia and the Cantacuzino family.

B. The porch, in the shape of a rectangle, arranged transversely on the axis of the church, surrounded by a stone parapet (Cărămizaru, 2014) that rises upon fourteen columns of stone (eight frontally and three on each side), which are based on a rhododendron flower carved in excision (relief), has, on the front, left and right sides, three railings, with acanthus plants with leaves and flowers, perforated, but also with the heraldic coat of arms of Wallachia [2] located on two of them, as follows: on the right side of the front railing (fig. 4), the crucified bird (fig. 3) and on the left railing (fig. 5), the same bird, but rendered with its head turned to the right wing (fig. 6) [15]. The staircase leading to the back door of the church also has a railing on which there is carved, by piercing, framed by acanthus rods, the crucified bird flanked, high, by the sun and crescent moon (fig. 7).

Figure 3., **Figure 4.**, **Figure 5**. **Figure 6.** and **Figure 7**. The heraldic coat of arms of Wallachia on the railing on the right front, on the railing on the left side of the porch and on the railing of the access staircase to the back door of the Church St. Gheorghe-Nou from Bucharest

C. On the inscription from 1699 [2] of the church (fig. 9) there is sculpted again the heraldic coat of arms of Wallachia (fig. 8). Above the front door of the church, framed, on the flanks, by acanthus plants with leaves and flowers and, below, two cherubim (fig. 11), the same coat of arms is carved as above (fig. 10).

Figure 8. Figure 9. Figure 10. and **Figure 11.**. The heraldic coat of arms of Wallachia on the inscription from 1699 and in the frame above the door at the front entrance of the Church of St. Gheorghe-Nou in Bucharest.

D. On the gilded canopy, on the right side of the narthex of the church (fig. 14), worked in Brâncoveanu's style, which protects the casket, made of gilded silver, containing the relics of St. Constantin Brâncoveanu [2], in two rectangular frames, positioned above the twisted pillars, there are represented, in two oval shields, surrounded by acanthus plants with leaves and flowers, in the left one (fig. 13) - the coat of arms of Wallachia [13] (fig. 12), while in the right one (fig. 15) - the coat of arms of the Cantacuzins (fig. 16). On the inside of the crypt lid / scraper cover (fig. 18) mentioned above, decorated with acanthus ornaments and with three oval medallions, in the central one appearing the bust of the voivode Constantin Brâncoveanu, guarded, on the left (fig. 17) and on the right (fig. 19), by two crossed birds similar to those described above, rendered with the heads facing frontwards and facing the ruler. On the outside of the crypt lid / scraper cover (fig. 21) having engraved, in the center, the Holy Martyr Constantin Vodă (voivode) Brâncoveanu holding the cross in his right hand, while in his left - a deed act, showed un-rolled, in the middle of the edge, framed by acanthus plants with leaves and flowers, there appears the specific family coat of arms of the Cantacuzinos (fig. 20).

Figure 12. Figure 13. Figure 14. Figure 15. and **Figure 16.**. The heraldic coat of arms of Wallachia in the frame on the left side and the coat of arms of the Cantacuzinos in the frame on the right side of the canopy that protects the chest with the relics of Constantin Brâncoveanu.

Figure 17. Figure 18. and **Figure 19.** The heraldic bird of Wallachia (in two hypostases) on the inside of the lid of the crypt containing the relics of Constantin Brâncoveanu.

Figure 20. and **Figure 21.** The coat of arms of the Cantacuzino family on the outside of the scraper lid with the relics of Constantin Brâncoveanu

E. Also in the narthex of the St. Gheorghe-Nou church there are two tombstones made of white marble (with borders equipped with vegetal and floral ornaments): one (in the distant plan) covers the tomb of the ruler Ioan Mavrocordat (fig. 23), and the other (in the closer plan), without inscription, covers the tomb of the founder Constantin Brâncoveanu. The one on the tomb of Ioan Mavrocordat includes, in the upper part, the heraldic coat of arms of Wallachia [2] (fig. 22). The slab on the tomb of the illustrious Brâncoveanu (fig. 25) also includes, in the upper part, the coat of arms of the Cantacuzino family combined with the heraldic coat of arms of Wallachia, namely: the bicephalous eagle, from which there protrudes entirely, between shoulders and neck, the sword pointing upwards, as well as the mace, both flaked by the sun and the crescent; on the eagle's chest and stomach there appears the crucified bird [17] (fig. 24).

Figure 22. Figure 23. Figure 24. and **Figure 25**. Coats of arms on the tombstones of the rulers Ioan Mavrocordat (left) and Constantin Brâncoveanu (right).

F. On the facades of four tetrapods, placed in front of the iconostasis and on the left side of the narthex, is engraved, in different hypostases, the coat of arms of the Cantacuzins [14], namely: 1) silver bicephalous eagle, positioned in the center, holding in his right claw the sword, to the left the cruciferous globe (fig. 26), bordered by two pals laden with wavy vines (fig. 27); 2) the two-headed eagle, crowned with an open crown, with five fleurons (fig. 28), located in the lower register, which stands above a trefoil cross supported by two modilions [16] (fig. 29); 3) the bicephalous eagle, crowned with an open crown, flanked by two horns of abundance (fig. 30) and inscribed in a rectangular frame of the same metal (fig. 31); 4) two-headed eagle, crowned with an open crown, placed in two rectangular frames, one at the top (fig. 32), the other at the bottom (fig. 34) and joined by four metal pillars (fig. 33).

Figure 26. Figure 27. Figure 28. Figure 29. Figure 30. Figure 31. Figure 32. Figure 33. and **Figure 34**. The bicephalous eagle on the facades of four tetrapods inside the Church of St. Gheorghe-Nou in Bucharest

G. On the iconostasis (fig. 36), in the upper register, in the middle, there is a small hexagon (symbol of work, rigor and collective effort) [15] of acanthus leaves, in which a round shield loaded with the bicephalous eagle is inscribed, holding in its right claw the mace, in its left the sword, all golden (fig. 35).

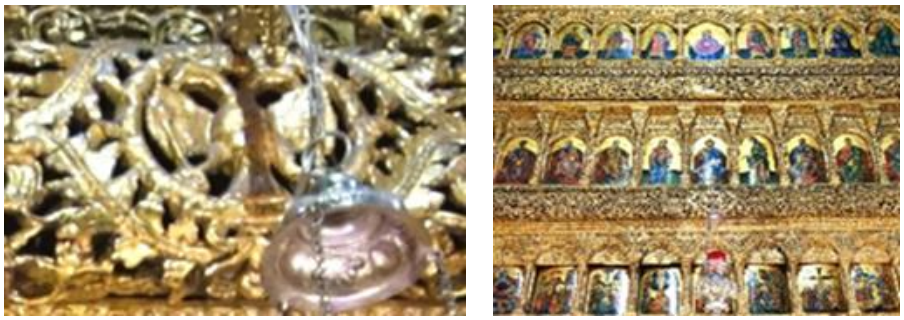

Figure 35. and **Figure 36**. Coat of arms of the Cantacuzino family on the iconostasis of the Church of St. Gheorghe-Nou Church in Bucharest

H. On the three purple curtains of the iconostasis (fig. 38) there is embroidered, with golden thread, the heraldic coat of arms of Wallachia (fig. 37).

Figure 37. and **Figure 38.**. The heraldic coat of arms of Wallachia embroidered on the three curtains from the iconostasis of the Church of St. Gheorghe-Nou in Bucharest

I. On the church floor, a few meters away from the iconostasis, in the center, made of marble mosaic, there is the heraldic coat of arms of Wallachia (fig. 39).

Figure 39. The heraldic coat of arms of Wallachia made of marble mosaic on the floor of the Church of St. Gheorghe-Nou in Bucharest.

J. On the gilded canopy, on the left side of the church narthex, which protects the crypts with the relics of the Holy Martyr Emilian from Durostor, of the Holy Hierarch Nicolae, the Archbishop of Lycia (right hand) [2] and the vestment of the Holy Pious Parascheva (fig. 41), in the upper register, positioned above the twisted pillars in the twist, on the corners, there is represented, in two round shields, surrounded by acanthus plants with leaves and flowers, the coat of arms of Wallachia: in the left, the bird crossed with its head turned to the wing right (fig. 40), and in the one on the right, the bird crossed with its head turned towards the left wing (fig. 42).

Figure 40. Figure 41. and **Figure 42.** The heraldic coat of arms of Wallachia (in double hypostasis) on the upper corners of the canopy that protects the crypts with the relics of the Holy Hierarch Nicholas, the Archbishop of Lycia (right hand).

K. On some tablecloths inside the church, alternating with radiant crosses, with golden vegetal and floral ornaments, on a purple background, there appears the bicephalous eagle sewn, crowned with a closed crown finished with a cross [14] (fig. 43).

Figure 43. Bicephalous eagle multiplied on tablecloths inside the Church of St. Gheorghe-Nou in Bucharest.

L. The church flag called “prapur”, attached downside to the stem, is made of purple velvet, endowed with fringes, with three golden tassels at the tops of the three tails (fig. 44) and has on the flag, embroidered, the image of Saint George on horseback and piercing with his spear (finished in cross) the dragon at the bottom, at the horse's feet (fig.

45). In the upper register, the flag has four seraphim embroidered on the corners, and on the four sides, starting from the bottom and clockwise, the text embroidered with gold thread, written in Romanian, in capital letters: VICTORY CARRIERS, LARGE MARTYR GEORGE / PRAY ON CHRIST GOD TO SAVE OUR SOULS / AS A SAVIOR OF THE SLAVES AND THE PROTECTOR OF THE POOR / THE DOCTOR OF THE SICK, THE HELPER OF THE LEADERS.

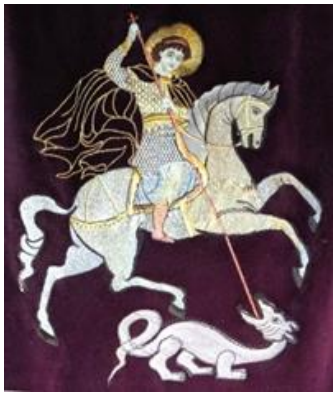

Figure 44. and **Figure 45**. The flag (the so-called "prapur" inside the Church of St. Gheorghe-Nou in Bucharest, in which St. Gheorghe is depicted while piercing the dragon.

CONCLUSIONS

Heraldic and vexillological springs represent a distinct section of the universal cultural heritage. The coats of arms are meant to individualize the owners and to express their duties and responsabilities. Demonstrating the scientific nature of the activity of identifying the symbols used, as well as the multitude of information transmitted by these heraldic and vexillological sources, there is an increasing interest in researching these types of signs that can serve to better understand the historical phenomena, but also to decipher the symbols by which the ancestors expressed their aspirations and thoughts.

In elaborating this study, we took into account the interest that these coats of arms, blazons and flags can present for teachers, students, pilgrims, but also for tourists. Our study is also an incentive for other researchers to detect, analyze and introduce into the scientific circuit other pieces of evidence of this kind, which may be still unknown to the general public.

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THE ANALYSIS OF THE LOAN INDEBTFULNESS DEGREE OF ROMANIA'S POPULATION DURING THE YEARS 2002- 2019

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ABSTRACT

The financial system is a set of arrangements and conventions that facilitate the transfer of money from its holders to those who need it. Our study performs an analysis of loans offered by banks to individuals. The loans have been granted, following the requests, both in lei (the national currency of Romania) or in the international currency as well. The analysis is performed based on data provided by the National Bank of Romania and the National Bank Deposit Guarantee Fund of Romania (FGDB) and presents the situation in each county and development region in Romania. Methodologically, in this study there have been rendered as for the period 2002-2019, two aspects: firstly the ratio between loans in national currency compared to loans in international currencies and, secondly, the relationship between accessing and the evolution of loans for houses/ flats in relation to the access and evolution of loans for personal needs, both in the national currency or in the international currency as well. A special analysis showed a clear representation of the way the situation has been treated, for both mentioned aspects, as well as the distribution of the results on the geographical regions of Romania. In this way, the results highlight the differentiated behavior of the population in each geographical region. The present study is only a part of a much more detailed analysis that follows the analysis of the indebtedness of the Romanian population, in which other indicators are also present.

Keywords: bank credit, financial system, population, currency, geographical region

INTRODUCTION

The analysis of the economic situation in a certain state is performed by a series of indicators. Among them, the degree of indebtedness of the population represents a starting point [11]. Accessing home loans or personal loans are important indicators for assessing the general economic situation in that area [2]. A loan is accepted only if, after having been made a detailed financial analysis, there is obtained a clear result of the real possibilities of paying back the borrowed amount, by the person requesting this loan [1], [3]. Precisely this fact is seen not only as a level of indebtedness of the population, with a slightly negative connotation but, on the contrary, must be perceived as an indicator of

economic growth of the area, growth of population income [4], [6]. The degree of accessibility for a loan reflects the existence of jobs, of stable salaries and surmounting a certain level. At the same time, incomes belong predominantly to the young and adult population under the age of 55. The orientation of the amounts acquired through loans presents certain peculiarities; personal loans are directed to the purchase of household goods, but also to vacations and treatments, including spa. This has clear effects on the quality of life, despite the degree of indebtedness acquired [10], [16].

METHODOLOGY

Methodologically, this study analyzes the degree of indebtedness through bank loans of the Romanian population in the period 2002-2019. This analysis has been performed at county level for each of the mentioned period. Equally, two forms of credit were taken into account: the home loan and the personal loan. In order to create a complete picture of these loans, the loans in lei (the national currency of Romania) and the loans in other currencies of international circulation were added together. These were converted into lei- value equivalent, at the official exchange rate of the NBR (National Bank of Romania) in that period, for each type of currency. This way the total amount analyzed was the one in the national currency (leu). The graphical representation has been made in ArcGIS, by using vector data for the administrative-territorial units (counties), establishing nine classes of value ranges. The size classes took into account the maximum and minimum values resulting from the general analyses.

RESULTS

The results highlight the differentiated behavior of the population in each geographical region, within each year analyzed from 2002-2019. In 2002, the degree of indebtedness of the population by accessing loans, regardless of their form, was relatively uniform in Romania (Fig. 1). However, Constanta (Constanta county, Dobrogea), Bacau (Bacau county, Bacau city and Iasi county - Moldavia), Cluj (Cluj county, Transylvania), Craiova (Dolj county, Oltenia), Ploiesti (Prahova county, Muntenia) and Timisoara (Timis county, Banat). The situation continues in a similar way in the following years (fig.2 and fig. 3).

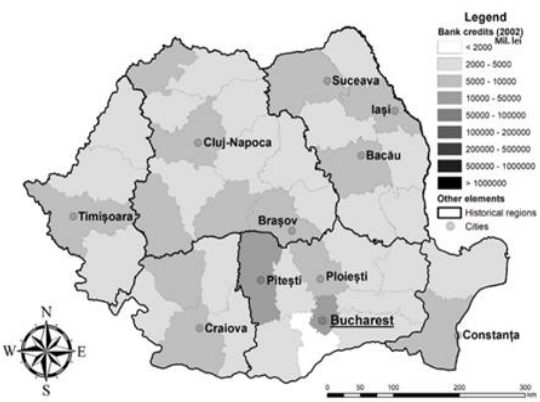

Figure 1. The degree of indebtedness of the Romanian population in 2002 (mil. Lei)

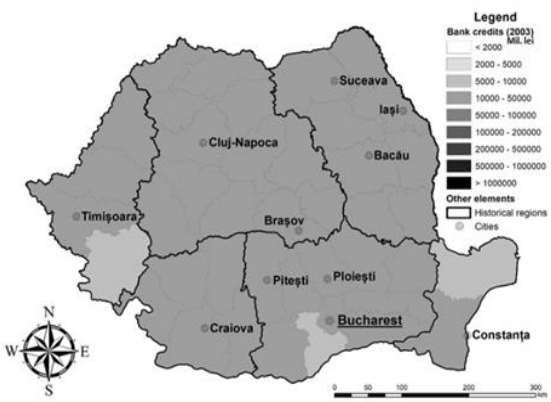

Figure 2. The degree of indebtedness of the Romanian population in 2003 (mil. lei)

The population of Constanta stands out by accessing loans and borrow capacity. Its behavior is justified, due to the economic possibilities (salary and additional income registered), taking into account the beneficial economic situation of the largest harbour

city on the Black Sea in Romania. Ploiesti (Prahova County, Muntenia) justifies this economic behavior by the economic importance given by the oil economy (fig. 4 and fig 5). All these are elements that favor the credibility of bank loans. Home loans were supported by special measures by the Romanian State, the first measure, named "first home", when accessibility has increased among young people, with income from all categories. Personal loans are accessed predominantly by the population over the age of 40, for the purchase of household goods or for holidays. Cities or areas where there are registered improvements in investments and where new jobs have appeared or economic growth has been noticed, there are also accesses of loans of the population (fig. 6, fig. 7).

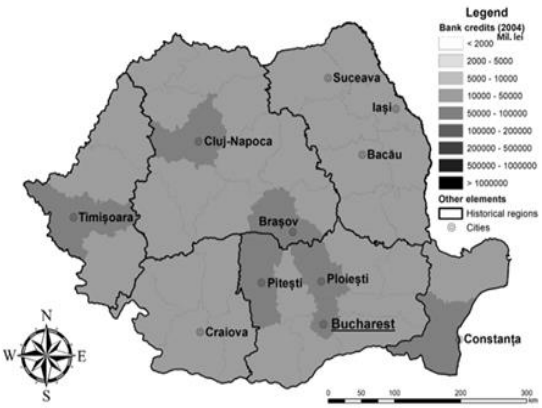

Figure 3. The degree of indebtedness of the Romanian population in 2004 (mil. lei)

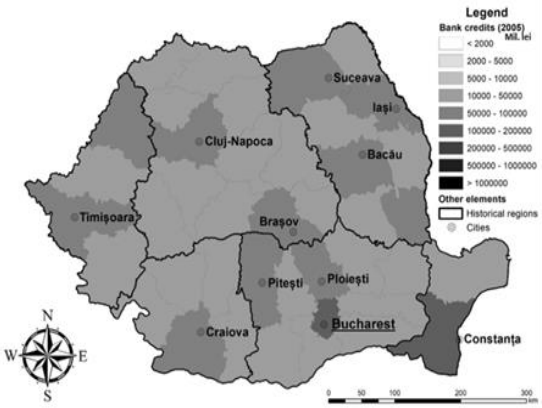

Figure 4. The degree of indebtedness of the Romanian population in 2005 (mil. lei)

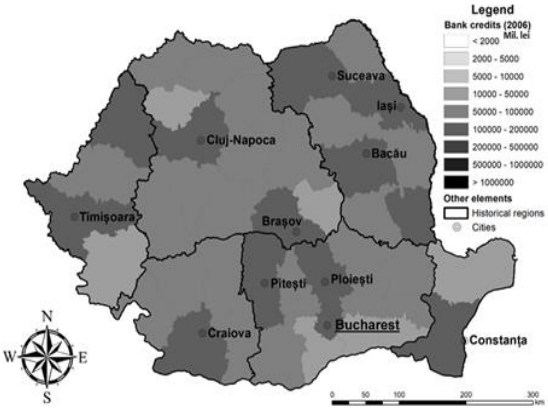

Figure 5. The degree of indebtedness of the Romanian population in 2006 (mil. lei)

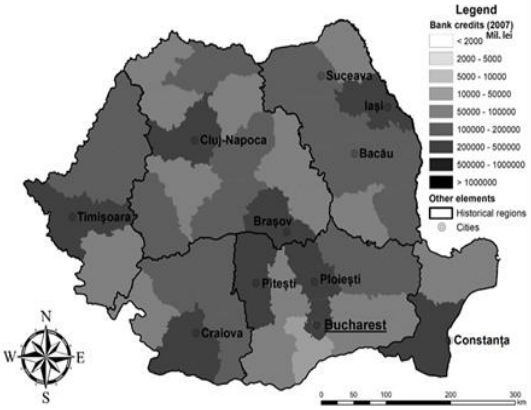

Figure 6. The degree of indebtedness of the Romanian population in 2007 (mil. lei)

The economic crisis from 2008-2010 in Romania is also felt in terms of the accessing to credit forms by the population. There are few areas where borrowed amounts are stagnant or slightly rising. Most banks tighten the conditions for granting loans, based on the increase in the degree of risk (fig. 8 and fig. 9). In this period of crisis, housing loans were granted through the "first home" measure to young people whose job was not based on high salaries, but on areas that were not greatly affected. In addition, there is the guarantee of the Romanian State in case of inability to pay. Accessing loans for personal needs is difficult during this period.

The numerical and value reduction of these types of loans are a result of the behaviour of the population (not assuming the risk of taking a loan) and of the banks through restrictive measures. The next stage in the Romanian economy, after overcoming the difficult

moment of the economic crisis after 2010, the relaxation regarding the granting of loans was felt. Those loans simply "by the I.D. card" through which the banks granted loans without having many requirements related to the source of income of those who were interested in a loan, favoured the rapid increase of the indebtedness of the population. These relaxation measures have gradually diminished. Their effects are visible in the case of the analysis of bank loan arrears [5].

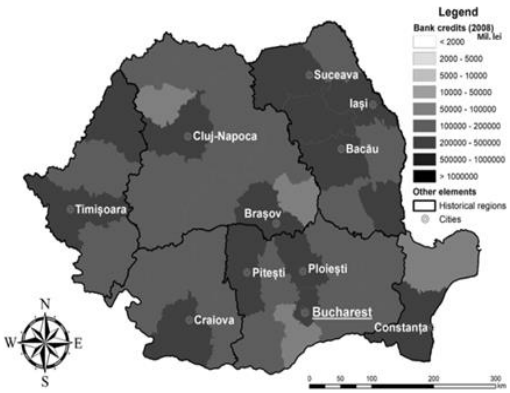

Figure 7. The degree of indebtedness of the Romanian population in 2008 (mil. lei)

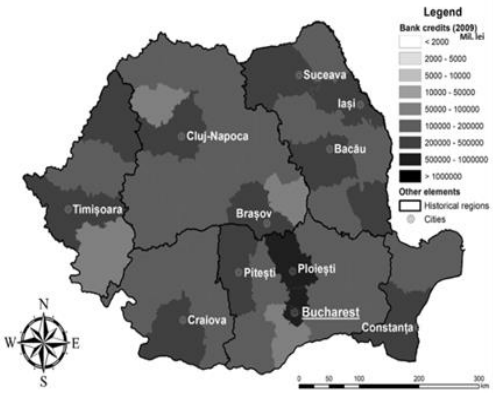

Figure 8. The degree of indebtedness of the Romanian population in 2009 (mil. lei)

recovers from the economic crisis registered in 2008-2010, in Transylvania (Cluj, Brasov, Sibiu, Hunedoara), there are registered increases in terms of access to bank loans, both for housing and personal needs (fig. 10, fig. 11 and fig.12). Another favourable situation for accessing bank loans were the salary increases, both the budgetary ones and the private ones. A series of measures taken regarding the increase of the minimum wage on economy in Romania, favoured this degree of indebtedness of the population to banks through loans for housing and personal needs [9].

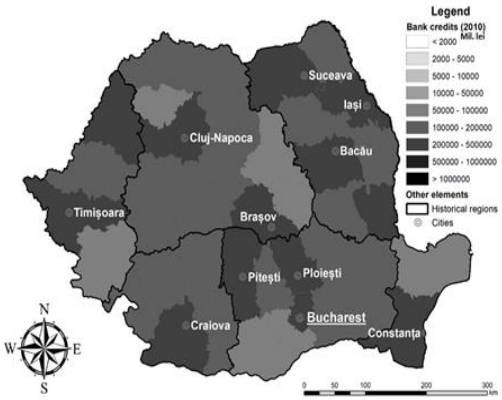

Figure 9. The degree of indebtedness of the Romanian population in 2010 (mil. lei)

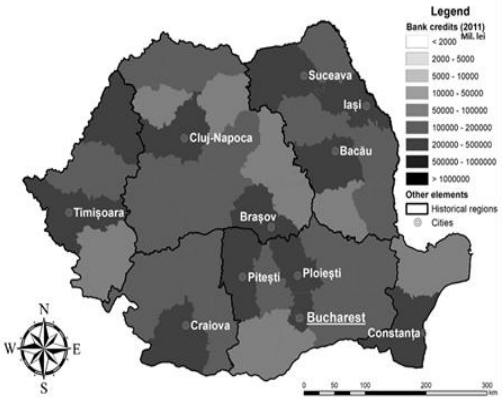

Figure 10. The degree of indebtedness of the Romanian population in 2011 (mil. lei)

During the same period, more and more loans are registered in Banat (Timisoara, Arad) as well as in Oltenia (Craiova, Tg. Jiu) and Moldova (Bacau, Suceava, Iasi), due to the economic stability (fig. 13, Fig. 14, Fig. 15 and Fig. 16). In recent years, Cluj is the one to hold the supremacy in terms of the value of the amount credited, the secondary positions changing between the major economic centers, Constanta, Timisoara and Brasov.

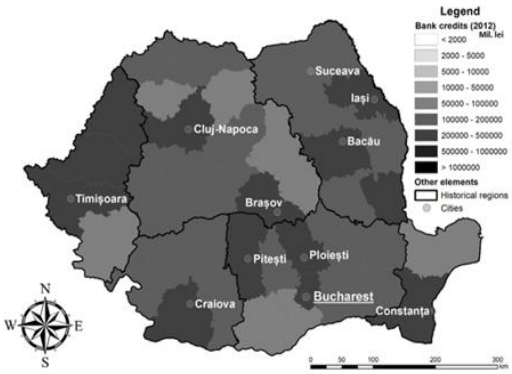

Figure 11 The degree of indebtedness of the Romanian population in 2012 (mil. lei)

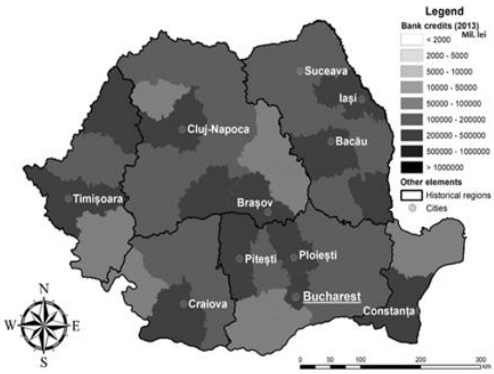

Figure 12. The degree of indebtedness of the Romanian population in 2013 (mil. lei)

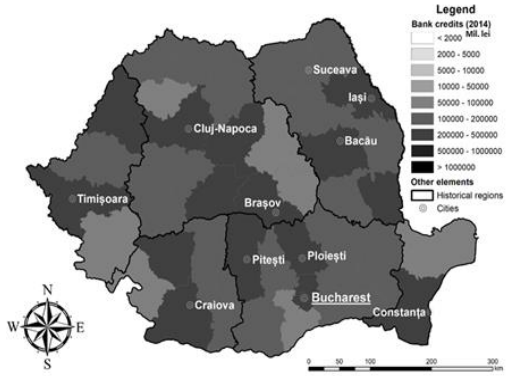

Figure 13. The degree of indebtedness of the Romanian population in 2014 (mil. lei)

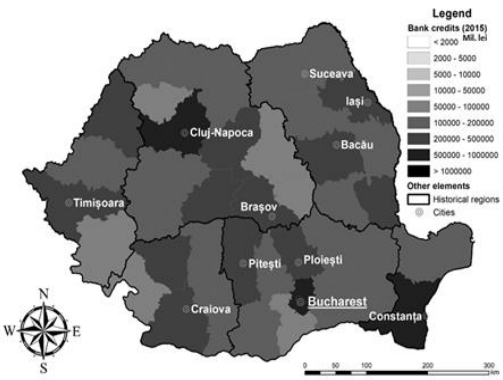

Figure 14. The degree of indebtedness of the Romanian population in 2015 (mil. lei)

New economic sectors have developed in many of Romania's regions. Tourism is one of them, where jobs have been growing throughout 2010-2019. The value of salaries in this sector has increased slightly from one year to another, allowing a continually increasing number of people to access loans for both housing and personal needs [5], [6]. The advantage of this sector consisted of the location of the new centers [7], [12], [11]. Many of the mono-industrial areas (based mainly on mining) have been “born” as a consequence of the development of the service sector, especially tourism.

This way, it is easy to observe how counties such as Hunedoara and Maramures have registered increases in accessing loans. Similar situations are registered in counties such as Tulcea, with the tourist capitalization of the Danube Delta, Buzau County with the capitalization of the Muddy Volcanoes from Paclele Mari, or urban centers with a special historical past and the capitalization of the tourist potential offered by cultural heritage - ethnic [15], [14], [13], [8]. Any economic activity favors conditions for increasing the quality of life, confidence in the possibilities to expand their living space or to purchase certain household goods. All this leads to an increase in the level of access to bank loans (fig.17 and fig.18).

Thus, it is easy to follow how counties such as Hunedoara and Maramures have registered increases in accessing loans. Similar situations are registered in counties such as Tulcea, with the tourist capitalization of the Danube Delta, Buzau County with the capitalization of the Muddy Volcanoes from Paclele Mari, or urban centers with a special historical past and the capitalization of the tourist potential offered by cultural-ethnic heritage. [15], [14], [13]. Any economic activity favours conditions for increasing the quality of life,

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New economic sectors have developed in many of Romania's regions. Tourism is one of them, a domain in which the number of jobs has been growing throughout 2010-2019. The value of salaries in this sector has increased slightly from one year to another, allowing an increasing number of people to access loans for both housing and personal needs [5], [6], [8]. The advantage of this sector consisted of the location of the new centers [7], [12], [11]. Many of the mono-industrial areas (based mainly on mining) have "come to life" following the development of the service sector, especially tourism. This way, it is easy to observe how counties such as Hunedoara and Maramures have registered increases in accessing loans. Similar situations are registered in counties such as Tulcea, with the tourist capitalization of the Danube Delta, Buzau County with the capitalization of the Muddy Volcanoes from Paclele Mari, or urban centers with a special historical past and the capitalization of the tourist potential offered by cultural-ethnic heritage. [15], [14], [13]. Any economic activity favours conditions for increasing the quality of life, confidence in the possibilities to expand their living space or to purchase certain household goods. All these lead to an increase in the level of access to bank loans (fig.17 and fig.18).

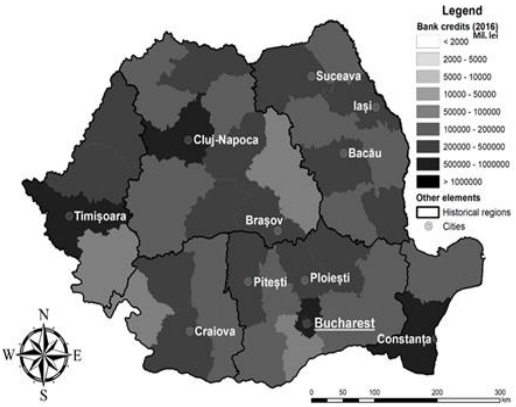

Figure 15. The degree of indebtedness of the Romanian population in 2016 (mil. lei)

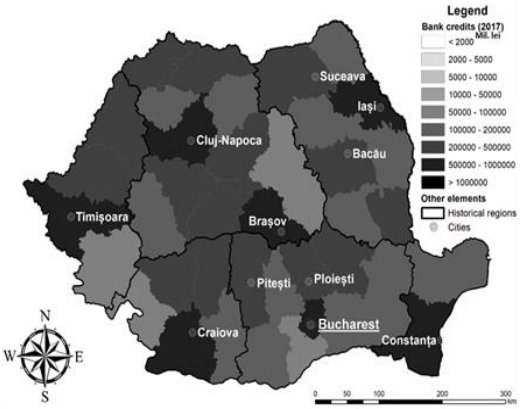

Figure 16. The degree of indebtedness of the Romanian population in 2017 (mil. lei)

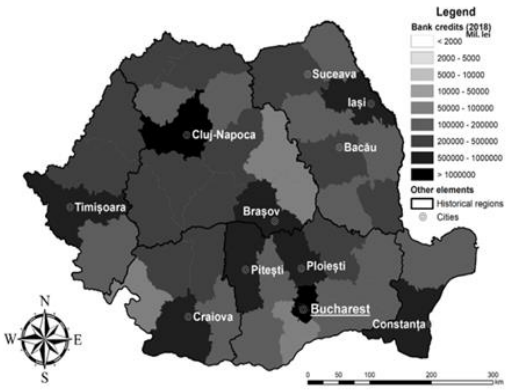

Figure 17. The degree of indebtedness of the Romanian population in 2018 (mil. lei)

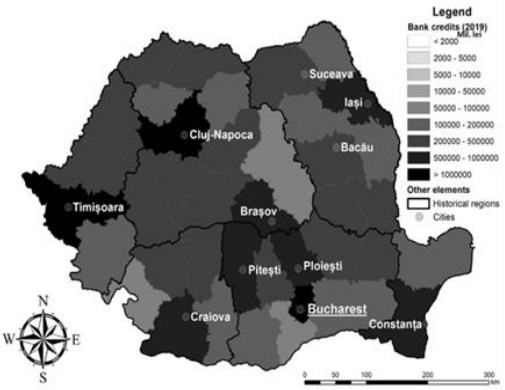

Figure 18. The degree of indebtedness of the Romanian population in 2019 (mil. lei)

CONCLUSIONS

The tracking of accessing bank loans in the period 2002-2019 highlights a series of economic peculiarities from each region of Romania. There are counties in Romania where the economy has had difficulties in implementing new economic activities. This is marked by a stagnation or a decrease in jobs. The lack of income discourages or places most of these inhabitants in the area of inability to access a bank loan. On the other hand, there are counties where foreign or Romanian investments have favored job creation. They attracted a predominantly young workforce. Thus there arose another need, that of a home. This way, most employees, who did not have a home, accessed a loan of the "first house" type, as well as of the real estate type or mortgage type. Thus, one can follow the centers with great attraction for the population. This attraction is for the opportunity offered by the existing jobs and the salary grade. From this point of view, large cities, such as Cluj Napoca, Timisoara, Constanta, Ploiesti, Pitesti, Bacau, Sibiu, Brasov, Craiova, to which there are added smaller ones, are the most attractive urban centers for young people, but also for working population of any age in Romania. The present study is only a part of a much more detailed analysis that follows the analysis of the degree of indebtedness of the Romanian population.

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THE CORRELATION BETWEEN MIGRATION CHAOS, NATIONAL SECURITY AND THE COVID-19 PANDEMIC

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ABSTRACT

The correlation between migration chaos, national security and the COVID-19 pandemic is particularly relevant given the huge waves of migration to European Union countries before the pandemic, the reverse migration during the pandemic and the national security protection of European countries, at the same time in the ability to control migration flows and assimilate the core values of the host countries, as migration exchange is a generator of terrorist or criminal transnational threats. Especially in the last few years, when Europe was flooded by giant waves of immigrants, which on the one hand created a serious problem in clarifying their identity and origin, and on the other hand caused significant changes in the socio-economic life of EU member states. This has led to the emergence and consideration of a number of issues related to the adoption of emergency measures for the distribution, accommodation and administration of migration and refugee flows by the central executive authorities of the Member States of the European Union. On the other hand, it provoked the formation of a policy focused on medium- and long-term conceptual planning and restructuring of public attitudes, applied concepts, developed strategies and implemented specific measures to address mass migration movements by creating opportunities for integration and inclusion of immigrants in social the economic and social life of the host country. While in 2020, as a result of the pandemic of COVID-19, there was a wave of reverse migration, which in turn caused social and economic consequences and problems in the individual administrative-territorial units of a number of countries, including the Republic of Bulgaria. This process has necessitated the study of local communities, as well as the planning and implementation of various mechanisms to address the problems that arose during the pandemic. The process of integration of immigrants has different dimensions, which are related on the one hand to their inclusion in the community, and on the other hand to their employment. This report will pay attention to the reverse migration on the territory of the Republic of Bulgaria and will pay significant attention to certain economic and social features in the formation and planning of policies and measures to address the pandemic of COVID-19 and the protection of national security of the country in the context of the economic and demographic aspect.

Keywords: demography, migration processes, national security, economic security

INTRODUCTION

One of the possible reasons for the decrease in the number of emigrants is the spread of the COVID-19 pandemic, as according to the European Border and Coast Guard Agency (FRONTEX) the number of people illegally crossing the borders of the European Union in 2020 fell by 13%, which represents about 124,000 people entering the territory of the

European Union. It should be noted that these are the lowest values in the last seven years, i.e. from 2013 until now. Many experts suggest that the reasons for this decline are related to the spread of COVID-19 and the introduction of restrictions on the movement of the population in all affected countries in 2020. Although the relative number of migrants has decreased, the movement is mainly along established routes through West Africa, the Central Mediterranean and the Western Balkans, mainly migrant Syrians, Tunisians, Algerians and Moroccans. A huge decrease is observed along the migration corridor in the Eastern Mediterranean through Greece, where their number has decreased by more than 75% to about 20,000, which in fact affects the potential migratory pressure established on the Republic of Bulgaria. The most attractive migration route in 2020 of illegal immigrants from the Central Mediterranean, with the number of migrants exceeding 35,000 in 2020, while the number of illegal migrants on the route through the Western Balkans is about 27,000, on which route there is also an increase in migratory pressure in 2020 compared to the relative number of migrants in 2019.

In recent years, there has certainly been an unprecedented increase in the number of migrants and refugees wishing to enter the European Union. In the area of border control, the responsibility lies entirely with the countries holding the external border. Of course, FRONTEX has the potential to provide additional technical assistance to European Union member states facing strong migratory pressures, which are assisted by coordination in the deployment of additional technical equipment, as well as support for border protection activities through the secondment of specially trained border guards. The question remains whether and to what extent the opportunities for not only coordination of maritime operations should be increased, but also the increase of the degree of active participation in operations at the external land borders on the routes passing through the territory of the Republic of Bulgaria, i.e. whether it is necessary to move to the creation of mechanisms and opportunities for active participation in specialized operations, and not mainly FRONTEX to coordinate the creation of specialized networks for the protection of the external borders of the European Union.

All activities planned and carried out by FRONTEX are based on a risk analysis, assessing the possible risks to the security of the European Union's borders, by developing models and trends in illegal migration and cross-border criminal activity at the external borders. Coordination in the deployment of specially trained staff and technical equipment where a Member State of the European Union is under strong pressure at the external border is one of the main activities of the organization. In this context, the activity of the agency involves the implementation of a number of studies bringing together various experts related to border control, the involvement of researchers and industry related to the production of alarm and security equipment for border protection in order to seek opportunities for implementation of the new technologies in the implementation of the daily activities of the border control authorities.

All activities of the agency involve not only the development of common standards for training of bodies guarding the external borders of the European Union, but also involve a number of efforts to harmonize the training of border guards of member states, which will increase efficiency during planning and the implementation of joint operations coordinated by FRONTEX.

All these activities can assist individual organizational structures and units in developing good practices applied in the field of border control and related to the decision-making process for the return of a certain number of migrants who have entered the borders of the Member States of the European Union. In the information 21st century, where the

importance of the development, implementation and management of information systems related to the synthesis, analysis and exchange of information between stakeholders is essential in the implementation of border control and the creation of mechanisms to overcome the consequences of implementation of the direct migratory pressure on the external borders of the member states of the European Union. Given the ever-increasing migratory pressures at the European Union's external borders, the issue of restructuring FRONTEX and creating and maintaining its own equipment and / or well-trained border guards, which can be involved at any time except on the agenda, may be on the agenda the coordination of a joint operation of the agency, as well as with direct participation in the implementation of the planned activities.

The debate on the very restructuring of FRONTEX in terms of the degree of participation in the various areas of the Agency's activity must be the subject of a wide-ranging discussion, both at European level in the face of the European Commission and the European Parliament and at a purely expert level. Member States of the European Union in the planning, development and sharing of good practices between the border authorities of the countries, as the control of the external borders of the European Union is essential in the implementation of cooperation for all Member States to improve quality at work and increasing the level of readiness to react to unusual pressure at a border of a member state of the European Union.

1. The relationship between migratory chaos, national security and the pandemic resulting from the spread of COVID-19

Representing the relationship between regional development, migration processes and national security is a legal, political and practical issue, as on the one hand migration processes are the result of forced and / or voluntary movements of the population in search of a dignified life in another nation state. In general, migratory movements of the population can be perceived and presented as a major pillar of the development of individual host regions, where local and national institutions are actively involved in the implementation of policies related to achieving regional integration and development through the creation of regional free movement systems that are linked to human mobility on a global scale.

It is the relationship between migration and the development of countries and regions in particular that has become central to contemporary political, economic and social debates in individual countries and at the European Union level in general. Migration processes contribute to the overall human development of both migrants and members of their countries of residence, which requires us to recognize that the migration processes themselves, regardless of the driving forces, are an opportunity for host societies to build a better and more prosperous, a global "common world" where everyone can contribute to the development of society by having the opportunity to live with dignity.

It should not be forgotten that migration processes are often a highly politicized issue, which is directly related on the one hand to national security and on the other to the preservation and preservation of national identity, and at the same time has a strong impact on economic opportunities to growth and / or decline, as the quantity and quality of migrants must be assessed through the opportunities for a highly productive workforce that has a direct impact on the economic growth of the region concerned or to create an opportunity for its decline. Conditionally, three different groups of migrants can be identified, according to the specific way in which they develop, namely the group of small and well-integrated and self-integrating immigration, the second group belongs to the

numerous and selflessly supporting emigration, which is typical for some ethnic groups and communities where patriarchy is strongly present in the family and society and the third group are a small number of refugees, whose integration is carried out through local and national institutions and non-governmental organizations.

2. Features of migration processes, national security and the spread of COVID-19.

Migrations have played a very important role in the development of Mankind. „Their main function has always been to ensure people's mobility and effective territorial disposition in terms of their ability to live and work. Migrations have also contributed to the rational use of labor, human and natural resources in a given territory. Migrations are often associated with improving the educational and qualification structure of the population, increasing its cultural level, but also with the increase in its needs and the expansion of the domestic and foreign markets.

On the other hand, migrations also have contradictory consequences - loss of working time, loss of leisure time, reduction of population and deterioration of its structure, excessive concentration of population, "forced" urbanization and a number of others“. [1] „The study of the migration processes in Bulgaria has many aspects:

- Economic - labor, labor market, distribution of productive forces, human resources, labor resources, change of environment, urbanization, etc. ;
- Social - wealth and poverty, democratic values, ethnic conflicts, religious and cultural tolerance, hunger, illness, education, refugee problems, etc.;
- Demographic - population development, birth rate, growth, density, ethnic structure, religious dignity, etc.;
- Geographic - natural disasters, ecosystems, settlement or depopulation of territories, belonging to a group (ethnic or racial), etc.;
- Legal - observance and protection of human rights, protection of the child, and so on“.[2]

Migration has a significant impact on the demographic development of the country in the territorial aspect and leads to a concentration of the population in the cities and urban areas around the big cities. Migration has had a significant impact on the development of the settlement network in the second half of the 20th century and the first decade of the 21st century. It has led to a rapid decline in the number of villages and their population, deterioration in reproductive capacity, aging and increasing its negative natural growth. This century is marked by the destruction of the balance between security, society and nature, which creates conditions for fierce regional conflicts, economic crises, thousands of deaths and yet more deaths on the road of migration [3].

The demographic crisis with its multifaceted manifestations is one of the most serious problems faced by the country over the coming decades as it continues to diminish and aging population, on the one hand, due to the delayed reforms of policies to support family values, The birth rate and the retention of young people, on the other hand, given the socio-economic conditions in the country, population displacement continues beyond its borders [4]. While preserving a demographic trend, Bulgaria will continue to fall into the "demographic hole" and go towards its "demographic and economic meltdown." Within a few decades, Bulgaria has become the fourth country in the aging world after Japan, Germany and Italy.

The country is aging rapidly and, according to the UN's demographic forecasts, it will experience the sharpest drop in the world-wide working-age population. Until 2050, labor resources (population aged 15-64) will decrease by 40%. An ever-smaller

number of workers will generate national income for the entire population. Since the relative share of the workforce is a key factor in the level of income in the country, this decline is likely to slow down growth. The most effective way to stop further shrinking labor is to stop migration. It will be important to boost immigration. A proactive immigration policy tailored to the needs of the Bulgarian business will have to be set up [5].

The impact of demographic processes on sustainable social and economic development can be traced in the following main directions:

- In the reproduction of labor resources - number, age, gender, education;
- In the case of employment, taking into account the different employment intensity by gender and age, as well as depending on the number of children in the family, the intergenerational interval, the gender structure, the educational and professional structure of emigrants and immigrants;
- In the case of unemployment, taking into account the unemployment rate by gender, age groups, young people and persons in retirement age;
- Taking into account the level of income depending on gender and age;
- Reallocation of income depending on the size and composition of the family;
- In the formation of the poverty level. Increasing or decreasing the number of children in small and, respectively, large families affect the increase or decrease of the poverty rate of different ethnic groups;
- Demand - the growth of the population leads to an increase in demand and the relative growth of children influences the demand for children's goods. Changes in population size, marriage and divorce, have led to a change in demand for housing (by squares and by number of rooms);
- Educational services. Growing or decreasing fertility rates over a period of time leads to a 1 or 3-year increase or decrease in demand for childcare facilities, 6 or 7 years of basic education, 13 or 14 years of secondary education, and 18 or 19 Years of demand for higher education;
- Healthcare. The change in the number of the population also changes the burden on health care establishments and the sex-age structure, the birth rate and mortality rate, and the proportion of doctors in the specialties, children's polyclinics, maternity hospitals, and so on;
- Social support, child-raising and child-raising allowances, development of the social service provision network of the population As long as there is a close interaction between population reproduction and the regional socio-economic development of the country or its regions, permanent monitoring is an important tool for managing the country's sustainable socio-economic and demographic development [6].

From the presented data in the following image we can see the emerging trend of population decline in the period 2016-2020, which is due to both the negative natural increase and migration processes.

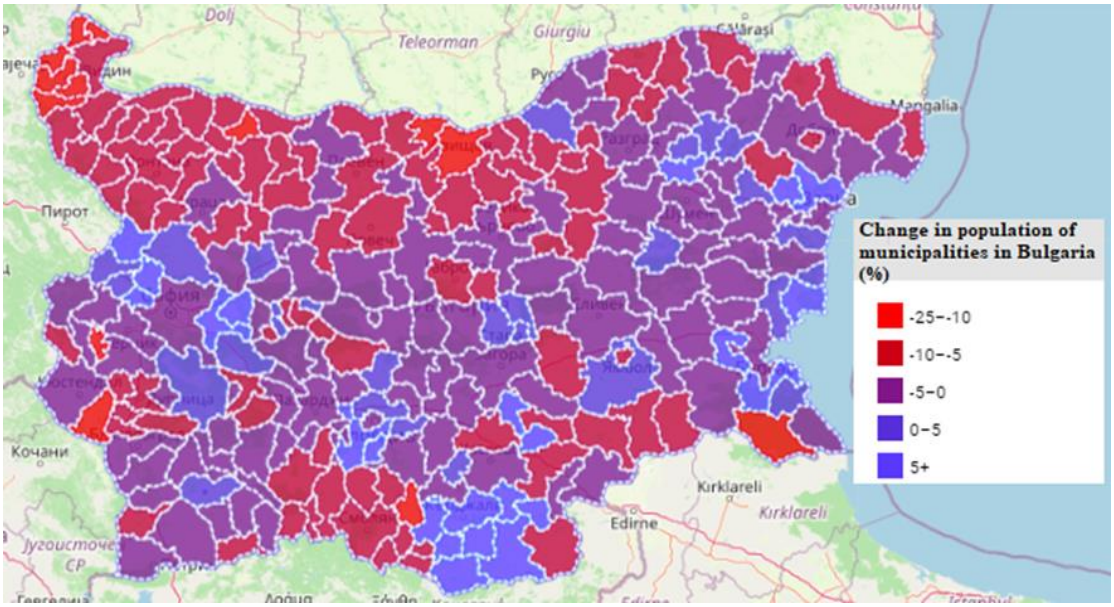

Figure 1. Population changes on municipalities in 2016-2020 [15]

During the considered five-year period in the municipalities in the Republic of Bulgaria there are tendencies of decrease of the share of the population during the considered five-year period, where in 214 out of 265 municipalities the population decreases. However, in 110 municipalities the decline exceeded 5% over the five-year period. Looking at the image, it can be seen that this sharp decline in population is concentrated in the municipalities located in northwestern Bulgaria and municipalities around the river Danube. This process is on the one hand the result of the lowest natural growth and aging population on the municipalities in the region, and on the other hand is a function of migration processes, which are the result of weak economic indicators in regions, very low investments and high unemployment [7]. But „the labor market in our country is catching up due to the growing mismatch in the skills and capabilities of the workforce and the needs of the economy. And while there are policies that partly attempt to change, the problem of quality of workforce is escalating but not adequately addressed, economists and financiers say [8]".

CONCLUSION

The dynamics in the global economy predetermines the creation of new configurations of interests, as a result of which co-operation is often transformed into even confrontation, through economic, social, currency diplomatic and other sanctions, and vice versa. Certainly the choice of economic strategy to ensure regional economic security has to be determined by the duration of the impact of the destabilizing factors, the level of competitiveness of the regional economy and its degree of dependence on direct state intervention through subsidies. In essence, achieving regional economic security is not only an economic but also a political issue that is directly dependent on the situational analysis of the internal and external environment. Although in the context of globalization of national economies, regional economic security can hardly be achieved, which implies increasing demand for opportunities to implement measures at national and national level to ensure regional economic security. At the top of the international level, to guarantee regional economic security, the establishment of a system of international economic security, which also has certain features

related to the opposite economic interests of individual countries, can be established. Certainly the choice of economic strategy to ensure regional economic security has to be determined by the duration of the impact of the destabilizing factors, the level of competitiveness of the regional economy and its degree of dependence on direct state intervention through subsidies. In essence, achieving regional economic security is not only an economic but also a political issue that is directly dependent on the situational analysis of the internal and external environment. Although in the context of globalization of national economies, regional economic security can hardly be achieved, which implies increasing demand for opportunities to implement measures at national and national level to ensure regional economic security.

At the top of the international level, to guarantee regional economic security, the establishment of a system of international economic security, which also has certain features related to the opposite economic interests of individual countries, can be established. The achievement of economic security as a whole must be related to building it at different levels, in different areas of socio-economic life, as well as to different territorial units that are in a certain dependence and subordination. This is the main reason why it is necessary to decompose the subject in economic security and to move from the particular country to analyzing and assessing economic security in the particular region. Naturally, economic security as a subject can guarantee the sustainability and development of the national economy and defend national economic interests internationally. While regional economic security as an entity can guarantee the sustainability and development of the local economy and assert local economic interests at national level as well as at international level under certain conditions.[9]

„The economic impact of the pandemic will unfold over a longer time frame than many recognize at the time of writing. Comparisons with the global financial crisis may go some way to convey the seriousness of the pandemic, but that crisis will undoubtedly pale in comparison. It is clear that a significant proportion of active businesses will fail, but this failure has – in many countries – been delayed by government policies and subsidies. The conditions shaping resilience during and after the financial crisis were similar in many ways to the factors seen as driving regional growth and competitiveness in ordinary times. The current crisis, however, will undoubtedly result in some long-standing changes in the ways people and firms move and operate.

This could mean that factors which were clear advantages in the past (such as agglomeration and the possibility of unplanned interactions) might operate differently in the context and aftermath of Covid-19“[10]. We can expect, that in 2030, global, regional and national inequalities in the political and economic spheres will generate crisis in countries across the Eastern Europe region, and maybe in all European countries. "Migration to the EU will increases. Economic and political crises, as well as environmental and natural disasters, will lead to migrant and refugee flows within the region and occasionally escalate into irregular migration flows towards the EU. African countries seek partnerships with the EU (mostly bilateral in order to address national challenges), but the expansion of informal movements and economies render many such partnerships ineffective"[11]. “Migrations are definitely complex processes for which some of the major organizations dealing with their problems, such as UNESCO, the UN, and so on, have chosen definitions and classifications. It can’t be unambiguously concluded that they only bring benefits or only harm to societies. They achieve multicultural diversity, innovation, opportunities for development. Numerous programs, strategies, normative documents and frequent debates on the issue of increased

migration processes in the European Union indicate the seriousness of the problem. The timeliness of the topic suggests that the real effects of immigration in the European Union and the development of new methods and tools to deal with the negative aspects of this process are yet to be clarified"[12]. The current COVID-19 pandemic highlights the importance of strong agencies for managing and mitigating "nontraditional" threats to security in the countries on the all world, as they manifest themselves both of the every countries, and globally. "Given the long-standing civilian versus military resources gap, some observers question whether those agencies that must deal with such challenges are adequately resourced relative to the current and future needs, and whether they are sufficiently integrated into national security plans and operations"[13], this is the one of the main question now in the time of the pandemic COVID-19, because "pandemics are for the most part disease outbreaks that become widespread as a result of the spread of human-to-human infection"[14].

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THE CULTURAL – HISTORICAL RESOURCES FROM DOBROGEA, ROMANIA- POTENTIAL LOCAL SOURCE OF ECONOMIC GROWTH AND EDUCATION

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ABSTRACT

The evaluation of the archeological and cultural potential represent essential elements of designing a complex study that may generate effects upon the durable tourism in a certain geographical area. The research aims to identify the monuments that are capable to satisfy the requirements imposed by the cultural and tourism- purposed activities by: accessibility, originality, old age, conservation state or maintenance or level of rehabilitation and promotion. The geographical areal under analysis is the historical and geographical province of Dobrogea, in Romania. It is a historical province of great value, while the present monuments have a particular feature connected to their old age, as well as certain particularities connected to their multi-ethnicity co-existing in this geographical areal. The methodology follows firstly the Cultural Monument List made up by the Ministry of Culture of Romania. On the second stage, there follows the analysis, on the field, of each monument enlisted and the establishment of the degree of cultural and tourism-purposed valorization, in compliance with the criteria already specified. The results of the study shows first of all a difference between the number of cultural monuments present, the value of which is undoubtedly extremely high, and the degree of valorization they benefit of. The exigencies of the tourists do not allow their being introduced and used into the tourism-purposed circuit or in the tourism offers regarding the monuments that have a very low degree of accessibility, originality and rehabilitation level.

Keywords: culture, archeological potential, education, multi-ethnicity, tourist circuits

INTRODUCTION

The cultural-historical monuments have represented and continue to represent, one of the most important resources regarding the cultural information of a region, and, to the same extent, they represent a form of cultural and historical education [14], [23], [22], [17]. Dobrogea abounds in such resources, being a region with an extremely rich historical

past. From the Greeks to the Romans, Ottomans or Slavs, a lot of populations have travelled through this place, leaving behind important material traces [10], [13], [1], [11], [15]. Out of these, the current study analyzes two of the most important monuments of the land comprised between the Danube and the Black Sea (fig. 1). The visibility of these cultural-historical monuments must become greater and greater, this being a necessity in order to know the places with historical significance. [19], [3], [2], [16].

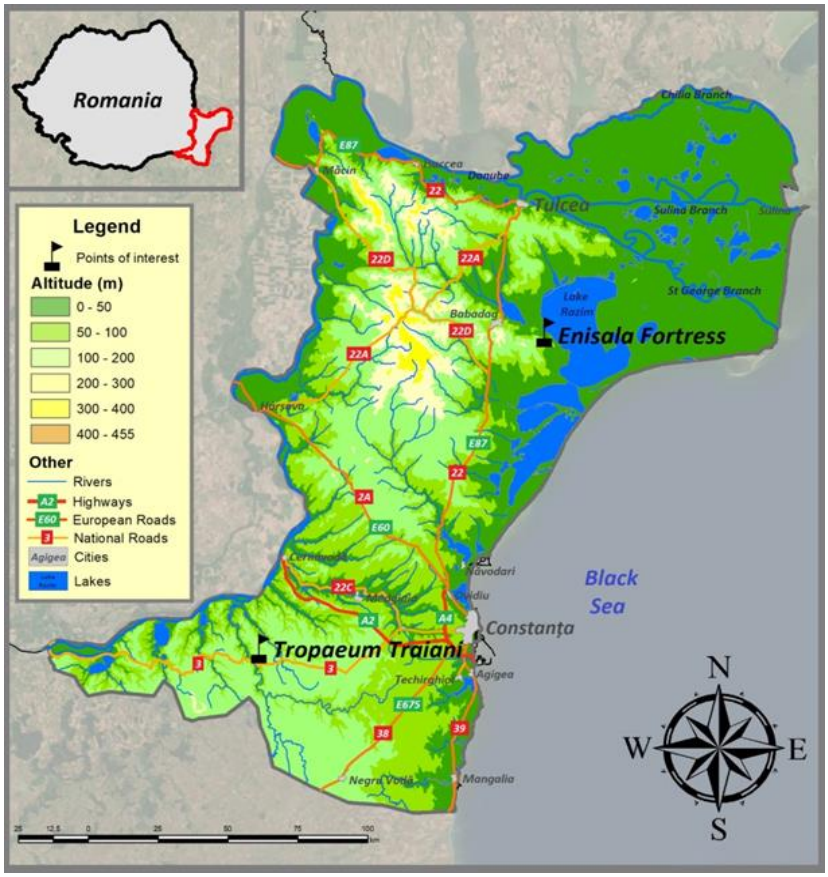

Figure 1. Location of Tropaeum Traiani and Enisala fortresses in Dobrogea province, Romania

The first written pieces of information about the existence of the Adamclisi artefacts date back only to the 19th century, when several researchers tried to assess the authenticity and the state of decay of the archaeological ensemble from Adamclisi. From the very beginnings, both the citadel and the monument were set up by Emperor Traian as a symbol of Roman power following the defeat of the Geto-Dacians and their allies in the battle from the Adamclisi fields in 102 [12]. Studies reveal the fact that the entire commemorative complex in which the triumphant Tropaeum Traiani monument is included, was built from 102 until 109 A.D. and the designer seems to have been the very Apolodor from Damascus. [12]. Once water pumps started being built in Dobrogea, after 1856, stone blocks from the Adamclisi ensemble were used, especially in the upper part. After the War of Independence, in 1882, archaeological excavations started and they were led by Grigore Tocilescu [21]. He also wrote a monography of the Tropaeum Traiani monument, in which, among others, he mentioned the fact that the monument was dedicated by the Romans to the God Mars. The Tropaeum Traiani Monument was rehabilitated in 1977; this was a difficult procedure caused by the lack of a greater part of the construction which had been destroyed ever since the Antiquity [12]. Equally, the

study follows into the footsteps of the construction and the special situations that the Enisala Citadel, another Dobrujan symbol, went through. The Enisala Fortification was part of the chain of Genoese colonies, which encompassed the cities from the Danube Delta – Chilia and Likostomion, the White Citadel from the mouths of the Dniester, Caffac in south Crimea. Between 1397-1416 the Enisala Citadel was part of the defensive system of Wallachia during the reign of Mircea the Elder. After Dobrogea was conquered by the Turks in 1419-1420, an Ottoman military garrison was established in the citadel. Most of the precinct walls are kept at a height of 5-10 m and can be easily noticed from long distances [9].

METHODOLOGY

The methodology follows, first of all, a few basic steps; the starting point is represented by the selection of the two cultural-historical monuments – The Tropaeum Traiani Citadel and the Enisala Citadel from the Cultural Monument List made up by the Ministry of Culture of Romania. The next stage focuses on: field analysis for each monument, making a decision regarding the degree of cultural and touristic valorisation, according to its accessibility, originality and restoration, possibly the preservation of the existent material traces. According to these elements, each of the two monuments can represent a real source of information used especially in the educational process. An analysis alongside the young generation must be made by means of specific didactic means, as it offers a huge advantage based on discovery.

RESULTS

The historical importance of the two cultural-historical monuments is well-known. From a touristic and educational perspective, the present study intends to emphasize their importance, according to the results obtained. Once brought to surface, the walls of the citadel started to gather a great importance for the culture and history of these places, at the same time becoming a real source of tourism and education.

What we can see today are only parts of this important monument, such as the sewer system and the civilian constructions (fig. 3 and fig 4). The outer walls are the original ones, and they also include some stair niches, which means that the citadel used to be a multi-storey one. The eastern and western gates, which most probably were not strictly for pedestrians, are connected to a main street provided with a large aqueduct. Traces of the constructions which had a religious purpose and significance are quite well preserved, offering a good visibility from a touristic point of view and also when it comes to explaining History lessons.

Documents certify to the fact that the citadel was abandoned starting with the 7th century, after invasions from the Huns and the Avar-Slavs. Nevertheless, the constructions belonging to the Dridu culture, dating back to the 9th – 10th centuries [12] are noticeable. The Tropaeum Traiani Citadel was built after the Dacian-Roman wars, and an inscription on the statue of Trajan discovered during the excavations, shows the fact that it was completed in 116 A.D. In the 4th century it was enlarged, encompassing a surface of approximately 10 ha, and an annex was added in the south-east area, outside the outer wall [12]. It was provided with four entrances, of which only two have large sizes, the ones in the east and in the west (fig. 2 and fig. 5).

Figure 2. The Tropaeum Traiani citadel-view from the Eastern gate

Figure 3. The Tropaeum Traiani citadel-the sewer system alongside the main road

Figure 4. The Tropaeum Traiani citadel –Civilian constructions

Figure 5. The Tropaeum Traiani citadel-The western Gate

Other important material traces are shown by Basilica Forensis which was very well preserved, just like all the details having to do with the architectural peculiarities of a place of worship (fig. 6 and fig. 7).

Figure 6. The Tropaeum Traiani citadel -Basilica Forensis

Figure 7. The Tropaeum Traiani citadel-Entrance to Basilica Forensis

Figure 8. The Tropaeum Traiani Monument

As for the touristic circuits, the historical site is visited by a reduced number of tourists (on average below 550 tourists /month – in 2019, given the fact that in 2020 the statistics is influenced by the COVID 19 pandemic), despite being extremely well-known in Romania due to its presence in the History course-books.

At the same time, visiting the place presupposes certain costs, if we take into account the fact that there are many other touristic objectives in the area, whereas accommodation and catering are missing [7], [8], [18], [5], [20].

At the end of 2019 the first and only accommodation was registered in Adamclisi - The Trophaeum Traiani Pension. The accommodation capacity in 2019 included 30 vacancies. This is not enough to develop mass toursism, despite the fact that amenities to support a larger number of arrivals have taken place, both in the archaeological site and in the museum (fig. 8). As for the touristic arrivals, if we analyze the data starting with the first month of 2019, we can notice a certain seasonality. Thus, the largest number of tourist arrivals are registered in the warm months, July, August and September. Firstly, during the colder months when the wind is more powerful, it is much more difficult to visit the historical site, as it is located in a relatively open space. Thus, the temperatures are felt to be lower and disconfort is greater for tourists. On the other hand, during winter, travelling to this historical site is difficult, access being possibile on only one road with asphaltic pavement which is deteriorated. Considering their historical significance, their cultural role and their huge educational potential, The Tropaeum Traiani Citadel, the Adamclisi Monument, and the Adamclisi Museum belong to the category of those cultural monuments which, despite having a reduced degree of visitation, display high values for originality and preservation. Unfortunately, a lower score is registered for accessibility.

The second monument analyzed is the Enisala Citadel. The West-South-West precinct was built on the steep edge of the promontory (fig.9).

The citadel is shaped as a trapeze or irregular quadrilateral, with the West-South-West side almost completely destroyed, with a length of more than 100m; the Eastern and the Northern sides are of approximately 50 m, and the Southern one has almost 30 m. The

precinct wall is 1,50 – 1,85 m thick and on the outside it shows eight defense towers with three, four and five sides (fig. 10).
Both the enclosure wall and the towers are built from carved, wrought, cubic limestone of small and middle sizes. The entrance (on the Southern side) used to be done through a gate with a very high opening, provided with a double arch and defended by a massive pentagonal bastion. The second enclosure wall of the fortification located on the North-East side is provided with square and triangular towers (fig. 11).
After 1991 the citadel walls, which had been ruined by bad weather, were restored, accessibility being very good. At the same time, originality, the existence of panels and informational materials, the belvedere amenities, managed to turn the Enisala Citadel from a barely-visited monument into one which has become important from a touristic point of view. Another advantage is its geographical location, as it is situated next to the traffic artery between Constanta and Tulcea, near Babadag and the lake with the same name. The development of such a monument is a gain both for the local population and for the tourism consumers [4], [6], [20].

Figure 9. The Enisala Citadel – outer view from the South

Figure 10. The Enisala Citadel – inner view of the wall

Figure 11. The Enisala Citadel – outer view of the North-East wall

There should be a permanent relationship between the historical monuments, the cultural monuments, the touristic and educational activities. This type of relationship favors the cultural-historical knowledge, which, in turn, ensures in the long run, respect for the history and culture of each Romanian geographical area. These two monuments, one dating from the antique period and the other from the medieval period, represent only a part from what Dobrogea has to offer in terms of cultural-historical information. Many of the monuments from this Romanian area, Dobrogea, are included in the Monument List, drawn up by the Ministry of Culture from Romania, but they are either not visible in the field or they are in a state in which they cannot be valorized from a touristic perspective. We must be aware of the fact that these inconveniences will not be improved within a short period of time. This is precisely what should guide us towards valorizing the monuments which have already gone through a process of restoration, preservation. Once rebuilt, these monuments would facilitate access from the main arteries, offer certain benefits to those who are setting up a business in the field of tourism, irrespective of whether it is in terms of accommodation or food industry, or one concerned with touristic information, so they would support the entire touristic process, with beneficial effects both for the residents and for the tourism consumers. The residential population would benefit from earning additional income offered by the newly-created jobs as well as from valorizing their own products (agriculture, handicraft etc.).

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THE IMPACT OF MARRIAGE ON THE FERTILITY LEVEL – THE CASE OF NORTH MACEDONIA

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ABSTRACT

The marriage behavior, i.e., the number of marriages and divorces with all the characteristics of the marring and divorcing couples, along with the fertility level, represent a challenge of studying in the field of population geography because of their great impact in certain segments of the demographic development.
This research analyzes the number of marriages and divorces, all of the qualitative and quantitative characteristics of the marriage behavior, as well as the number of children born within the framework of the marital union, or children born outside marriage. Fertility, the dynamics in the fertility rates, and the impact of marriage on the fertility level were also analyzed, due to their significant role in a society like ours.
The impact of marriage on the fertility level was confirmed by testing the hypotheses set at the beginning of the research. The testing of the one null hypothesis "the marriage behavior has no impact on the fertility level" and the three auxiliary hypotheses were done using the method of linear regression. By testing these hypotheses, a significant scientific fact has been pointed, on which the demographic development in the country should be further based, i.e. one of the foundations in creating family policies.

Keywords: marriage, divorce, fertility, impact, modernization

INTRODUCTION

The interpretation of marriage and its impact on fertility in historical contexts have gone through various stages in their development, but almost always, the forms of marriage have been sharpened up by the social circumstances. The stages in the development of marriage and fertility are usually presented in general because they do not have a strictly defined time frame, given the great influence of local factors [5].
Due to the development of science, technique, and technology, which imposed the fast pace of life, the views of the population towards marriage, family, and the birth of children have largely shifted. In our country, although a little later than in developed countries, attitudes towards marriage and towards the decision if, when, and how many children a family should have, significantly changed. The changes in the marital behavior driven by the demographic transition, which are significantly highlighted in recent years, can be seen in the declining number of marriages, the increasing number of divorces, the reduced number of live births, the declining fertility below the level needed for the so-called "simple generation replacement", the increasing number of nuclear families composed of parents with one child, etc. There is also a large number of informal communities (cohabitations) in the country, for which no records are kept, but we meet every day. However, despite all the changes that occurred, we are still a society in which the marriage is considered as a major institution and the first stage in founding a family,

socially justified and desirable, so its analysis and the analysis of its impact on fertility are of particular importance for the future demographic development.
The purpose of this paper is to improve the study methods, tools, and instruments that can be used in such research, but also to provide thoroughness in the process of creating an idea of the characteristics of marriage and fertility behavior and their linkage in the Republic of North Macedonia.

DATA SOURCES, METHODOLOGY AND LITERATURE REVIEW

The available population data sources allowed a deep and thorough study of the demographic issues and their mutual connection, and thus provided a basis for planning and forecasting future population, economic and overall development. Much of the data is very dynamic given the nature of the processes and the phenomena to which they refer to, so this creates difficulties in monitoring, collecting the latest information, difficulties in their selection and application [2]. Most of the data needed for this research were obtained from the regular annual publication of the State Statistical Office, Natural Population Change where can be obtained data on the number of marriages and divorces and the number of live births, regardless of whether those children were born in or outside the marital union. In order to calculate the needed rates were used census data, but as the last census was conducted in 2002, the lack of data for the recent years was complemented by the population estimates.
The rate, as a relative number that represents the frequency of an event in a given time interval, is one of the most important indicators of certain events. The simplest measure of marriage is the crude marriage rate or the number of marriages in a year per 1,000 population at midyear. The crude marriage rate has disadvantages since it expresses the number of marriages compared to the entire population, including persons younger than 18 years, instead of concentrating on the population at risk, that is, people of marrying age [15]. Also, it must be noted that the crude marriage rate represents the number of marriages, not the number of people getting married [6].
The simplest measure of divorce is the crude divorce rate (CDR), or the number of divorces in a year per 1,000 population at midyear. The crude divorce rates, just looked at are the most widely used measures of the instability of marriage [16], but they have the limitation same as the crude marriage rate. The crude divorce rate expresses the number of divorces compared to the entire population, including children and singles, instead of concentrating on the population at risk, that is, of married people.
The fertility rate is determined in several different ways. Often, fertility rates are determined depending on what we want to emphasize. If we analyze the connection between the number of live births and the total population, it means that we have calculated the crude fertility (birth) rate (CBR (f)). The Total Fertility Rate (TFR), according to the Population Reference Bureau [10], is defined as the average number of children a woman would have if she survived all of her births or reproductive years. Reproductive year's means the age between 15 and 49 years. If that value is 2.1 it means that a basic population reproduction is ensured, i.e. that there is replacement of generations. This value is known as the critical value [14]. Also, an important indicator is the extramarital birth rate, which is defined as the number of extramarital live births per 1,000 live births (EMBR). In order to test the connection between the marriages and

[10] https://www.prb.org/glossary/

the number of births was used the linear regression [11] as one of the fundamental statistical and machine learning techniques. The linear regression is a basic and commonly used type of predictive analysis for finding relationship between two continuous variables. In our case, one is predictor or indepen¬dent variable (number of marriages) and the other is response or dependent variable (number of births).

Marriage and fertility in North Macedonia have been the subject of research in a number of scientific geographical papers. Of special importance is the paper dedicated to the analysis of the birth rate of the population in the Republic of Macedonia in 2004 [21], the one about the population structure according to the marital status in 2005 [22], the paper about the characteristics of the population fertility in 2007 [18], the two papers in 2009 [19], [20], with the focus on certain characteristics of the marital communities in the Republic of Macedonia, i.e. papers on ethnically homogeneous and heterogeneous marriages, by Madzevikj. In 2016 [1], Apostolovska Tosevska and Gorin published a paper on the dynamics in the volume and age of the female reproductive population in the Republic of Macedonia. Marriages and divorces have been analyzed in the papers by Ljakoska et al., in 2018 [15], [16], and 2019, [11], [13], while the fertility and the reproductive behavior were analyzed in 2018 [3], (Apostolovska Toshevska et al., about the reproductive behavior of the female population in the only Roma governed community), in 2019 [12], [17] (childbearing outside marriage, and the municipalities by the scope of women in childbearing age (Ljakoska, 2019)), while in 2020, were analyzed the changes in the reproductive behavior of women (Ljakoska, 2020) [14].

Changes in the numbers and rates of marriages, divorces and live births

The population structure according to the marital status is considered as one of the basic demographic indicators precisely because of its impact on fertility rates and generation change [4]. Hence, the marital status of the population, with all its characteristics and specifics, is a great challenge for research, because it largely reflects on the demographic development of the country. Marriage as an institution is still associated with the creation of the family as one of the most important sociological forms and pillars of society [15], in fact, marriage is a social framework of reproduction [5].

The research of marriage rate is important precisely because of the dependency of the reproduction rates and the marital behavior. The fertility level is largely determined by the frequency of marriages because the largest number of births are still realized within the marital unions [5]. Therefore, marriage is defined as a social institution with the task to control the adults' sexual behavior in order to regulate reproduction [7].

The analyzed period, from 1971 till 2015, is characterized by significant changes regarding the issue of marriage, i.e. changes in terms of the number of marriages. These changes were most felt in the last twenty years when the number of marriages significantly decreased (in 2015, the number of marriages was 15.5% lower than in 1987, the year with the highest recorded values).

Another change, in the series of demographic changes that our society is facing today, is, of course, the increasing number of divorces. The issue of divorce is particularly important, and the fact that their number is increasing is particularly worrying, especially since it is becoming an integral part of the society more and more and reflects on all the processes of the population, especially fertility.

[11] https://realpython.com/linear-regression-in-python/
https://towardsdatascience.com/linear-regression-detailed-view-ea73175f6e86

Table 1. Trend in the number of marriages, divorces and live births in the period 1971-2015

Year	Marriages	Divorces	Live Births		
			Total	Inside Marriage	Outside Marriage
1971	14739	463	37904	35475	2429
1972	14903	580	38187	35755	2432
1973	15105	1053	37479	35112	2367
1974	15118	1072	38383	36011	2372
1975	15554	1270	39579	36972	2607
1976	15023	1066	39810	37220	2590
1977	15601	822	38930	36358	2672
1978	15702	776	38790	36320	2470
1979	16122	816	39407	36995	2412
1980	16145	890	39784	37369	2415
1981	16303	911	39488	37103	2385
1982	16606	911	39789	37399	2390
1983	16404	747	39210	36876	2 334
1984	16054	886	38861	36476	2385
1985	16335	817	38722	36177	2545
1986	16326	1017	38234	35829	2405
1987	16799	811	38572	36015	2557
1988	16380	861	37879	35259	2620
1989	15842	951	35927	33403	2524
1990	15688	749	35401	32883	2518
1991	15311	496	34830	32379	2451
1992	15354	578	33238	30806	2432
1993	15080	636	32374	29739	2635
1994	15736	612	33487	30628	2859
1995	15823	710	32154	29524	2630
1996	14089	705	31403	28813	2590
1997	14072	1021	29478	26864	2614
1998	13993	1027	29244	26467	2777
1999	14172	1045	27309	24638	2671
2000	14255	1325	29308	26440	2868
2001	13267	1448	27010	24203	2807
2002	14522	1310	27761	24787	2974
2003	14402	1405	27011	23996	3015
2004	14073	1645	23361	20495	2866
2005	14500	1552	22482	19687	2795
2006	14908	1475	22585	19763	2822
2007	15490	1417	22688	19837	2851
2008	14695	1209	22945	20137	2808
2009	14923	1287	23684	20792	2892
2010	14155	1720	24296	21338	2958
2011	14736	1753	22770	20119	2651
2012	13991	1926	23568	20826	2742
2013	13982	2045	23138	20513	2625
2014	13813	2210	23596	20890	2706
2015	14186	2200	23075	20545	2530

Source: SSO [8], [23]

The phenomenon of divorce is particularly interesting to study from a demographic point of view, because it affects a whole range of population-related processes, and especially emphasizes their impact on the fertility level [10]. In the analyzed forty-five-year period, a total of 20,226 divorces were registered, which means that slightly less than 100,500

persons gained the status of a divorced person. On average, about 450 divorces were registered each year. The highest number of divorces was registered in 2014, i.e. 2210, which is almost five times the number in the year with the lowest number of registered divorces (1971 - 463 divorces recorded).

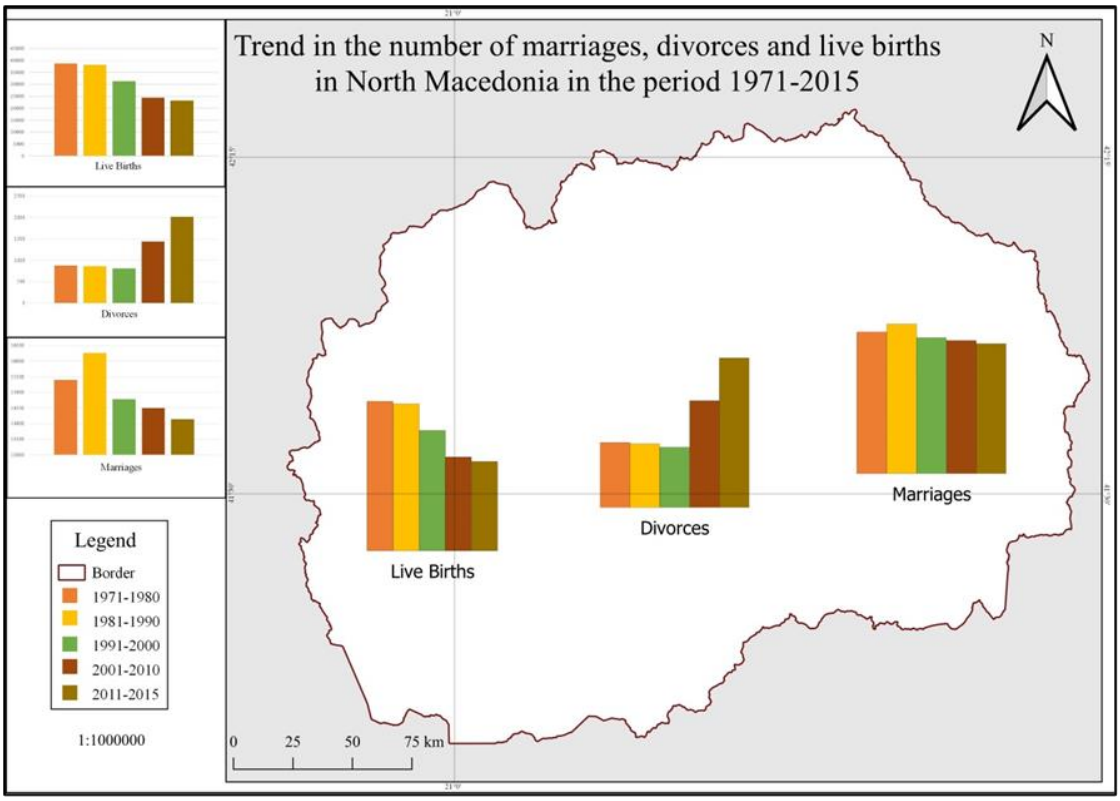

Figure 1. Trend in the number of marriages, divorces and live births in the period 1971-2015

These demographic changes were followed by the continuous decrease of the total number of live births, expressed in absolute and relative terms, which at the state level started since the mid-nineties of the last century, and with certain oscillations, continues until nowadays. These changes are accompanied by the increasingly present division of marriage and parenthood, which is reflected in the changed share of children born in and outside marriage.

The number of children born inside marriage follows the trend of the total number of live births, i.e. it decreases, while the number of children born out of wedlock does not show any significant changes in the period we are analyzing.

However, the analysis of the rates much more clearly indicates to all the changes that have occurred. Therefore, the crude marriage rate is directly conditioned by the number of marriages. The greater the number of marriages is, the higher the marriage rate will be and vice versa [9], [4]. Thus, the crude marriage rate in the country, following the reduced number of marriages decreased from 8.9‰ at the beginning of the analyzed period, to 6.8‰ at the end of that period. The crude divorce rate increased three times in the period from 1971 to 2015, i.e. the value of 0.3‰ increased to 1.1‰ in 2015.

Table 2. The Crude Marriage, Divorce and Fertility Rate, the TFR and the EMBR

Year	CMR	CDR	CBR (*f*)	TFR	EMBR
1971	8.9	0.3	22.9	-	64.1
1972	8.9	0.3	22.7	-	63.7
1973	8.9	0.6	22	-	63.2
1974	8.7	0.6	22.2	-	61.8
1975	8.9	0.7	22.5	-	65.9
1976	8.4	0.6	22.3	-	65.1
1977	8.6	0.5	21.5	-	68.6
1978	8.6	0.4	21.1	-	63.7
1979	8.7	0.4	21.2	-	61.2
1980	8.5	0.5	21.1	-	60.7
1981	8.5	0.5	20.6	-	60.4
1982	8.6	0.5	20.5	-	60.1
1983	8.3	0.4	19.9	-	59.5
1984	8.1	0.5	19.5	-	61.4
1985	8.1	0.4	19.2	-	65.7
1986	8.0	0.5	18.7	-	62.9
1987	8.1	0.4	18.7	-	66.3
1988	7.8	0.4	18.1	-	69.2
1989	7.5	0.5	17	-	70.3
1990	7.4	0.4	16.6	-	71.1
1991	7.5	0.2	17.1	-	70.4
1992	7.5	0.3	16.2	-	73.2
1993	7.3	0.3	15.7	-	81.4
1994	8.1	0.3	17.2	2.23	85.4
1995	8.0	0.4	16.3	2.13	81.8
1996	7.1	0.4	15.8	2.07	82.5
1997	7.0	0.5	14.8	1.93	88.7
1998	7.0	0.5	14.6	1.90	95.0
1999	7.0	0.5	13.5	1.76	97.8
2000	7.0	0.7	14.5	1.88	97.9
2001	6.5	0.7	13.3	1.73	103.9
2002	7.1	0.6	13.7	1.80	107.1
2003	7.1	0.7	13.3	1.77	111.6
2004	6.9	0.8	11.5	1.52	122.7
2005	7.1	0.8	11.0	1.46	124.3
2006	7.3	0.7	11.1	1.46	125.0
2007	7.6	0.7	11.1	1.46	125.7
2008	7.2	0.6	11.2	1.47	122.4
2009	7.3	0.6	11.5	1.52	122.1
2010	6.9	0.8	11.8	1.56	121.7
2011	7.2	0.9	11.1	1.46	116.4
2012	6.8	0.9	11.4	1.51	116.3
2013	6.8	1.0	11.2	1.49	113.4
2014	6.7	1.1	11.4	1.52	114.7
2015	6.8	1.1	11.1	1.50	109.6

Source: SSO [8], [23].

Declining births also means reducing fertility rates, which are crucial for the replacement of generations. From once high values that ranged up to 3.5 children per woman of fertile age, in recent years, these values have not even reached the value that can ensure a simple population reproduction, i.e., 2.1 children per woman. "According to Peter Mc Donald, when the fertility of the population falls below the 'magic' level of 1.5 children per

woman, it is rare and difficult to rehabilitate, that is, to notice an increase in the fertility rate" [24]. Therefore, what is most worrying is the constantly reducing total fertility rate, which is below the value of 2.1 since 1997 and continues to decrease, which indicates that there is no renewal of the population in the country. The only rate with increased values is that of births outside marriage.

The fertility level is under the critical value of 2.1 for several decades and is the main cause for depopulation and pronounced population aging. The main goal of sustainable demographic development is the stationary population, a population in which the next generation will be the same size as the existing one. Unfortunately, with values like this, the existence of the population in North Macedonia is in question.

The impact of marriage on the fertility level in the Republic of North Macedonia

The fact that with the decreased number of marriages there was a decreased number of births shows their mutual connection, but how strong this connection is, can be shown only after testing the hypotheses set in the text below. If these hypotheses prove true, they would constitute new scientific facts. The testing and proving of the hypotheses were performed using the method of linear regression and the statistical software (Python 3.5), and data from the vital statistics and authors' calculations. Thus, wanting to prove the impact of marriage on fertility in the Republic of North Macedonia, we set one null and three auxiliary hypotheses.

The null hypothesis "Marriage has no impact on the fertility level" aims to prove if the level of fertility is largely determined by the frequency of marital unions for the simple reason that most of the births occur within the marital unions.

The influence of the number of marriages in the period 1971-2015, on the number of live births in the same period, was tested using the linear regression method. That way we tried to describe the dependence between the independent variable x (number of marriages) and the dependent variable y (number of live births). We evaluated the parameters in the model using the method of least squares.

In the linear regression model:

$$y = \beta_1 x + \beta_0,$$

with the least-squares method, the obtained scores were (β_0)ˆ=-0,0005062 and (β_1)ˆ=5,4702 . The positive (β_1)ˆ value shows that the number of marriages has a positive effect on the number of live births. From the many parameters obtained, we can distinguish the coefficient of determination R^2 and the p - value. Using p<0,05 as a rule to reject the hypothesis that marriages have no impact on the number of live births (fertility level), we can conclude that the number of marriages significantly affects the number of live births. The value R^2=0,553 of the coefficient of determination shows that 55.3% of the variation in the number of live births is caused by the variation in the number of marriages.

If we evaluate that the number of live births depends on the number of marriages with the line of linear regression given by:

y=-0,0005062x+5,4702,

then, the ratio between the observed real values and the predicted ones looks like the one in figure 2.

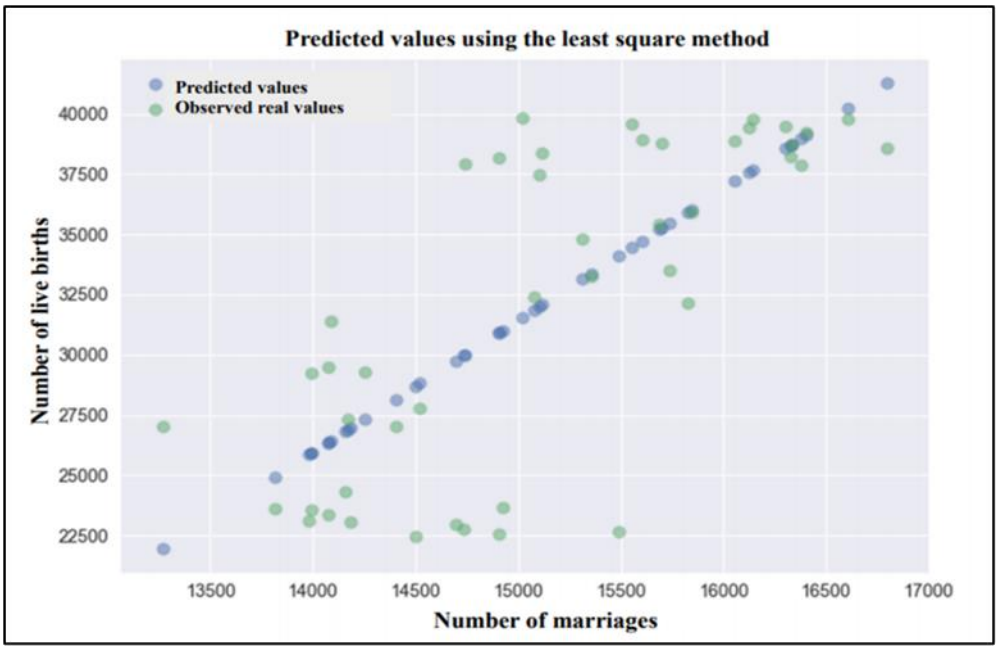

Figure 2. The ratio between the observed real and predicted values for the number of marriages and the number of live births in the period 1971-2015

Rejecting the null hypothesis means that the first auxiliary hypotheses, which is also connected to the impact of marriages on births "The marriage rate decreases, and so did the fertility rate", is accurate. Thus, knowing that marriage affects births, it is to be expected that the lower the number of marriages is, the lower the number of live births will be.

In today's "modern age", when economic independence is constantly strengthening and the sense of responsibility towards the partner is decreasing, it is much easier for the spouses to decide to end the marriage. Therefore, the second auxiliary hypothesis emerged, "The number of divorces increases as well as the divorce rate."

The changes can be shown using a graph for the number of divorces and the crude divorce rate in the period from 1971 to 2015 (Figure 3)

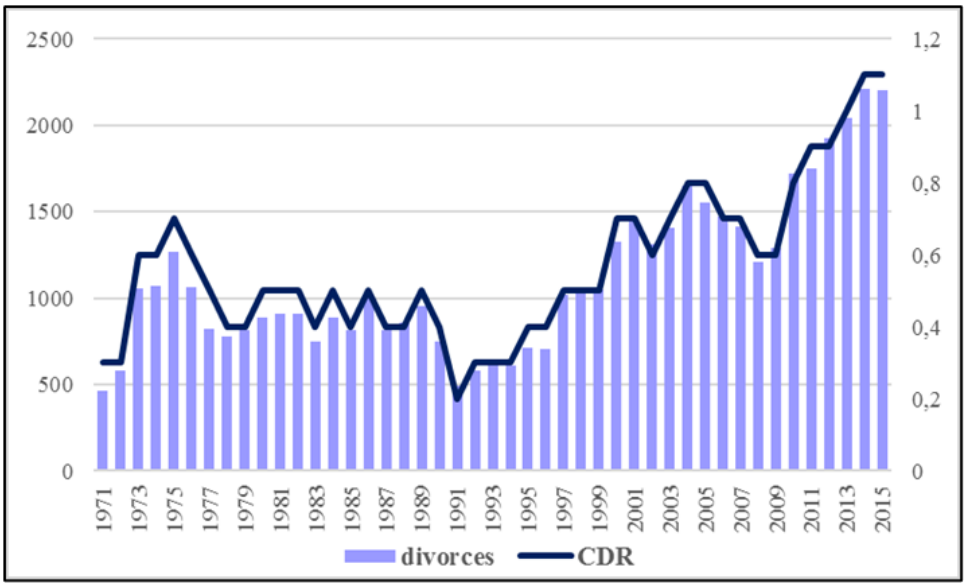

Figure 3. Number of divorces and crude divorce rate in the period 1971 - 2015

In figure 3 can be noticed that the number of divorces increased by almost five times in the period we are analyzing, while the divorce rate increased by almost four times. The increase in the divorce rate is due to the increased number of divorces, but also due to the changes in the total population.
The third auxiliary hypothesis refers to the change in the number of live births and births outside marriage, "The number of live births decreases, while the number of children born outside marriage increases".
In times of reduced number of marriages and increased number of divorces, it is to be expected that the number of live births will be reduced. On the other hand, the new opinions and attitudes on marriage and family are the reason for the increased number of single-parent families, which affects the increase in the number of children born outside marriage, especially the increase of their share in the total number of live births.

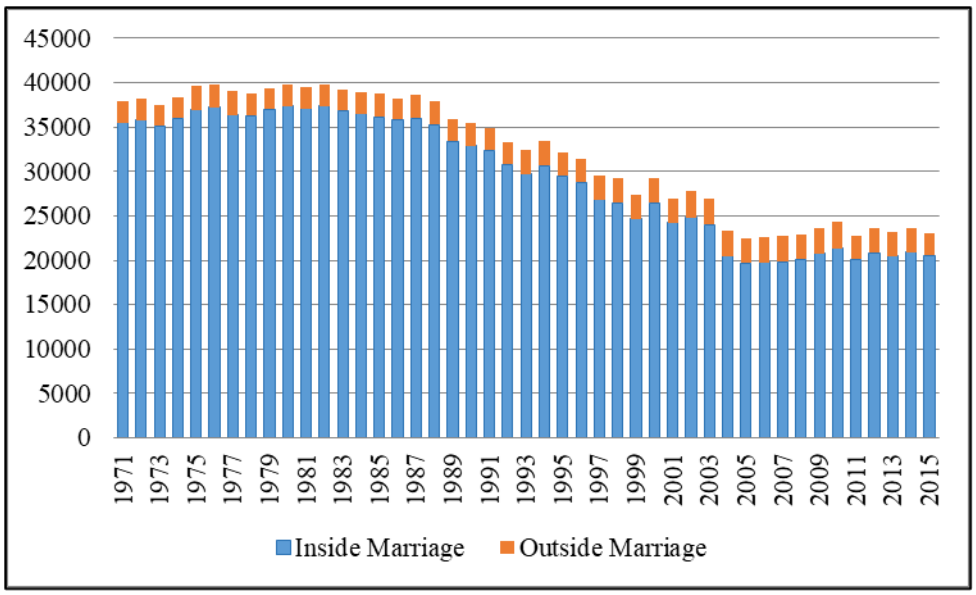

Figure 4. Number and percentage share of children born in a marriage union and outside marriage in the period 1971 - 2015

The number of children born outside marriage in the period we were analyzing has increased slightly. On the other hand, the share has grown, but not as a result of the increased number of children born outside marriage, but as a result of the declining number of children born within the marriage unions, which came as a consequence of the declined number of marriages and the increased number of divorces. The share of children born outside marriage has almost doubled in the last 45 years. This fact only proved the third auxiliary hypothesis as accurate.

CONCLUSION

The major social changes have significantly influenced the changes in the opinions and attitudes of individuals regarding marriage and starting a family. For some people, especially the older generations, the idea of postponing marriage and parenthood is unacceptable, while for others it is something natural and a feature of the "modern life".
The results of the analysis indicate that marriage, although one of the oldest institutions of the human race, in the post-transition phase that has affected our society, gradually lost its importance. The future of marriage becomes uncertain. Marriage is no longer

predictable because its future is in the "competence" of the spouses themselves, and not in religion, tradition or society [5]. In the time of change and modernization, the individual becomes self-sufficient and in some way selfish. No one wants to lose their privacy, people are usually unwilling to change their habits, share the living space, or lose economic independence [25], hence it can be concluded that the impact of individual behavior is twice more greater than the sum influence of the biological factors. However, when it comes to having a child, despite the new attitudes on life and the new types of informal communities, in most countries, even in the most developed, most children are still born within the marital union [10].

The analysis of the number of marriages, clearly shows that their number has decreased significantly in this, almost half a century. Among the main reasons, besides changed attitudes, it must be mentioned the reduction of the marrying age population, which can further on take a part in the demo-reproductive processes in the country [22].

On the other hand, the number of divorces has increased significantly. This trend in divorces was expected if we take into account all the other changes related to the second demographic transition such as the emancipation of women and persons higher education, the involvement of women in the labor market and their greater independence, parental support if the partners want to divorce, which was not the case in the past (today, divorced women often return to their parents' home after the divorce), but also the openness of the society to accept such a change in marital behavior, without condemning it.

What is most worrying, however, is the declining number of live births, which has dropped by approximately 40% over a period of 45 years, as well as the declining TFR rates that have been below the critical value of 2.1 in the country for the last twenty years. Of the total number of live births, a larger decrease is observed in the number of children born in a marriage union, while the number of children born outside marriage showed some small, insignificant changes. Hence, we can freely say that what Vasić noted in 2007 [25], "Women are increasingly opting for parenthood outside of marriage because they do not want to give up parenting, but at the same time do not want to lose economic independence and privacy, or simply do not think that they can live with a partner" is obviously present in North Macedonia as well.

This research was completed by testing the hypotheses, i.e. by rejecting the null hypothesis that "Marriage has no impact on the fertility level" which proves that in fact there is an impact of marriage on fertility and the variations in the number of live births, in 55 3% are conditioned by the variations in the number of marriages. Rejecting the null hypothesis meant accepting the first auxiliary hypothesis according to which "The marriage rate decreases, and so did the fertility rate", starting from the fact that the marriages and fertility rates are influenced by the number of marriages and births and if the number is decreasing, the rates are decreasing as well. The following two auxiliary hypotheses concerning divorce and children born out of wedlock were also accurate.

The obtained results are a clear indication that marriage and fertility are interrelated in a so-called "vicious cycle" and it is necessary to activate all competent institutions, the Government, the local-self-government and the scientific community in order to create a strategy to encourage young people to get married, to raise the births and fertility rates, but also to raise the level of economic and overall development. The results of the tested hypotheses are scientific facts on which could be based any population policy. Only this way, the population policy will be properly integrated in the society, it will be consistent and it will get a special mark so it can be implemented even where it is considered impossible.

Acknowledgment:
This research was part of the doctoral thesis "Demogeographic development of marriage and fertility in the Republic of Macedonia", by Marija Ljakoska, defended on July 08, 2019, at the Ss. Cyril and Methodius University in Skopje, Faculty of Natural Sciences and Mathematics, Institute of Geography.

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THE INFLUENCE OF THE SARS-COV2 PANDEMIC ON HOME AND PERSONAL NEEDS BANK LOANS OF THE POPULATION IN ROMANIA IN 2020

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ABSTRACT

Each period features typical aspects regarding investment in a certain field. Home and personal needs purchases by accessing bank loans have become more and more attractive. Our study analyzes this situation of home and personal needs bank loans accessed by the Romanian population in the first six months, January-July 2020. The analysis is made based on the data given by the National Bank of Romania and the National Fund of Deposit Guarantee from Romania. The methodology relied on tracking the two types of loans, for personal needs and homes and on the graphic representation of their distribution. The distribution map based on the two types of credits in counties, expanded regionally and then nationally for every month (January-July) in 2020 offers the bird's eye view upon this situation. The results of the survey follow firstly the attitude differences of the population in Romania regarding accessing home and personal needs loans before and after the Sars CoV 2 pandemic. The Covid 19 pandemic unpredictably influences many Romanians' budgets and implicitly the whole Romanian economic landscape. In each region from Romania there are counties with a high economic potential which go beyond the national ratio. Equally there are counties where the economic potential is lower. This is exactly the reason why we tried to capture in this survey the situation from each county. The incomes of the population influence accessing bank loans, regardless of their type. Because the statistics data have been issued until mid 2020, the situation is not very highly visible, but there is a shaped tendency concerning the orientation of the population towards a certain type of consumption. We intend to continue the survey for the next months of 2020 after this year as well.

Keywords: bank loans, population, pandemic, economy

INTRODUCTION

The need to purchase consumer goods or economic goods is a need often expressed through spending level or expenses [2]. These expenses may exceed the available budget at some point. In these situations, bank loans are used. Banks welcome and support the

population by providing loans for personal needs and loans for the purchase of a home. The conditions under which these loans are obtained are not at all similar, but they are often influenced, and at the same time, dependent on the income of those who access bank loans and the possible guarantees that come with their support, depending on the type of loan. Under the conditions that the incomes are diminished after the dismissals, increases of the arrears at the bank rates are automatically registered. Research in this area highlights solutions for staggering or deferring payments [4], [6], [1], [3], [5]. The current situation, that of 2020 is a special one, under the influence of the pandemic with COVID 19. The situation falls into the category of unforeseen events, thus there are difficult times for several categories of employees, especially in services, including tourism [12], [14], [16]. Most of those who have suffered jobs are young people, many of whom are registered as beneficiaries of bank loans [10], [11]. The present study presents a situation of the bank credit management capacity accessed both in the period prior to the pandemic with COVD 19, considered as the degree of indebtedness of the population (fig. 1), as well as during the six months of 2020, but also the arrears registered within this last period, both at the level of Romania and at the level of each geographical region.

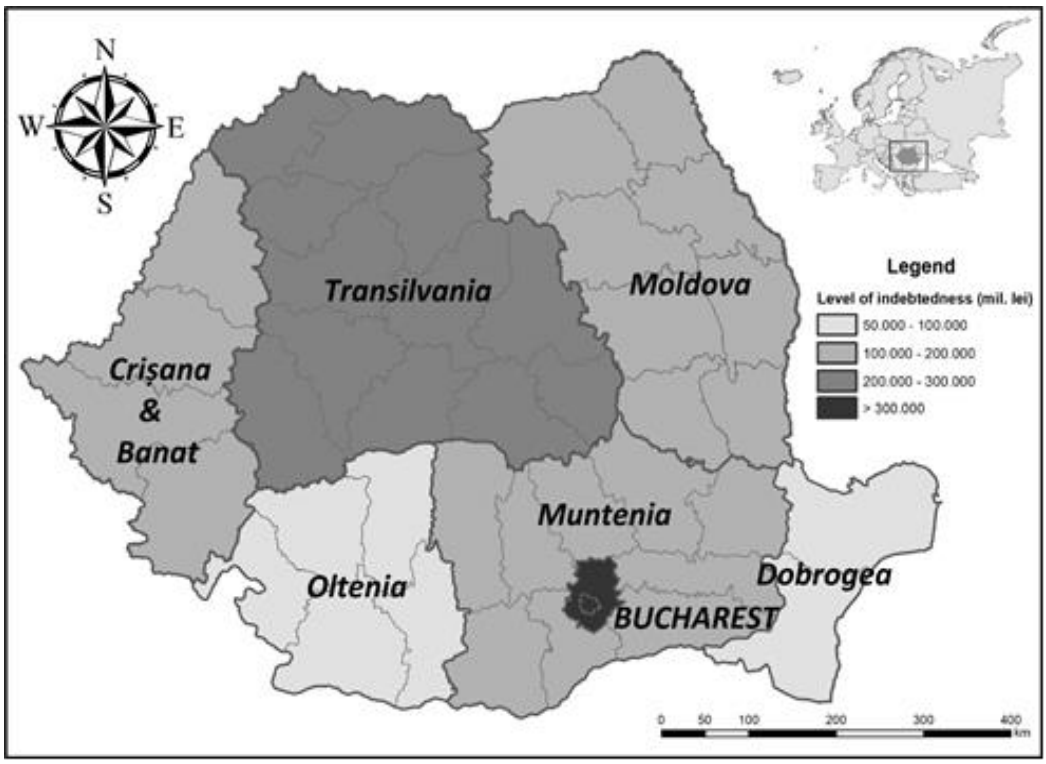

Figure.1. Romania's geographical position in Europe and the degree of bank indebtedness of the population in each province of Romania during January-July 2020

METHODOLOGY

The entire study is profiled on data provided by the National Bank and the National Bank Deposit Guarantee Fund of Romania (FGDB). Tracking the behavior of the consumer of bank loans highlights various situations. Most follow the pattern of the classic consumer - they pay the installments along with other expenses, considered mandatory, restricting personal expenses. This methodological result is visible when, according to the data provided, the following are analyzed in parallel: the loans accessed and granted, the arrears, the bank deposits made by the population, registered for the same period.

Regarding loans and arrears, it is necessary to follow, those in lei and those in foreign currency. In this way you can see the trust that those who access loans have in terms of the currency in which they receive their salary or obtain their income.

RESULTS AND DISCUSSION

The year 2020 was and remains the year of financial challenges. During the first six months of the year, bank loans fluctuated quite a bit in terms of accessing and granting them. The general trend for the six months analyzed is upward for loans in the national currency (fig. 2), which cannot be stated about foreign currency loans accessed by the Romanian population (fig. 3).

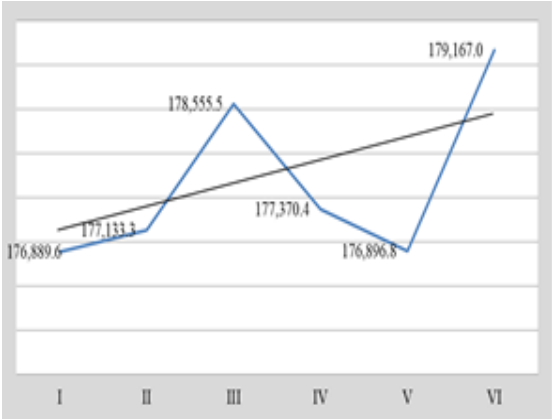

Figure. 2. The evolution of loans in lei from Romania during January-June 2020

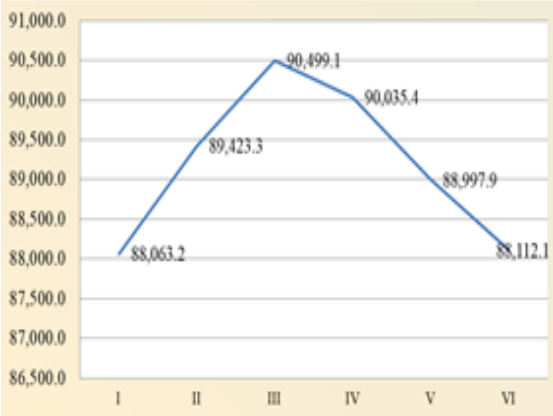

Figure. 3. The evolution of foreign currency loans in Romania during January-June 2020

Careful tracking of absolute values shows fairly large oscillating values. In January and February, including March, that is the pre-pandemic period, access to credit is increasing. Once the pandemic and the imposition of restrictions are triggered, a sharp decrease in these loans can be observed until May. When relaxations are felt and many actually resume work, loan applications appear in May-June.

The two types of loans analyzed for the population of Romania, offer a different image of the preferences and goals that the population proposes. Home loans continue to remain on an upward slope, regardless of its conditions or the risks the year 2020 may offer (fig. 4). Analyzing the situation of these types of loans in the six provinces (Transylvania, Banat-Crisana, Muntenia, Moldova, Dobrogea and Oltenia), we find differences - the value differences are less relevant given the size of each province, but important are the monthly fluctuations from each province (fig. 5). Thus, in the pre-pandemic months, January and February, accessing loans for personal needs is an upward trend phenomenon, in perfect agreement with the income of the population. In these types of loans there are also assimilated the loans for the purchase of cars, excluding the new ones, where the loans are specific.

Also, during this period, the credits for the purchase of vacations corresponding to the warm period of 2020 represent a considerable percentage. The tourism trade enables the acquisition of an attractive offer in terms of value, influencing the behavior of the tourism consumer. Once the SARS CoV2 epidemic is triggered, the population's behavior changes, therefore there appears a downward slope between March and May, more precisely in the period when quarantine is imposed. Loans for personal needs are accessed during this period as well, but reduced in terms of value, oriented towards goods that

support the development of economic activity from home or home-work. These are mainly computers and electronic equipment.

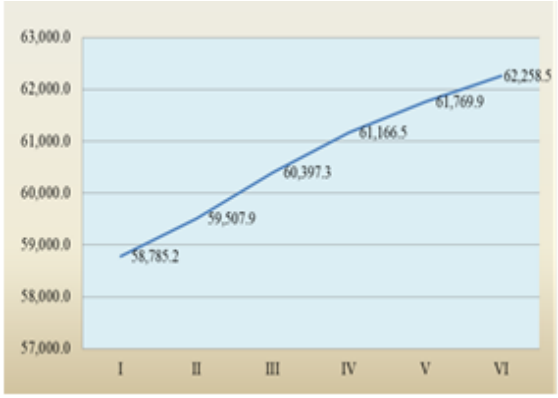

Figure. 4. Romania home loans in lei during January-June 2020

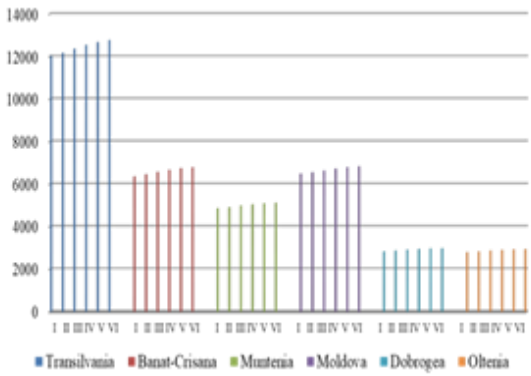

Figure. 5. Loans in lei for housing in each province of Romania during January-June 2020

Regarding the loans for personal needs, the behavior of the Romanian population is different from one month to another, for the period under analysis - January-July 2020 (fig. 6 and fig. 7).

Figure 6. Consumer loans in lei in Romania during January-June 2020

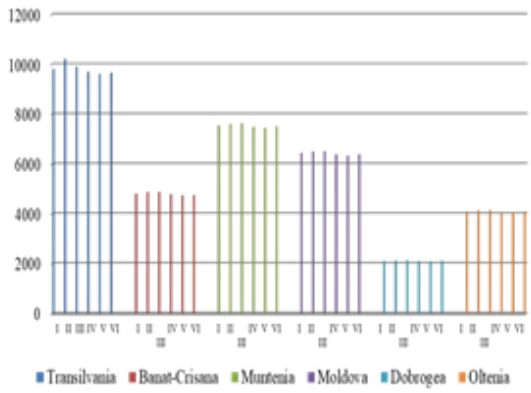

Figure 7. Loans for consumption in lei in each province of Romania during January-June 2020

The unforeseen situation triggered by the pandemic of COVID 19, also brings upset in terms of repayment of installments on loans accessed in previous periods, many of them having a fairly long history. This situation is amplified by several elements: the inherent arrears or arrears that may occur regardless of the economic situation; arrears arising from misunderstandings triggered by the authorities' messages regarding the deferral of installments for those who have bank loans; another reason is the poor communication between banks and the population regarding the postponement of bank installments in the situation given by the COVID 19 pandemic; last but not least, the arrears appeared as a result of the reduction of incomes - technical unemployment or of dismissals, the incomes of the population becoming incapable to cover the bank installments (fig. 8 and fig. 9). The worst financial situations are registered by HoReCa companies, at least in the first period of the pandemic crisis. It is then easily possible to register a potential to adapt to the given conditions. The employees had a lot to suffer, as their incomes decreased continually one month to another. These declines also have effects upon bank loans,

accessed mostly in the years or months just before the pandemic. Loan arrears are recorded in both the national currency (leu) or the international currency.

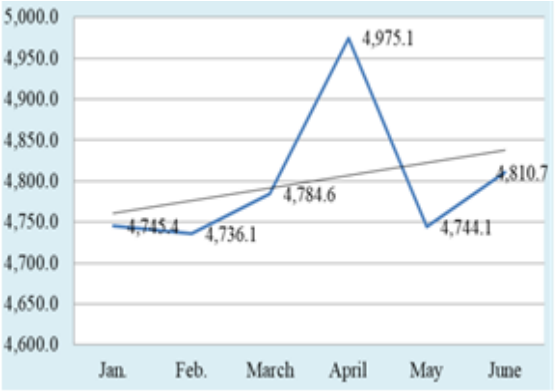

Figure 8. The evolution of overdue loans in lei in Romania during January-June 2020

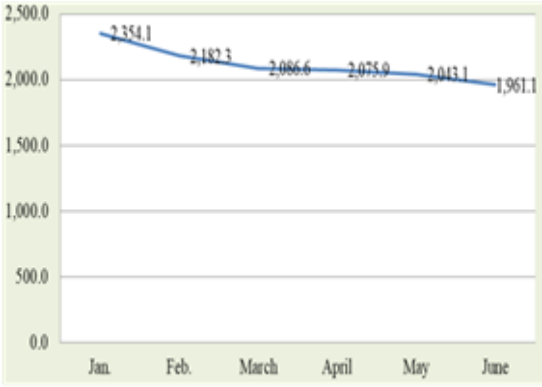

Figure 9. Evolution of arrears on foreign currency loans in Romania during January-June 2020

Adapting the economic activities to this special situation has become a priority for most entrepreneurs. Among them, there range those functioning in the tourist field, owners of accommodation structures, especially pensions/ hostels or small hotels. Many of the guesthouses have had the ability to adapt more easily to the imposed conditions, especially those related to social distance, the movement of people inside and outside them, the endowment with high speed internet for those who worked in this way. Most of these accommodation structures offered suitable working conditions for those who needed relaxation after school hours, through special recreational activities (the natural setting being the one that majorly contributed to this situation), hiking being the most attractive and recommended one during this period. To these ones, there are also added other activities, such as workshops, in which children are trained mainly. These workshops can also be used for educational purposes. They involve a small number of people and can have beneficial effects on the acquired knowledge regarding certain fields, crafts but also cultural values of some ethnic groups [13], [14]. Other areas where economic activities in the field of services have been registered, including agri-tourism accommodation areas, have been registered in the vicinity of important natural resources such as salt deposits or special natural phenomena [12], [15], [9]. What stood out during this period, was the ability to adapt the economic activity of each economic unit, regardless of the specifics, to the given conditions. A resilient, sustainable economy is an economy that has the ability to adapt to special conditions, and this period is one of them [7], [8].

Another registered phenomenon was the return to Romania of a fairly high number of people who worked outside Romania's borders, especially in the European Union. The effects of this phenomenon were both positive and negative. The positive effect could be noticed by recording and evaluating the bank deposits (fig. 10). Despite the declining income of the Romanian population in January-July 2020, bank deposits registered a slight increase. This phenomenon can be explained both by the participation in the creation of these deposits of the middle-income population, but also of those who obtained a higher profit working abroad. This financial-banking phenomenon is registered in all regions of Romania and can be considered as a positive thing.

The negative effects registered with the return to Romania of those who left for the countries of the European Union, were related to the lack of occupation and, implicitly,

of incomes. For many of them, their income was a source of consumption, but limited to a certain duration. Most Romanians who returned from the European Union countries were from all counties, without noticing certain regions.

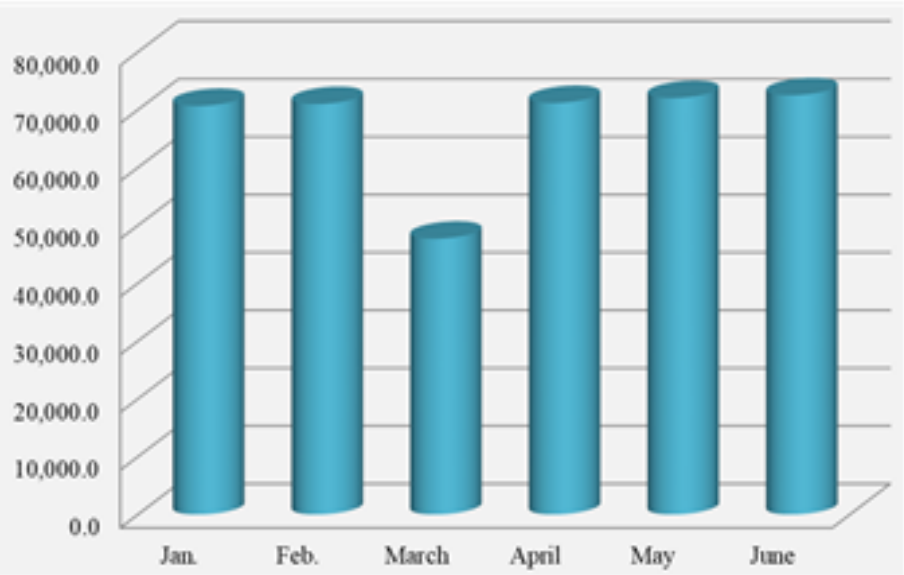

Figure 10. The evolution of bank deposits in lei of the Romanian population during January-June 2020

CONCLUSIONS

The economic situation that Romania is going through is not a unitary one, but it is one registered at a worldwide level. Adapting the economy to special situations is a necessity. The evaluation of the national economy highlights areas that have a significant increase in turnover, in the pay related to wages and expansion in work networks. On the other hand, there are areas that have restricted their work capacity until its final cessation. The areas in Romania that had the capacity to adapt economically can also be noticed through bank indicators, such as bank loans and deposits, regardless of currency (national or international). Equally notable there are the areas that have a higher inertia in terms of adaptability, using the same banking indicators. Among the provinces, it stands out in terms of accessing and obtaining loans for housing in Transylvania, whose trend is upward, throughout the analyzed period. The ascendant situation is common in all regions of Romania, but here the slope is much more accentuated. The capital, Bucharest, is positioned in a similar situation. The oscillations it registers regarding loans for personal needs are clearly expressed in all regions of Romania in March, the month in which the COVID 19 pandemic is established. It is a natural reaction of the population to an unprecedented situation. The simple form of financial protection was expressed by population by reducing expenses, especially those with a credit card, or accessing consumer loans or personal need loans. Starting with May, relaxation is also felt among consumers. In this way, we can say that an economic adaptation at individual level is necessary.

Everyone must have the ability to understand that the transformations that the world economy is going through, bring permanent changes. In this case, obtaining income is possible only by adapting our educational and working capacity. This principle must be respected, and the economy of each state, including Romania, will find those solutions for economic recovery.

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TRENDS IN THE EVOLUTION OF REGIONAL DISPARITIES OF ONCOLOGICAL MORTALITY IN ROMANIA

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ABSTRACT

Cancer has been considered one of the most important problems globally, when it comes to the disease of the population, being ranked 2nd in the world after cardiovascular disease. According to international databases, such as the WHO, at European level, 25% of new cancer cases are registered globally, approximately 3.9 million cases occur annually and approximately 1.7 million deaths. Cancer is also responsible for about 20% of all deaths annually. Most deaths are caused by lung cancer (C30 - C39), colorectal cancer (C15 - C26), breast cancer (C50) and pancreatic cancer (C15 - C26). In this material we want to present the situation of oncological mortality in Romania for the period 2008-2016, more precisely the identification of geographical areas with extreme values. This analysis starts from the medical database provided by the Romanian Ministry of Health on the incidence of cancer, starting with 2008, immediately after Romania's accession to the European Union, when the centralization of data in a unitary system was implemented. Data on oncological mortality are processed and then reported at the level of the territorial administrative unit in order to perform statistical analyzes and perform spatial models using GIS methods.

Keywords: cancer, oncological mortality, GIS, spatial distribution.

INTRODUCTION

According to the World Health Organization, cancer is one of the leading causes of disease in the global population, but also a major cause of mortality, in 2018 there were over 9.6 million deaths globally, 1 in 6 deaths are produces due to cancer. [1] Over time, numerous specialized studies have addressed the spatial dimension of cancer either in an attempt to find a closer link between the geographical distribution and the appearance of cancer cases, or to develop public policies with specific, regional location. [2], [3], [4], [5]. An important moment in the development of new methods and techniques for analyzing medical data, either statistical or imaging, is the use of GIS technology on a large scale. This technology allows first of all the processing of a immense volume of data according to the software specifications.

The use of GIS has made it possible to create spatial models designed to support various public policies, making it easier to understand this phenomenon as well as the possibility to analyze in detail the distribution of different types of cancer. Therefore, Geographic Information Systems allow users to develop and then analyze spatial models for a better understanding of the relationship between cancer, environmental factors and socio-economic factors [6], [7], [8], [9], [10]. The spatialization of medical data has brought

more knowledge and helped to understand the determinants from a new perspective, being a defining element in the effectiveness of public policies for preventing, combating and treating cancer and implicitly oncological mortality [11], [12] , [13], [14].
Studying the specialized literature, a common element is observed, the lack of relevant data at a detailed level represents an impediment, considering the current situation, a huge volume of medical data. It is necessary to use methods of spatial representation, these offering a broader vision on the distribution of cancers at the national level, regional discrimination, the evolution of cancers, etc.

RESEARCH METHODOLOGY

Figure 1. Study area

For this study, we used a database with national coverage, at the level of territorial administrative unit for the period 2008-2017. This database includes the cancer situation in Romania at locality level for each type of cancer, as well as the oncological mortality situation (fig. No. 1).
Based on initial medical data, the prevalence of oncological mortality for category C00-C95 was calculated based on the total number. The processing of medical data involved the aggregation of all types of cancer at the locality level that will be spatialized and represented on the map using a GIS tool. To begin with, a relational database system RDBMS - PostgreSQL was used to be able to generate a database with a vast number of records. An important thing to mention refers to the reduced processing time in, the operation of aggregation and later pivoting of the data necessary to obtain statistical situations is improved, it differs depending on the hardware configuration on which these processes are performed. The data were structured in tabular form and were exported in Microsoft Excel compatible format for various statistical situations and specific graphics. These tables were later used to spatialize the oncological mortality using an open source

software, QuantumGis, through which we connected to the database to assign to each locality the corresponding values, based on a common element, the locality code. These tables once entered in QuantumGis were classified in 5 intervals and represented cartographically in gray tones, the high values with light tones, towards white, and the low values with dark tones, towards black. Thus, oncological mortality was represented according to the total number of cases, the number of cases corresponding to the total population in the form of spatial models for each year, specific to the period 2008-2016

RESULTS

Oncological mortality in Romania for the period 2008-2016

The next nine figures (from fig. no. 2 to fig no. 10) represent the situation of the geographical distribution of oncological mortality, how many people died due to one or more types of cancer, and the analysis was performed for the period 2008-2016 according to the total number of deaths.

Analyzing both the spatialization of the phenomenon in the form of spatial models and the database, we can present some concrete situations regarding the intensity of the phenomenon. Therefore, in the nine figures, the geographical distribution of oncological mortality (C00-C96) for total persons highlights the extreme values of over 401 deaths per year, reported to the territorial administrative unit. Cluj Napoca registered in 2008 about 800 deaths, and in 2016 the number increases to 958; another locality with extreme values is Iași, where the number of deaths increases from 700 to 1000 cases, the same happens with the other localities represented in white, they register extreme values of over 401 cases of deaths. The capital of the country, Bucharest ranks 11th as the number of deaths, increasing sharply (from 460 to 742). The low values are found in localities such as Izvoarele in Dolj County, Chirnogi, Călărași County. Greaca Giurgiu county etc. All these localities keep their values below 50 cases of death.

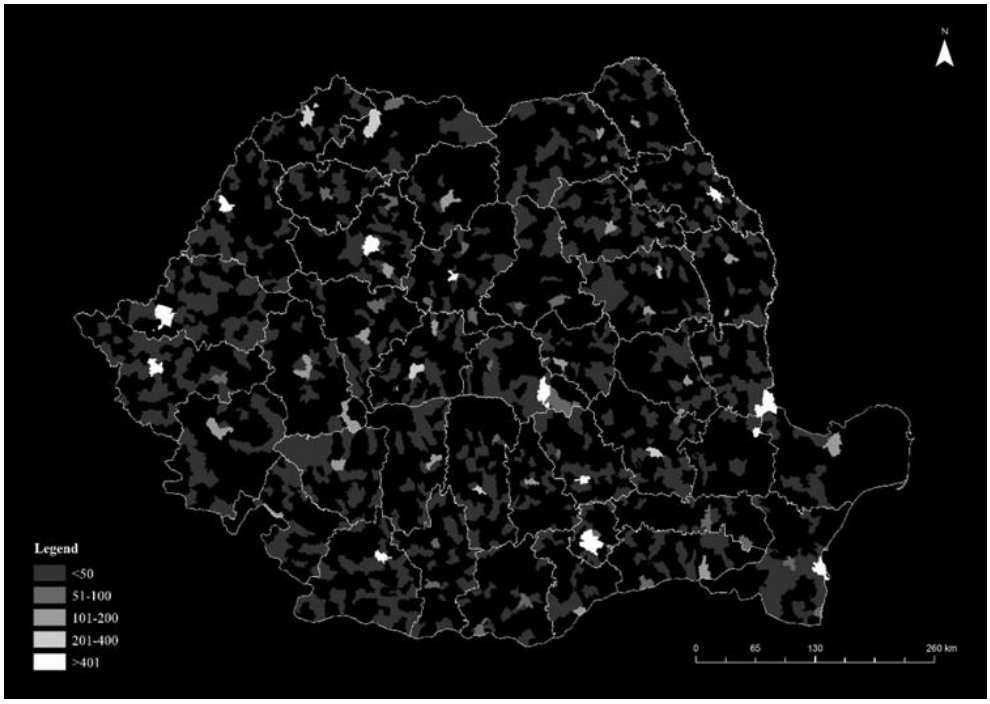

Figure 2. Geographical distribution of oncological mortality (C00-C96) - total (persons) year 2008. Source: Ministry of Health

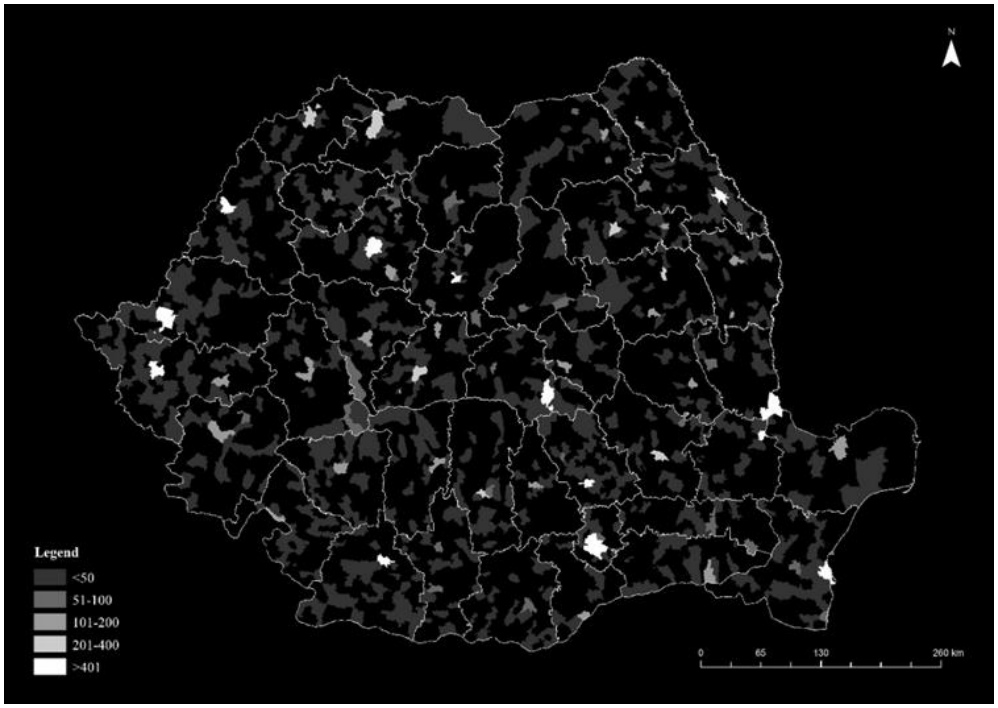

Figure.3. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2009. Source: Ministry of Health

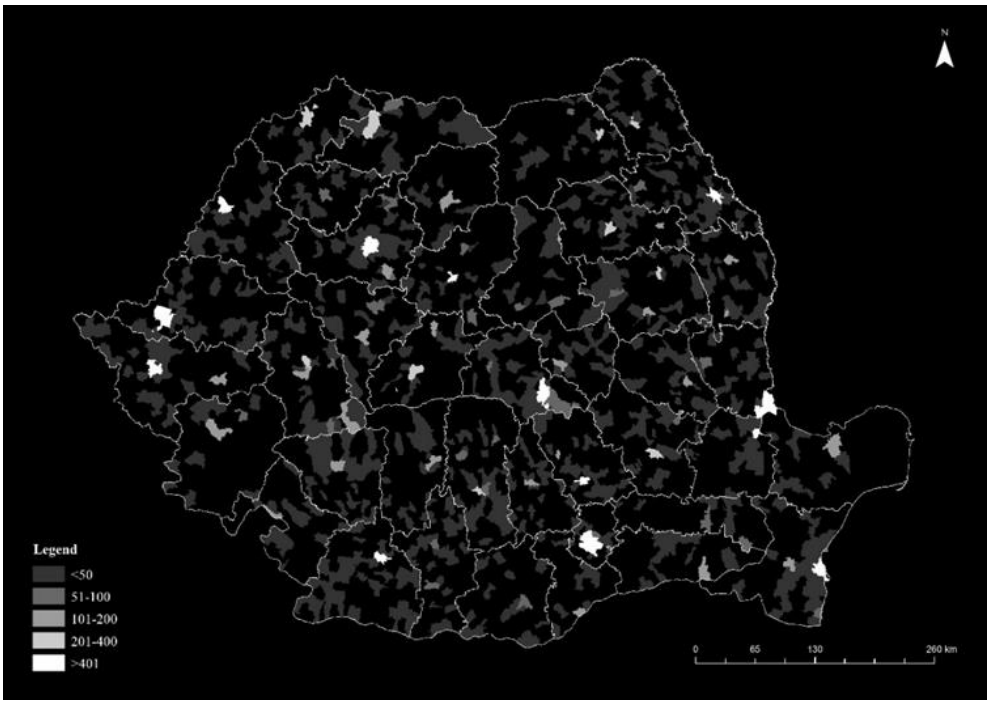

Figure 4. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2010. Source: Ministry of Health

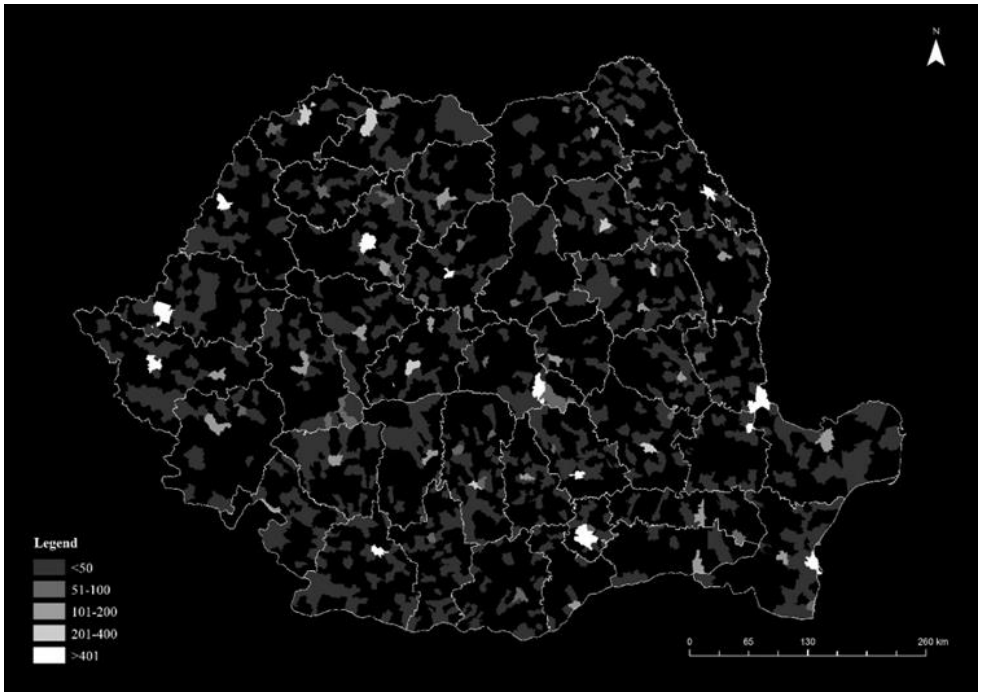

Figure 5. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2011. Source: Ministry of Health

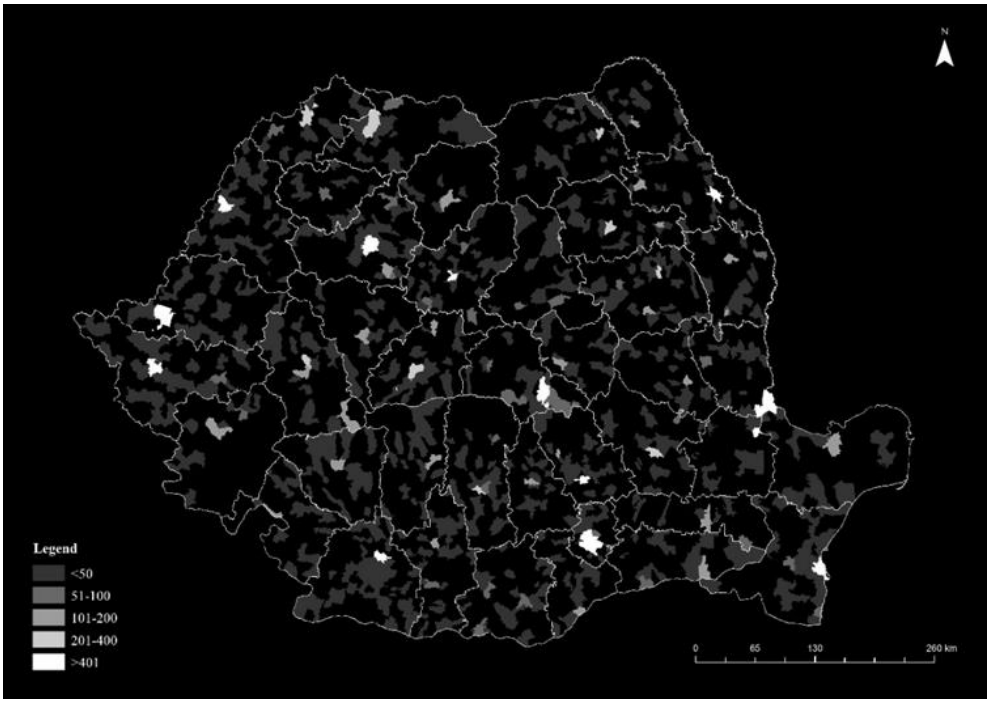

Figure 6. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2012. Source: Ministry of Health

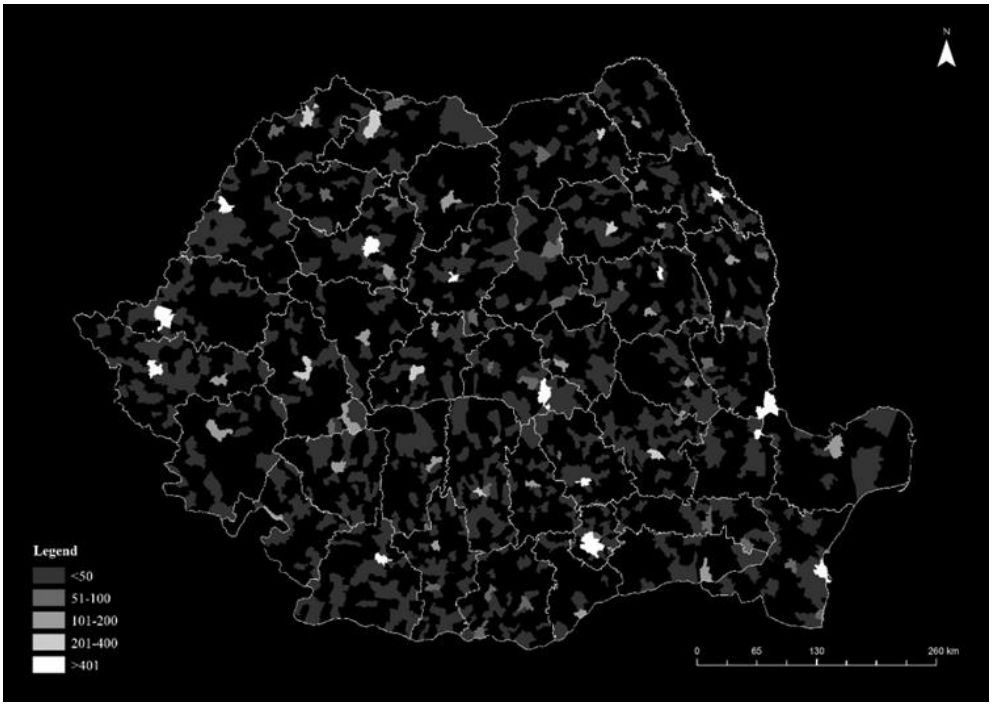

Figure 7. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2013. Source: Ministry of Health

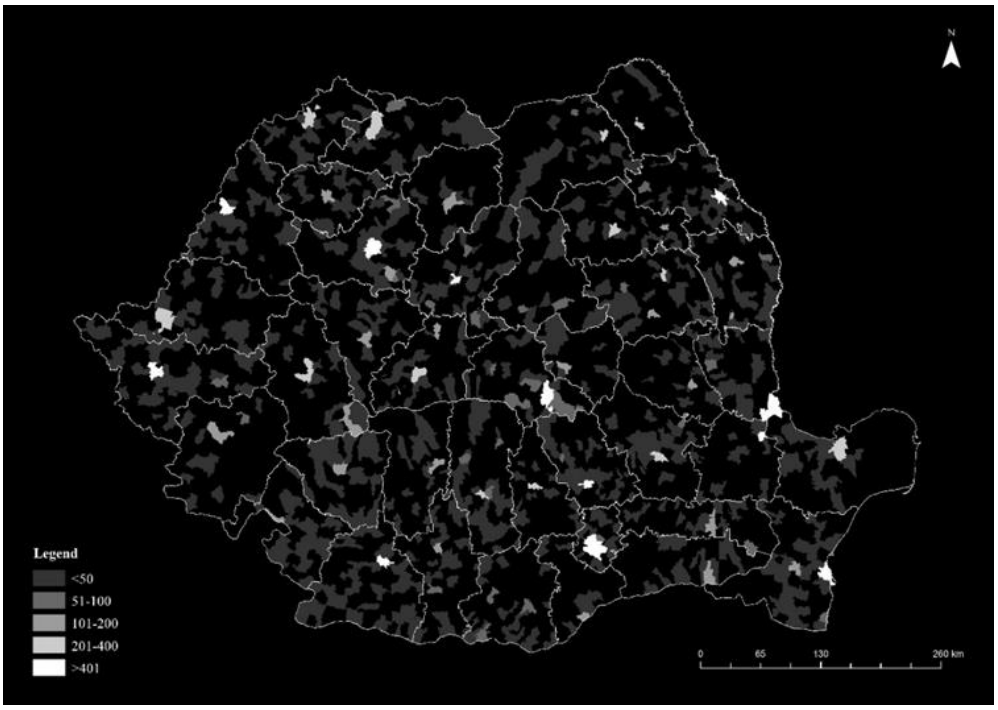

Figure 8. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2014. Source: Ministry of Health

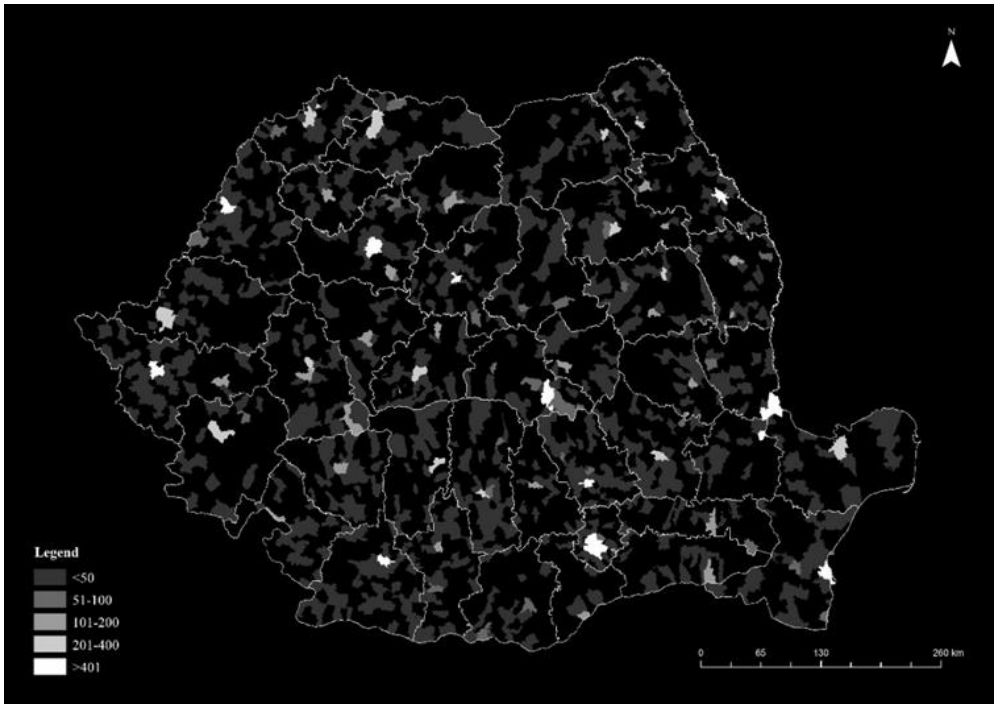

Figure 9. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2015. Source: Ministry of Health

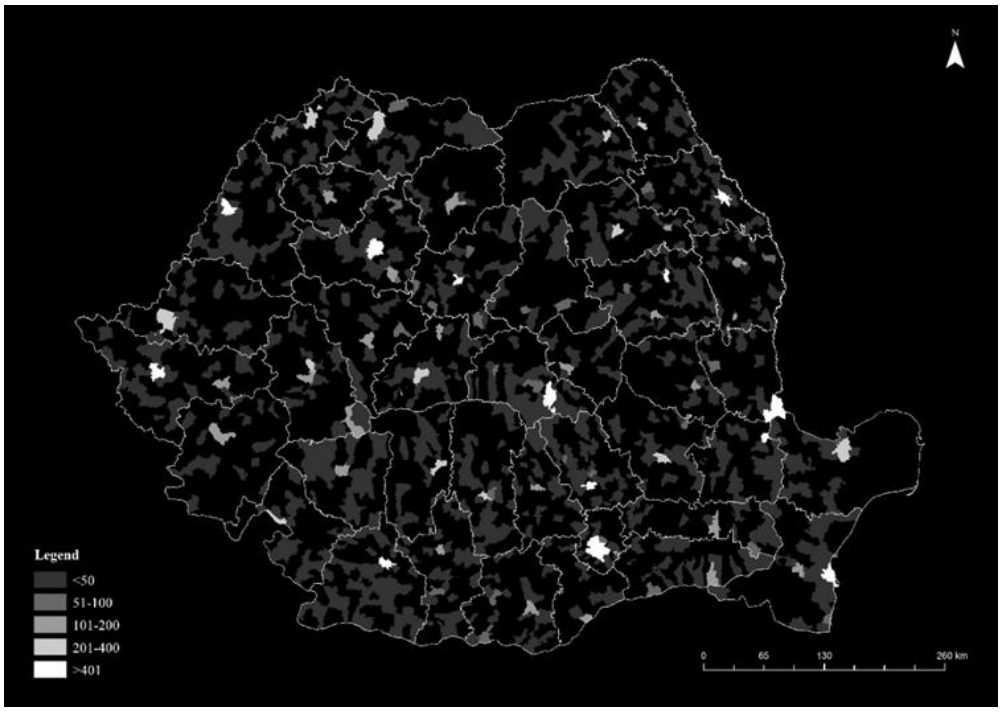

Figure 10. Geographical distribution of oncological mortality (C00-C96) -total (persons) year 2016. Source: Ministry of Health

CONCLUSIONS

In order to achieve the most relevant results, with the help of geographical information systems, it is necessary to treat together the three main components, the geospatial component, the environmental component and the medical component. It is expected that the maximum values will be found in large urban centers and the minimum values in

isolated, sparsely populated localities, but this material wants to bring forward the current situation we face, being a starting point for future more detailed studies. What is certain is that the appearance and development of certain carcinogenic diseases that later, in some cases lead to death are closely related to the activities of large urban centers, but also large industrial areas of the country, through huge amounts of pollutants emitted during periods when operating at full capacity

DISCUSSIONS

Regarding the cancer situation in Romania, the incidence and mortality are increasing, cancer being the second cause of disease, respectively mortality, tending to overcome cardiovascular diseases. Compared to the average incidence and mortality encountered in European countries, the one in Romania exceeds it, for example cervical cancer exceeds 3 times the European average. Another significant example is the cancer found especially in the male population, lung cancer whose average is 10% higher than in the European Union. The cancers with the most records identified in 2012 for the male population are lung cancer, colorectal cancer and prostate cancer, and among the female population are breast cancer, colorectal cancer and uterine cancer [15], [16]. The situation at national level is complex, in the last 20 years all these values have an upward trend, both in terms of incidence and cancer mortality.

Prevention remains the main way to lead to the lowest possible mortality rate, more precisely the public policies for prevention correlated with the spatial dimension. An example of this is a study conducted in Virginia, USA, which showed a higher rate of cervical cancer mortality in the West where Pap smears were not performed. Thus, a geographic information system was used to spatialize this information, which further helped to develop public policies to finance these annual screening analyzes, leading to a lower rate [17].

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SECTION

CARTOGRAPHY, GIS

& SPATIAL PLANNING

GEOCHEMISTRY AND SM-ND DATING OF AMPHIBOLITES OF ESEKA GREEN STONES BELT (NYONG COMPLEX SOUTH CAMEROON): HIGHLIGHTING OF DISTENSIVE EPISODES IN A COMPRESSIVE OROGENIC CONTEXT

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ABSTRACT

The Eséka Greenstone Belt (CRVE) is located in the Nyong Paleoproterozoic unit, Northern edge of the Congo craton, Cameroon. The petrographic, geochemical, and isotopic geochemistry (Sm-Nd) approach of this Nyong complex amphibolites, allowed to highlight three petrographic facies (plagioclastic amphibolites, melanocratic amphibolites and garnet amphibolites), with mineralogical assemblies more or less similar to Hornblende and plagioclase. Fifteen amphibolites samples distributed throughout the CRVE were collected and differentiated into three main facies (garnet, plagioclastic and melanocratic amphibolites). The thin sections were made at the Langfang Rock Detection Technology Services Ltd laboratory in China. The major elements were analysed by X-ray fluorescence (XRF) in South Africa. Isotope geochemical analyses were achieved at the University of Rennes in France. The analyses were carried out following the isotopic dilution method using a multicollector mass spectrometer by thermos-ionization of the Finnigam MAT 262 type to decipher the isotopic composition of samples. Garnet amphibolites are on average richer in silica (47.40 - 52.58%) compared to plagioclastic and melanocratic amphibolites. The alkali content is low in melanocratic amphibolites, in particular for K2O (0.13 - 0.14%). These metabasites have several common geochemical features such as: the relatively high contents of Y (22.03 - 39 ppm), Zr (63.78 - 481.99 ppm), Th (0.55 - 12.37 ppm), the low content of Ta (0.33 - 1.20 ppm); a high concentration of compatible elements (5.60% <MgO <13.86%, 64.37 <Ni <622.98 and 230<V<322 ppm) and parallel spectra moderately enriched in light rare earths compared to heavy rare earths (1.41 <LaN/YbN <22.97). The CRVE amphibolites had 147Sm / 144Nd ratio values varying from 0.0841 to 0.1046, associated by negative εNd values (-28.52 to -19.33). These relatively low values, typical of crustal rocks derived from the continental crust. The CT ages (between ~ 2092 and ~ 2418 Ma), were interpreted as intermediate ages between the events recorded in the Paleoproterozoic (~ 2. 05 Ga- ~ 2.5 Ga) and the major Eburnean event (~ 2.1 Ga). These formations show a basaltic protolith with an original composition of sub-alkaline magmas with tholeiitic affinity. The amphibolites of CRVE derive on the one hand from the tholeiites established in an anorogenic context coming from a weakly enriched mantle source and on the other hand, amphibolites with calcium-alkaline affinity established in an orogenic context. These CRVE amphibolite characteristics, suggested

distensive (and/or transtensive) episodes in a compressive orogenic context for their implementation.

Keywords: Amphibolites, CRVE, Sm-Nd dating, Distensive, Geochemistry.

INTRODUCTION

The continental crust contains approximately 350 volcano-sedimentary belts of about 1.4 million km2 and only around forty are reasonably well documented. The Congo Craton is a set of Archean and Paleoproterozoic greenstone belts [1], [2], [3], [4]. Although the petrographic and geochemical characteristics are formally well identified, their geodynamic context still remains controversial. Some authors expected displacement processes around the paradigms of plate tectonics [5], [6], [7], [8]. While others relied on the more vertical and diapirically processes [9], [10], [11] and the importance of mantle feathers [12], [13], [14]. In Cameroon, greenstone belts were identified in the Ntem [15], [16] and Nyong [17], [18], [19] complexes. The Lolodorf-Ngomedzap green stone belt (CRVL) dated around 3.06 Ga [16] remains in the relic state within the intrusive granitoids of the Nyong unit set up around 2.9 Ga. It was characterized by the metabasites and iron quartzites association. The basic facies of CRVL are clino and orthopyroxene graniferous orthoamphibolites originating from dolerites and gabbros transformations. They showed the association of tholeiitic and calc-alkaline sequences. Based on Sm-Nd model ages, a lower Archean age was selected for the establishment and metamorphism of the CRVL [16] and the amphibolites of Mvengue, between 3.3 and 3.6 Ga (Fig. 1). Cartographically, the limits between the CRVL and CRVE were very hypothetical since they were all located in the area where metabasites and iron quartzites were abundant within the ribbon series (Fig. 1b). This paper describes the geochemistry and geochronology (Sm-Nd) of Eséka Greenstone Belt (CRVE) amphibolites. The purpose being to know whether the CRVE amphibolites (Nyong complex) would be an extension of those of CRVL (Ntem complex) with a common or different context origin.

GEOLOGICAL CONTEXT

In Southern Cameroon, the Ntem, Nyong and Ayina complexes represent the Congo Craton North-West edges and are composed of granulitic gneiss and a charnockitic intrusive complex set up around 2.9 Ga [4], [16], [20], [21], [22]. The greenstones belts set up between 3.0 and 3.3 Ga in a context of proto-oceanic rift as well as a whole of metamorphic rocks of amphibolitic to granulitic facies, associated with the establishment of granitoids dated to 2.6-2.9 Ga are recognized in the Ntem complex. [23], [24], [25]. The Nyong complex formations mark the end of the Eburnean cycle in Cameroon [26], [27], [28] where the paleoproterozoic chain structuring resulting from the collision between the Congo and São Francisco cratons is set between 2.1 and 2.0 Ga. The CRVE belongs to the Nyong complex [17]. It is surrounded by laminated series [29] formed by garnet mylonites towards the South-East, by the CRVL towards the South [29] and by the Pan-African formations of the Yaoundé group towards the North (Fig. 1). The CRVE is lithologically characterized by metabasites (amphibolites, grenatites, eclogites) and ferrifere quartzites association. It is intruded by a vein made up of muscovite pegmatites and ultrabasite. Undifferentiated gneisses and intrusive rocks (alkaline syenites, tonalites) fill the complexity of this geological whole rocks [30]. The CRVE is structurally marked by a D2 deformation phase which takes up the D1 old Liberian EW structures, a

generalized NE-SW foliation and subvertical seam shears and tangential tectonics with South-East vergence responsible for the overlap of Nyong unit on Ntem unit [31]. These tectonic and metamorphic characteristics confirm a much more vigorous structural evolution than the unity of Ntem during the Eburnian orogeny and of the influence of pan-African tectonics [25].

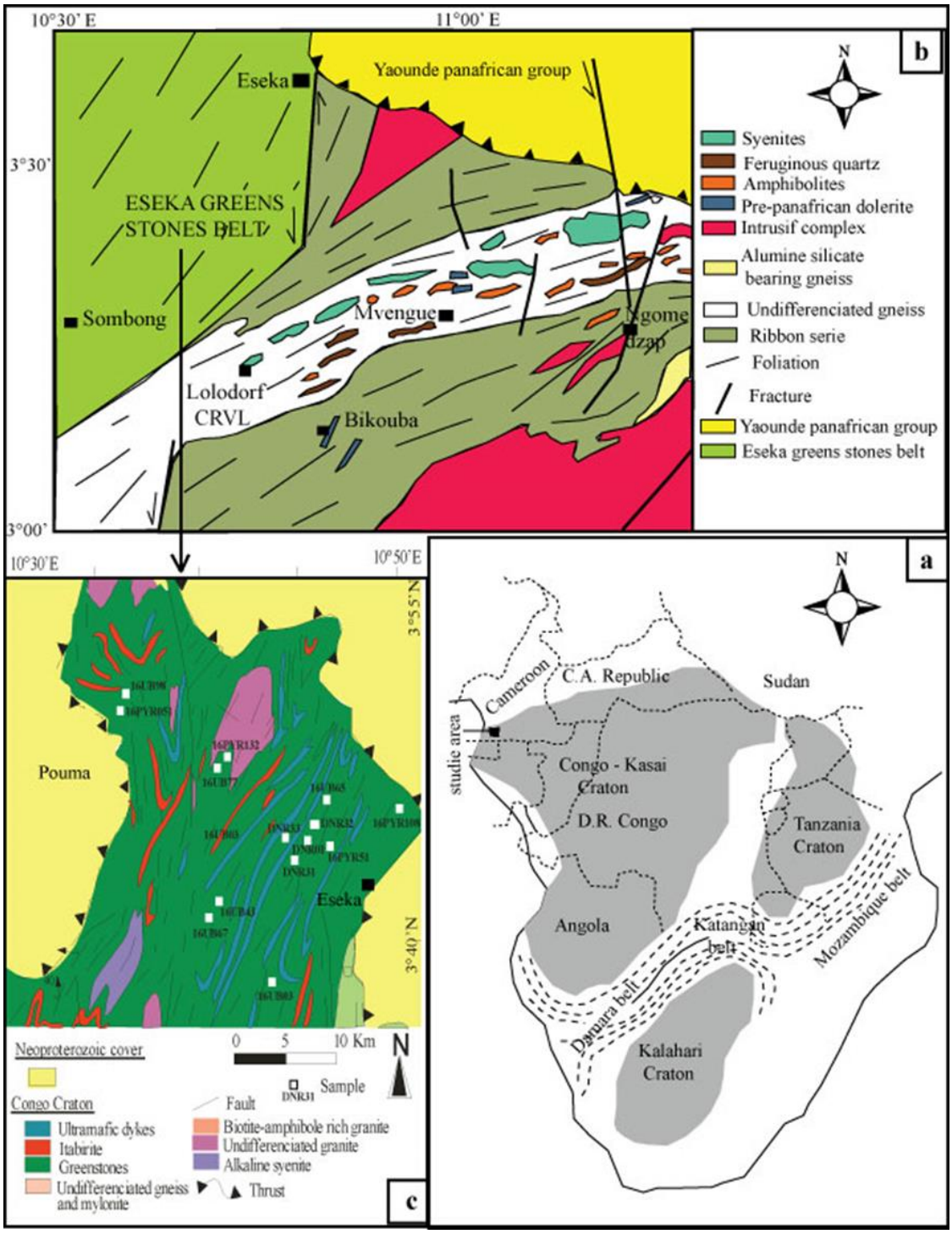

Figure 1: Geological setting of the study: a) Geological diagram showing the position of the Congo-Kasai, Tanzania and Kalahari cratons in Africa and the layout of the Pan-African belts [51]; b) Geological map of the Eseka - Lolodorf region (modified by [15]; c) Geological map of the Eseka region showing the Eseka greenstone belt.

ANALYTICAL METHODS

About fifteen amphibolite samples distributed throughout the CRVE were collected and differentiated into three main facies (garnet, plagioclastic and melanocratic amphibolites). The thin sections were made at the Langfang Rock Detection Technology Services Ltd laboratory in China. Major elements were analysed by X-ray fluorescence (XRF) with the Phillips PW 1840 device and trace elements by mass spectrometry coupled to induction plasma (ICP-MS) on a VG-Plasma Quad STE ICP mass spectrometer at the SANAS laboratory of the ALS group (Australian Laboratory Services) in South Africa. Works carried out by [32] and [33] describe the analytical procedure. The analytical uncertainties were 1% for major elements, between 5 and 10% for trace elements, 5% for rare earths > 10 ppm and 10% for trace elements <10 ppm. Isotope geochemical analyses were achieved at the University of Rennes in France. The analyses were carried out following the isotopic dilution method [32]. Based on this method, the isotopic composition of samples was done using a multicollector mass spectrometer by thermos-ionization of the Finnigam MAT 262 type. The Nd isotopic ratios were corrected for mass fractionation by normalizing to 146Nd/144 Nd = 0.7219. Total procedural blanks were b80 pg for Nd. Measurements of the Ames Nd standard gave a mean 143Nd/144Nd ratio of 0.512125 ± 8 (2σ, n=5). Errors are given in 2 sigma (95 %) confidence level.

RESULTS

Petrographic characteristics of the amphibolites of Eseka

The petrographic study revealed three amphibolitic facies: plagioclastic, melanocratic and garnet facies (Fig. 2). These facies were exposed in ball-shape and block-shape on bed and edge of watercourses or as intrusive veins interspersed with other metamorphic rocks (gneiss, mylonites, ultrabasites, quartzites and iron formations). Garnet amphibolites (Fig. 2a and 2b) had a dark appearance and represent the most dominant facies. The texture was granoblastic to coronitic. The primary assembly was amphibole + garnet + plagioclase + biotite ± pyroxene. Secondary minerals were sphene, quartz, epidote and opaque minerals. Garnets were very abundant in the rock and sometimes have crowns of quartz and feldspar crystals. The plagioclastic amphibolites (Fig. 2c and 2d) showed a granoblastic to epidoblastic texture. Hornblende, plagioclase and quartz formed the main assemblage of the rock. Pyroxene appeared in the upper amphibolite facies.

While ferro-titanium oxides, quartz, chlorite, biotite, zircon and opaque minerals constituted the accessory minerals. Melanocratic amphibolites (Fig. 2e, 2f) had a dark appearance with fine grains and a massive structure on the ground. The main mineralogical assembly was amphibole + plagioclase. The opaque minerals + epidote + biotite constitute the secondary assembly. The texture was granoblastic unbeds. The epidote was secondary in rock and occurred in the form of clusters. These crystals were generally into interstices and sometimes in inclusions into the amphibole.

Whole-Rock Chemistry and Nature of the Protoliths

The facies chemical data of analysed samples on total rocks are presented in Table 1. It appeared that, the CRVE amphibolites had SiO2 contents ranging from 46.63 till 52.58%. The K2O contents varied from one facies to another and from one sample to another. They were ranked from 0.13 to 1.81% suggesting an oxide post-magmatic remobilization. The CaO obtained values varied between 8.50 and 13.19% and those of Al2O3 between

8.70 and 14.85% which prove their mobility. Fe2O3 contents changed between 11.44 and 16.63%; TiO2 contents are generally low, less than 2% and P2O5 contents are also very low, varying between 0.06 and 0.30%.

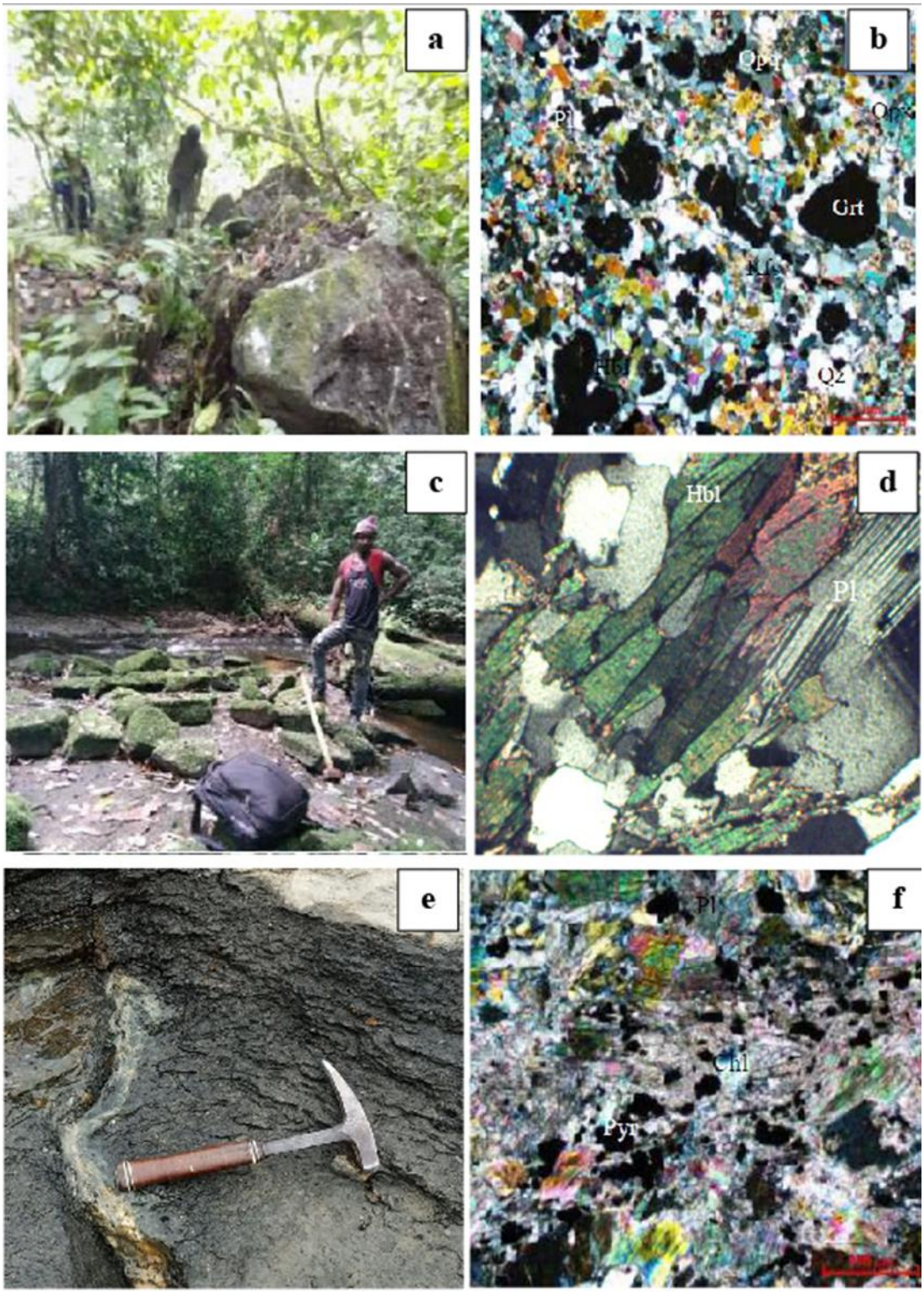

Figure 2: Petrographic characteristics of amphibolites in the Eséka Greenstone Belt

CRVE amphibolites have relatively high Y (22.03 - 39 ppm), Zr (63.78 - 481.99 ppm), Th (0.55 - 12.37 ppm) and low Ta (0.33 - 1.20 ppm) contents. The compatible elements were present in high concentrations (5.60% <MgO <13.86%, 64.37 <Ni <622.98 and V between 230 and 322 ppm), which indicate the presence of primitive liquid among the studied rocks.

In the [34] prototypes triangular diagram, the samples representative points (Fig. 3a) are plotted at the end of the magmatic ridge near the basalts/gabbros. This point arrangement reveals that the studied metamorphic rocks were of magmatic origin. The TAS diagram of Le [35] refines a basaltic protolith on amphibolites (Fig. 3b). Like amphibolites of the Lolodorf-Ngomedzap greenstone belt, CRVE amphibolites have chemical compositions of alkaline basalts [29]. Apart from 16UB67 and 16UB65 samples which had Y/Nb ≈ 2, all the samples show Y/Nb ratios much greater than 2 and Ti/V less than 50 (Fig. 3d). According to [36], such values exclude an alkaline affinity for these rocks whose original composition is similar to that of sub-alkaline magmas (Fig. 3b). The low values of Hf/Th ratios (0.38 - 3.84) <5, suggest calc-alkaline basalts characteristic of the volcanic arcs. These rocks have a tholeiitic affinity as illustrated by the AFM classification diagram (Fig. 3c) by [37]. Rare earths diagram (Fig. 3e) normalized with respect to chondrites [38] showed that the spectra were parallel and moderately enriched in light rare earths (LREE) compared to heavy rare earths (HREE) (1.41 < LaN / YbN <22.97). A positive or negative anomaly was observed in Tm, Er, Pr and Eu, reflecting the role operated by plagioclastic feldspar.

Table 1: Major, trace and rare-earth elements distribution in whole fractions of CRVE amphibolites

	Garnet bearing amphibolite						Plagioclastic bearing amphibolite					Melanocratic amphibolite		
Sample	16UB77	16UB92	16UB03	16UB65	DNR01	DNR31	DNR32	DNR33	16UB98	16UB43	16UB67	16PYR051	16PYR132	16PYR108
	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
SiO_2	52.58	49.07	48.44	49.58	48.20	47.40	47.26	47.00	46.63	48.78	47.72	48.52	47.96	48.73
TiO_2	1.08	1.07	0.91	0.56	0.81	1.18	1.34	1.06	1.18	1.09	0.97	0.86	0.91	0.95
Al_2O_3	14.48	14.85	13.22	13.73	13.08	8.92	10.33	9.50	8.70	13.74	9.06	13.23	13.53	13.98
Fe_2O_3	12.61	13.73	13.87	11.44	12.90	16.63	16.44	14.71	16.59	13.60	15.40	13.16	14.04	14.47
MnO	0.19	0.19	0.20	0.18	0.23	0.24	0.23	0.21	0.25	0.19	0.22	0.21	0.21	0.22
MgO	5.60	6.46	8.37	9.90	9.65	12.17	10.30	12.74	12.21	7.26	13.86	9.41	8.75	8.42
CaO	8.50	9.96	9.48	9.45	13.19	9.34	9.82	10.04	9.33	9.73	9.74	12.50	11.96	11.00
Na_2O	3.59	3.27	2.19	3.01	1.64	1.19	2.20	1.98	1.11	3.45	1.47	1.71	2.02	2.02
K_2O	0.68	0.73	1.81	1.08	0.13	1.47	0.39	0.90	1.47	0.87	0.54	0.14	0.13	0.13
P_2O_5	0.18	0.14	0.20	0.21	0.13	0.20	0.14	0.23	0.20	0.30	0.06	0.14	0.15	0.11
LOI	0.12	0.16	0.16	0.27	0.04	0.07	0.64	0.72	0.82	0.91	0.62	0.07	0.07	0.01
Total	99.58	99.61	98.82	99.41	99.98	98.79	99.08	99.07	98.47	99.89	99.67	99.93	99.71	100.04
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Ag	12.35	18.12	17.62	15.56	<0,01	7.40	19.28	23.68	18.77	17.65	12.31	0,01	0,01	<0,01
As	1.01	5.18	5.00	1.22	1.87	5.03	0.94	0.72	0.76	0.90	3.93	0.21	0.43	4.47
Ba	158.81	319.22	428.64	1850.30	89.00	430.10	366.32	666.98	475.73	453.34	1338.42	88.00	90.00	67.67
Be	2.86	3.90	3.99	6.49	7.21	4.29	3.41	4.40	3.50	5.22	4.51	4.31	7.65	5.29
Co	82.13	41.61	38.34	41.89	58.80	38.82	53.55	51.50	50.28	47.05	43.95	57.80	54.80	55.87
Cr	692.37	116.48	369.71	410.46	602.50	370.52	310.48	583.21	563.71	346.27	303.46	499.50	331.00	237.67
Cs	1.45	2.87	3.58	2.47	3.32	3.69	1.57	1.73	2.27	2.96	1.77	3.46	5.98	3.42
Cu	153.98	145.61	67.55	31.08	133.75	66.03	198.43	101.45	120.37	121.43	95.31	123.75	115.25	75.83

Ga	30.23	43.90	43.96	124.62	6.50	44.33	42.70	83.25	42.76	83.78	70.80	7.50	6.50	10.67
In	13.08	62.93	13.84	32.26	0.79	12.87	13.34	13.61	16.21	13.80	21.14	3.64	0.93	1.28
Mo	2.91	4.90	2.84	4.18	0.48	2.54	3.03	2.94	0.97	4.85	2.99	0.56	1.21	0.51
Nb	7.24	13.10	12.56	21.97	2.25	12.59	8.23	8.42	7.69	6.36	22.58	2.25	2.25	1.83
Ni	622.98	64.37	100.48	135.20	210.00	101.50	175.28	247.96	211.39	145.32	129.49	197.00	176.00	116.67
Pb	9.86	17.44	17.53	24.74	0.50	17.61	15.58	19.03	15.67	20.88	18.84	0.50	1.50	2.67
Rb	4.61	40.11	73.89	95.40	6.12	73.96	9.76	27.66	43.55	21.99	80.87	6.12	6.12	4.41
Sc	39.26	39.67	43.45	47.04	23.00	44.19	41.19	43.92	44.97	42.94	43.72	25.00	23.00	34.00
Sr	207.51	518.01	436.86	851.68	68.65	437.74	333.40	512.65	252.25	458.25	737.47	67.65	67.65	53.43
Ta	0.48	1.01	1.02	0.90	0.33	1.06	0.52	0.49	0.53	0.43	1.20	0.34	0.46	0.57
Th	0.82	10.92	12.37	2.96	0.75	12.35	1.47	2.93	2.92	1.94	8.77	0.70	0.72	0.55
U	0.37	4.92	4.84	0.92	0.03	4.81	0.55	0.44	0.47	0.43	3.77	0.04	0.04	0.05
V	296.17	285.96	280.04	230.98	260.50	281.88	262.74	231.32	256.82	230.92	279.61	282.00	305.00	322.00
W	0.61	1.42	1.33	0.97	0,01	1.18	0.75	0.71	0.66	1.07	0.90	0,01	0,01	0,01
Yb	2.04	2.34	2.57	2.55	4.01	2.35	2.35	1.92	2.58	2.21	2.32	1.24	2.33	1.43
Y	23.68	39.00	38.43	29.10	23.03	38.16	29.93	26.48	29.36	26.45	37.57	22.03	22.03	29.02
Zn	166.04	159.78	170.78	294.59	39.00	171.17	181.37	244.86	192.37	230.53	214.72	42.50	42.50	52.67
Zr	87.14	183.02	180.52	481.99	63.78	187.28	127.03	146.30	124.53	129.23	409.73	65.78	69.78	73.52
Au	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
La	15.03	38.30	40.37	81.60	4.53	40.42	28.40	52.02	30.47	38.40	68.36	4.43	4.59	4.08
Ce	38.48	85.42	87.86	160.72	10.58	88.43	61.36	104.47	63.81	77.79	141.95	10.68	11.26	10.11
Pr	10.83	16.06	15.64	15.71	0.47	15.57	12.90	9.32	12.48	12.47	16.07	0.49	0.59	0.78
Nd	22.43	42.24	42.34	72.12	7.75	41.48	29.26	46.39	29.36	37.19	63.69	7.63	7.55	7.17
Sm	5.04	8.77	8.60	12.23	2.30	8.46	6.31	8.60	6.14	7.40	11.48	2.38	2.40	2.28
Eu	1.52	2.49	2.34	3.61	0.70	2.26	1.59	2.06	1.44	2.13	3.10	0.66	0.78	0.71
Gd	5.23	8.16	7.78	9.08	2.86	7.49	6.24	7.11	5.86	6.43	9.32	2.88	3.11	3.10
Tb	0.76	1.14	1.07	1.14	0.48	1.06	0.92	0.93	0.86	0.88	1.25	0.49	0.52	0.55
Dy	4.55	7.11	6.76	6.05	3.88	6.52	5.49	5.22	5.14	4.89	7.29	3.83	3.92	4.10
Hf	2.20	4.69	4.71	11.38	1.36	4.99	3.18	3.68	3.20	3.05	10.13	1.44	1.43	1.43
Ho	0.79	1.29	1.36	1.08	0.31	1.37	1.00	0.95	1.07	0.84	1.40	0.34	0.38	0.59
Er	2.22	3.79	3.73	2.76	2.50	3.66	2.87	2.55	2.82	2.42	3.70	2.41	2.46	2.56
Tm	0.43	0.65	0.58	0.49	0.15	0.59	0.54	0.46	0.47	0.54	0.55	0.16	0.19	0.27
Yb	3.18	5.04	4.91	3.17	2.47	4.65	3.95	3.05	3.82	4.13	3.51	2.27	2.26	2.47
Lu	0.32	0.58	0.60	0.37	0.39	0.58	0.43	0.36	0.45	0.35	0.54	0.37	0.36	0.40

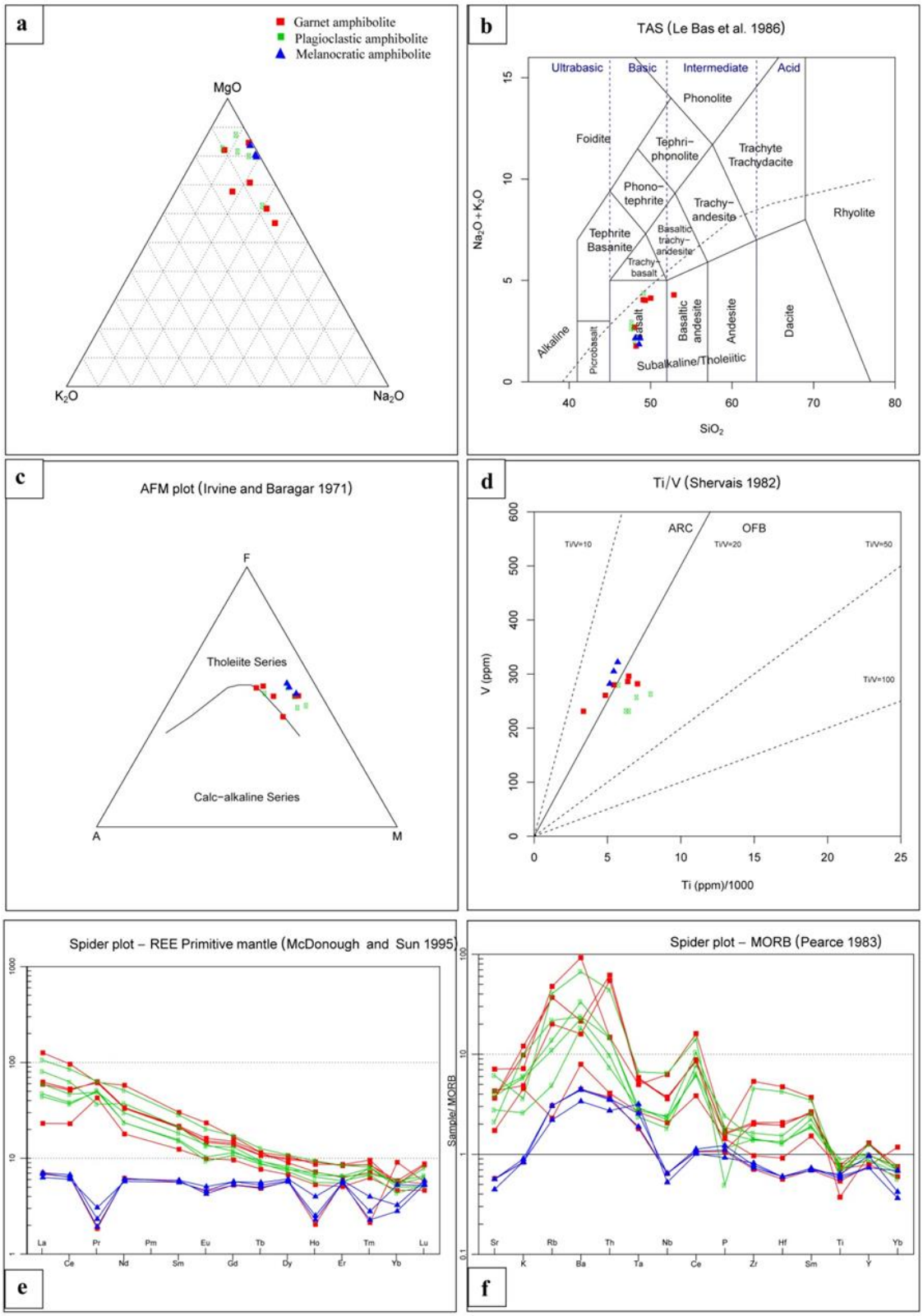

Figure 3: a) Position of the amphibolitic rocks of the CRVE in the triangular diagram (K2O-MgO-Na2O) of [34]; b) TAS diagram of [35] illustrating the basaltic affinity for protolites of CRVE amphibolites; c) AFM diagram [37] showing the tholeiitic affinity of CRVE amphibolites; d) Ti/V diagram [36], illustrating the tectonic context of CRVE amphibolites ; e) Behaviour of normalized REE with respect to chondrites [38] of the CRVE amphibolites; f) Diagrams normalized to MORBs, showing high variability of mobile Sr, K and Rb in metamorphism.

Table 2. Isotopic analysis, initial ratios and Nd-model ages of representative samples of CRVE

	Sample	Sm (ppm)	Nd (ppm)	147Sm/144Nd	143Nd/144Nd	err 2σm	εNd	T (DM) (Ma)
Garnet bearing amphibolite	16UB92	4.19	20.3	0.0991	0.511382	6	-24.50	2340.9
	16UB03	6.02	17.86	0.086500	0.511183	2	-28.38	2346.4
	16UB65	6.11	18.85	0.094200	0.511245	3	-27.17	2418.3
	DNR01	5.9	13.1	0.084100	0.511176	8	-28.52	2311.4
	DNR31	4.43	22.88	0.096100	0.511337	4	-25.38	2339.3
Plagioclastic bearing amphibolite	DNR32	5.25	13.09	0.092800	0.511241	7	-27.25	2395.5
	DNR33	4.24	22.15	0.096200	0.511357	5	-24.99	2315.6
	16UB98	5.42	21.35	0.100600	0.511407	4	-24.01	2338.5
	16UB43	3.87	12.38	0.1046	0.511647	7	-19.33	2092.1
	16UB67	2.12	13.33	0.09885	0.511376	3	-24.62	2343.8
Melanocratic amphibolite	16PYR05 1	2.99	13.15	0.098200	0.511366	6	-24.81	2343.7
	16PYR13 2	5.38	14.55	0.10055	0.511383	3	-24.48	2369.4
	16PYR10 8	6.69	23.87	0.1024	0.511458	3	-23.02	2307.0

m= measured isotopic ratios; εNd(T) values were calculated using present day (143Nd/144Nd)CHUR=0.512638 and 147Sm/144Nd)CHUR=0.1967; CHUR= Chondrite Uniform Reservoir; λ= 6.54. 10-12 a-1 [50].

They were between ~ 2092 and ~ 2395 Ma for the plagioclastic facies. Obtained ages for the garnet facies were in the same range (2311 - 2418 Ma). Finally, the melanocratic facies indicated very similar ages from 2307 to 2369 Ma. These calculated ages for the Sombong migmatitic gneisses on the Nyong river south of Eséka [4] and Bienkop north of Eséka, then for garnet gneiss and garnet and orthopyroxene gneiss at Ngok Tos south of Eséka [28], were interpreted as intermediate ages between events recorded in the Paleoproterozoic (~ 2 .05 Ga- ~ 2.5 Ga) and the major Eburnean event (~ 2.1 Ga).

DISCUSSION

The MORB normalized diagrams (Fig. 3f) show a great variability of mobile Sr, K and Rb in metamorphism. The very variable levels of Th and other rare earths in the samples, suggest as demonstrated by [29] in the metabasites of Lolodorf-Ngomedzap and [17] in the Eséka metabasites that these magmas were not cogenitic. In addition, in the Archean metabasites of the Lolodorf-Ngomedzap greenstone belt, the standardized profiles at MORB are presented into three groups [29]: weakly enriched in Th with BABB composition, enriched in Th and enriched in Th and LREE profiles. The CRVE amphibolites present the same profiles with the difference that the weakly enriched in Th profile (ThN <10) did not show a composition of BABB but of the intermediate domain or continental tholeiite (Fig. 4a).

The La/Nb ratio is normally used to distinguish the sources of the lithospheric and asthenospheric mantles [39], [40]. In CRVE amphibolites, the La / Nb ratio values (1.97 - 6.18) > 1.5 were very high to be linked to a source located in the continental lithospheric mantle [41], [42].

Classic discriminant diagrams such as Zr-Ti-Sr [43]; Fig. 4b) and Zr/Y vs Ti/Y [44]; Fig. 4c) which consider the HFSE immobile in metamorphism, eliminated the intraplate approach and bring the CRVE amphibolites closer to MORB and VAB. This was well illustrated in the ternary diagram Y/15-La/10-Nb/8 [45]; Fig. 4d) where majority of the analysed samples were in the calc-alkaline arc domain with some samples in the field of

toléiitic arc. In the Th/Yb binary vs Nb/Yb diagram of [46], the studied rocks were located in the domain of calc-alkaline volcanic rocks of volcanic arc (Fig. 4e). The Tb * 3-Ta * 2-Th diagram (Fig. 4a) by [47] located some samples of CRVE amphibolites in the orogenic domain while others were positioned in the intermediate domain (continental tholeiites).

Based on the age models of neodymium, several protoliths for the studied rocks with a Paleo-Proterozoic age (ages between 2418 Ma and 2307 Ma) were highlighted. In plagioclastic amphibolites, only one sample shows a younger age of 2092 Ga. This age could indicate a differentiation from a differentiated protolith of the Paleoproterozoic mantle, that is, relatively shortly before the major event recorded by these rocks at ~ 2.05 Ga (date of the major Eburnean event well identified at the African continental level, in particular in the West African, Congo, Saharian and Touareg, and the Kalahari cratons) [28], [26], [48]. The Nd isochron (Fig. 4f) gave an age of 2270 ± 410 Ma (initial isotope ratio 143Nd/144Nd = 0.50963 ± 0.00045, MSWD = 5.5).

This Paleoproterozoic age is not different from that obtained by evaporation in the Eburnian metabasites of Ngovayang or by U-Pb in the Eséka formations [28], [4], despite an offset of 410 Ma for a very good standard deviation (MSWD = 5.5), thus indicating that there was certainly another younger event of around 410 Ma which affected the Nd composition of these rocks. The CRVE amphibolites joined those of the lower Archean of Lolodorf-Ngomedzap with various compositions.

These formations derived firstly from tholeiites set up in an anorogenic context (coming from a weakly enriched mantle source) and from amphibolites with calc-alkaline affinity set up in an orogenic context. CRVE amphibolites suggested distensive (and/or transtensive) episodes in a compressive orogenic context for their implementation, as demonstrated by [49] in the Archean metabasites of Amsaga in eastern Mauritania.

CONCLUSION

Amphibolites of the Eséka sector, with previously studied basic and ultrabasic rocks, form the belt of Nyong paleoproterozoic green rocks called CRVE with relatively similar geochemical and geochronological features. Similar to the lower Archean amphibolites of the Lolodorf-Ngomedzap greenstone belt, those of CRVE have chemical compositions which exclude an alkaline affinity and eliminate the intraplate context by bringing them closer to basalts of mid-oceanic wrinkles (MORB) and basalts of volcanic arches (VAB). A structural study could allow to better explore the tectonic phenomena of this important Cameroonian basement portion in order to better characterize the boundaries between CRVE and CRVL.

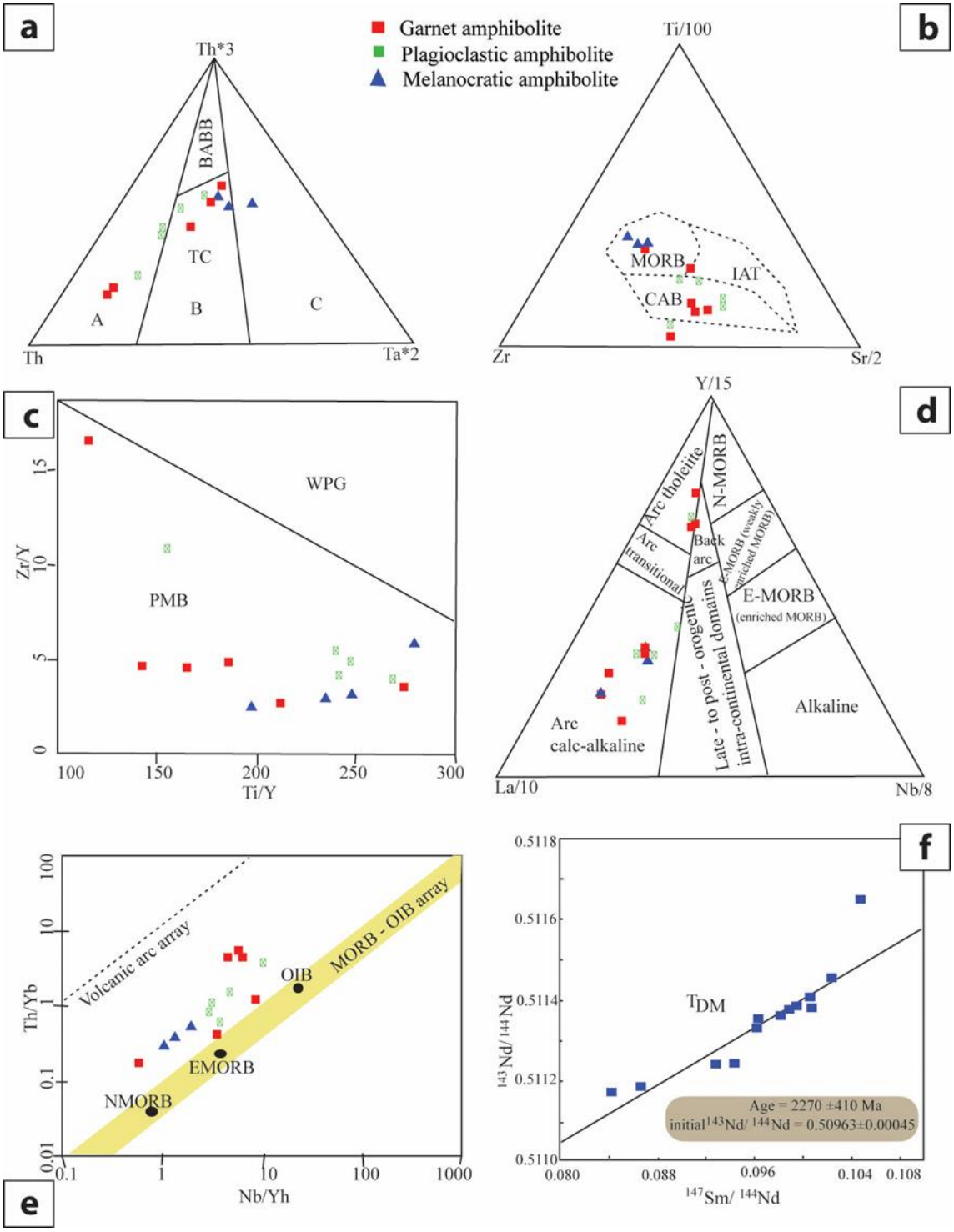

Figure 4: a) Th-Tb*3-Ta*2 diagram of [47]. A: orogenic domain. B: intermediate domain. C: anorogenic domain. BABB: basalts of the back-arc basins. TC: Continental Tholeiites; b) Basalt tectonic discrimination [43]; c) Zr/YvsTi/Y discrimination diagram of [44]. WPG: Intraplate basalts, PMB: plate edge basalts; d) Ternary diagram Y/15-La/10-Nb/8 [45] illustrating the geodynamic context of CRVE amphibolites; e) Binary diagram Th/Yb versus Nb/Yb of [46] illustrating the geodynamic context of CRVE amphibolites; f) Isochrone of Neodyne

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HOW SYSTEM OF SETTLEMENTS IN SERBIA WILL CHANGE? GEOGRAPHIC DETERMINANTS OF SPATIAL-FUNCTIONAL RELATIONSHIPS OF URBAN AND RURAL AREAS

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ABSTRACT

System of heterogeneous settlements in Serbia was shaped by phenomenon and processes rooted in their geographical position: accessibility, population dynamics, socio-economic transformation and functional capacity of the centers. This paper examines future spatial-functional development of the national urban system (consisting from urban and rural areas) with focus on geographical determinants and population dynamics. The research provides an overview of the key geographical factors and processes which influence development of the urban system. The aim of the paper is to predict future spatial-functional relationships between urban and rural areas of Serbia in the line and context with the official projection of the population. The result should contribute to wider discussion about new implementation models in the new generation of spatial planning documents.

Keywords: urban centers, urban and rural areas, population dynamics, Serbia.

INTRODUCTION

Urban centers, urban and rural areas which compose urban systems in Serbia represent heterogeneous set of settlements which differs in demographic size, economic development and functional capacity. This is a consequence of different development predispositions in geographical and socio-historical context. Similarly, to the most of Southeast Europe, Serbia is not sufficiently urbanized compared to the most developed part of the continent. Serbia was affected by intensive urbanization only in the second half of the twentieth century. Until the 1960s, Serbia had a predominantly agricultural character in terms of economic structure, and was rural environment in terms of population structure [1]. Small urban centers dominate in the spatial-structural and functional organization of the settlement network. At first glance, it can be concluded that the urban network of Serbia is characterized by the favorable position of urban settlements, however, a more detailed analysis of the concentration of population and functions indicates numerous problems and challenges of their spatial development

SPATIAL ASPECTS OF SETTLEMENT DISTRIBUTION AND DEVELOPMENT

The spatial distribution of cities is largely conditioned by physical and geographical characteristics of Serbian geospace. This is indicated by a clear correlation between the

spatial distribution of the population, the average altitude and the intensity of construction (percentage of land covered with build-up areas) [2], [3].
Research shows that urban centers at lower average altitudes tend to have more intensive level of construction. Therefore, settlements in the area of Belgrade, Vojvodina, Niš, Priština, as well as cities along the West Morava River have the highest intensity of construction [2], [3], [4]. The lowest intensity of construction is in cities located in southeastern Serbia, which is a predominantly mountainous area. There is a strong correlation between the spatial distribution of the population and the intensity of built-up areas. Densely populated parts of urban areas also have a higher intensity of construction, which supports the thesis that the urban settlements, i.e. their central and planned zones are still relatively compact [2], [3]. In the structure of build-up areas, the classes of discontinuous urban fabric with very low density have the largest share (19%), while as discontinuous urban areas of medium and low density of construction have equal share of around 15% (based on Urban Atlas - UA) [5]. Furthermore, this is confirmed by changes in land cover (according to CORINE), and it can be concluded that the total increase of settlement area, from 2012 to 2018 was only about 2%, mostly in the vicinity of Belgrade and Novi Sad, whereas the greatest intensity of changes was noticed in the urban area of Priština.
Regarding transport accessibility, which is measured with distance of settlements from the nearest urban centers (travel-time), it is confirmed that the settlements near the centers located along the main development axes have better accessibility. This mainly refers to the Danube-Sava development axis. At the level of statistical regions, there are significant differences between Belgrade and Vojvodina compared to other regions of Serbia. Due to a more developed local road network and favorable geographical and transport position, majority of the settlements in the area of Vojvodina are covered within 45-minute isochrone of a more developed urban center. Settlements in the area of Šumadija and parts of Western and Southern Serbia within the scope of the Morava and West Morava development axes also have favorable accessibility. Border parts and mountainous areas of northeastern Serbia, eastern, southern and southwestern Serbia have low transport accessibility. Due to weak development of traffic infrastructure and unfavorable physical-geographical characteristics, these areas are far beyond the 45-minute of leading centers of work and services.

POPULATION DISTRIBUTION AND FUNCTION CONCENTRATION

Due to high disparities in demographic size and demographic potential, territorial coverage and diversification of functions, as well as the difference in size of their spheres of influence, urban centers in Serbia have various roles and significance in the territorial integration of Serbia.
The discrepancy between the population of the leading and other urban centers shows that Serbia does not have a properly and evenly developed urban system, i.e. that the flows of urbanization were not timely directed towards a more balanced spatial distribution. The polarization effects of urbanization, spatially manifested by demographic and economic-functional concentration, are also expressed in the majority of statistical regions. The disproportion in the demographic size of Belgrade and other larger cities is a consequence of the incoherence and asymmetry of the urban system of Serbia. Changes in urban systems are very slow, and spontaneous mitigation of territorial disparities cannot be expected in the near future. Deficiency is noticeable in terms of evenly distributed urban centers with 100,000 to 200,000 inhabitants and absence of centers with 300,000 to

500,000 inhabitants with developed macro-regional functions, which would lead to the balanced internal development of Serbia. Relevant facts and the experience of countries that have a similar urban system show that no major changes will take place in this field in the coming period.

The spatial disproportion of functions is manifested with an increase and concentration of functions in the most important urban areas in Serbia and with a significant reduction in the functional capacities of other urban areas and urban centers, as well as their territorial influence, which leads to the population to other places, i.e. abroad.

The functional capacities of urban centers have been significantly reduced, which is reflected in the reduction of space under their direct influence. More than 1/3 of the settlements are not part of any urban area. It is noticeable that most centers of urban areas integrate mainly settlements that belong administratively to them, while only areas of Belgrade, Novi Sad, Priština, Niš and Kragujevac integrate into their sphere of influence a territory wider than administrative. On the contrary, some important urban centers such as Novi Pazar, Kraljevo, Bor and Pirot fail to integrate even the settlements of their administrative territory. This fact is further supported by the analysis of the structure of daily migrants of the economically active population who perform the occupation of settlements within the urban area. Only Belgrade, Novi Sad, Priština and Niš are destinations for a significant number of daily migrants from the territories of other local self-government units. Moreover, Kragujevac, Vranje, Požarevac, and Valjevo have a certain subregional influence. In addition, urban areas overlap, so some of them have the characteristics of polycentric and hierarchically structured systems.

In urban areas, the largest functional transformations occurred in the central and peri-urban zone of urban centers. The urban center specializes in the tertiary sector, while the secondary sector is relocated to peri-urban settlements in isochrony of daily migrations. However, the organization of local transport, communal infrastructure, as well as the function of housing, are not adapting fast enough to these changes. Thus, the settlements of the peri-urban zones have almost no public infrastructure and facilities.

Analysis of daily migration indicates the development of the labor market and intensity of the impact that the urban center has on the immediate surroundings. Majority of urban centers make impact only to the nearby settlements within their administrative territories. However, it is confirmed that the daily migration is mainly noticeable in the areas which are leading development and business centers – Belgrade, Novi Sad and Niš, while smaller migration systems are formed along the development axes and in the centers of Kragujevac, Valjevo and Novi Pazar.

In rural areas, the process of demographic fragmentation of villages is pronounced, which is a consequence of long-term depopulation. Population-large settlements are located in the region of Vojvodina and the region of Belgrade. As a consequence of unfavorable demographic trends, undirected and uncontrolled migration flows, the age, economic and educational structure of the population has been disrupted. Regarding the average age of the population, a clear regional imbalance is expressed. On average, the oldest population is registered in the southern, eastern and southwestern rural settlements, where some villages already lost their permanent inhabitants. Recent research that takes into account several different indicators of rurality / urbanity indicates several tendencies in the spatial distribution of the population in rural areas in Serbia. The dominant areas of growth are the rural areas around Belgrade, Novi Sad and Niš. Other rural areas are exposed to negative demographic tendencies, which are especially present in the mountainous and peripheral parts of eastern, southwestern and southern Serbia [4], [6].

FUTURE PERSPECTIVES

Among the numerous challenges to the development of urban centers in Serbia, two stand out as the most significant - depopulation and reduction of functional capacities of urban centers. Depopulation is not a problem only from the aspect of population reduction, but the collapse of the socio-economic structure, reduction of the quality of the labor force, deterioration of the age of the population, low fertility, etc. A new component in further strengthening depopulation in Serbia is the increasingly pronounced emigration of the high-quality workforce, that will progress in the future, which is recognized as one of the biggest national challenges. In the cause-and-effect relationship with depopulation is also a reduction in the number and spatial range of functions of urban centers, i.e. a reduction of the impact of urban centers to the surroundings. Nevertheless, favorable condition for the urban development are better infrastructural connections which will follow with the completion of the construction of transport corridors and accompanying facilities, as well as the started process of reindustrialization.

Internal problems of urban centers that stand out are: usurpation of public space, substandard quality of housing and utilities, violation of environmental quality, social segregation, sometimes even gentrification. Finally, for urban centers in Serbia, global challenges which are persist in the wider regional environment and Europe are becoming increasingly important, while internal and specific ones are becoming less significant.

Based on ESPON (European Spatial Planning Observation Network) research, it can be concluded that the level of polycentricity has decreased in all European countries in the past two decades. The reason for this is the increased accessibility of large centers, as well as economic development and population growth in large metropolitan areas. The process of reducing polycentricity is expected to continue in the future, as indicated by all the scenarios considered. European Union (EU) member states (which joined in 2005 and after) initially had a more favorable polycentric development of urban centers than the "core" of the EU, but the process of declining polycentricity was faster in the newly acceded countries, with an emphasis process of accelerating centralization. Socio-economic transformations and their spatial manifestation in the urban systems of the former socialist states, which are now members of the EU, have many common characteristics with the development of the urban system of Serbia, and all indicate intensified polarization and accelerated development of the center-periphery structure [7].

Urban systems will be transformed, both positively and negatively, in conditions of continuous population decline. In general, urban and rural settlements will be demographically reduced, with certain exceptions, which refer to certain suburban settlements - parts of peri-urban rings of larger urban areas.

The share of the urban population will increase. The intensity of the reduction of the population of urban centers will depend on their demographic size, natural and migratory trends and qualitative ones, i.e. structural features of the population, and will certainly be more pronounced in medium and small urban centers.

Daily urban systems have been formed, the number of daily migrants will stagnate in most cases, and will decrease over time. In the Danube-Sava development zone and agglomerations, daily migration will be developed according to the system of "urban context", and in other urban areas it will take place according to the traditional hierarchical model.The zones of direct influence of urban centers will decrease with the intensification of daily migration of the population, while urban areas will be extended due to the development of traffic infrastructure, but there will be less inhabitants, so the contingent of those participating in daily migration will be also reduced.

The development of major roads will have a positive effect on the integration of centers in the central part of Serbia, and will, to some extent, qualitatively strengthen the connections to the border areas. Mobility will increase, and the trend of development of electronic communications will provide greater autonomy of the individual and business (expansion of work on the move, from home, etc.), regardless of the location of the company.

The concentration of the economy in agglomerations and along development axes will continue (except for those that depend on the location of resources such as the exploitation of mineral resources). The automation of production and business will have a great impact on the spatial distribution and structure of the workforce.

In rural areas, villages will not be able to integrate their surrounding rural area, so this role will be taken over by local urban centers with the development of specific functions (tourism and complementary activities, seasonal housing, etc.).

Generally, it can be said that Serbia is a country in which, to a greater or lesser extent, the spatial-developmental dichotomy "center - periphery" is expressed at all territorial-administrative and territorial-functional levels. The differences between the core and the periphery are refracted in transitional forms which, depending on numerous geographical, socio-economic, spatial-functional, territorial-administrative and other specifics, have different nuances and dimensions. Conditionally, it manifests in the form of semi-peripheries, which is fragmented into parts that have the intention of joining the core and parts that are increasingly taking on the characteristics of the periphery.

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PLANNING SERBIA SPATIALLY – BUSINESS AS USUAL IN THE AGE OF INEQUALITY

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ABSTRACT

Cities and regions in Serbia are increasingly taking ownership of their futures through the devolution agenda, yet deeper structural inequalities cannot be tackled by local action alone. National frameworks are needed, not least, given the lack of one for Serbia and, more generally, because of the sectoral approach which is taken to policy. In the first two decades of the 21th century, the spatial planning system in Serbia underwent a significant transformation following the general trends of change within the country. The predominance of the neoliberal - market model of the economy has directly led to the obvious suppression of social services both in quality and in terms of funding, and the same has happened with the environmental sector. To challenge the persistent social and economic inequalities across the State, in November 2019 the Spatial Plan of Serbia 2035 was launched, reaching in December 2020 the final draft status. Unfortunately, this national spatial framework become more the legal basis for massive infrastructure project rather then the comprehensive policy document, failing or carefully avoiding to address growing political, social and economic uncertainties brought by the global challenges of technological and climate change, beside the current pandemic. The paper analyzes the causal relationships that have led to the current state of planning, given the examples of spatial problem mitigation and relativisation, and discussed the effectiveness of such a partial approach to the field of spatial planning in Serbia.

Keywords: spatial planning, inequality, sectoral approach, Serbia

INTRODUCTION

Territorial development of Serbia is characterized by pronounced spatial unevenness which is the result of two opposite processes - on the one hand there is a concentration of population, capital, and activities in large centers, especially in Belgrade, and on the other hand emptying of rural areas and peripheral regions. The problem, of course, is not new and its solution was emphasized in all planning documents, including the Spatial Plan of the Republic of Serbia in 1996 and 2010.

The key determinants of these plans, especially the latter, emphasize the "competitiveness" of the territories in terms of access to different funds - which means that the neoliberal economic approach has not been abandoned, which implies inequality, sharp polarization in spatial terms, decline of peripheral regions in economic and social terms. etc.

The spatial plan of the Republic of Serbia from 1996 had as its basic starting point the so-called "Demetropolization of Serbia", i.e., reduction of development differences between Belgrade (and other large centers) and underdeveloped, i.e., peripheral regions (rural,

hilly-mountainous, border, etc.). Thus perceived, the basic problem of the territorial development of Serbia has led to the fact that, in the best tradition of planning, measures, instruments and means are concentrated in the realization of a simple but important goal - balanced territorial development. Even after 2000, when the European contribution to the policies of territorial development began to be seriously respected, there was no reason to change the stated goal, following the best results of the socialist period, the concept of the so-called "Welfare state", which is widely applied in the areas we call the European Union today. Namely, many of the European recommendations, such as increasing accessibility or territorial cohesion, represent an adequate response to the problems in Serbia, but instead of using the European framework to give legitimacy to this, in principle, healthy policy, it went to the other extreme.

The general social, economic, but above all political environment pushed the planning in the other direction. In the programs of implementation of the Spatial Plan of the Republic of Serbia for the period 2011-2015 positive trends were observed in the selected indicators for all goals, with some restrictions. Particularly relevant for the assessment of the situation is the Report on the implementation of the Spatial Plan of the Republic of Serbia for the period 2016-2020. In the report for 2018 [1], the indicators for all goals are contradictory: when, for example. word on territorial cohesion, part of the indicators shows trends leading to increased cohesion, and almost the same number of indicators shows a decrease in cohesion.

The same is the case with the protection of the territory or regional connectivity. The only conclusion that can be drawn from this situation is that the 2010 Spatial plan of the Republic of Serbia is implemented partially, sectorally, without sufficient coordination of activities even within the same sector, which reduces the expected effects on space, especially in terms of very demanding sustainability standards.

Another assessment is particularly indicative [1] - by far the largest active implementation of strategic priority projects was recorded in the sub-area Sustainable development of economy, transport and infrastructure (79.2%), and by far the weakest in the sub-area Population, settlements and social development (only 2, 3%). It is not difficult to conclude in which direction we should work in the new Spatial Plan of the Republic of Serbia.

PHASE 1: THE INITIAL CONCEPT OF SOLVING SPATIAL INEQUALITY IN SERBIA

When it comes to the differentiation of the space of Serbia, the Figure 1 is illustrative. The dilemma regarding the choice of scenarios was solved already during the preparation of the Thematic Notebooks: the presented solution was supported by an exceptional database and quality analysis [2]. The distinction between two zones and two dynamics of development, in the first variant called the core and the periphery, and in the later central part of Serbia and the border, hilly and mountainous, poorly accessible areas, is a scientific fact.

The initial concept of solving the problem of spatial inequality in Serbia is that the planning solutions will be adjusted in terms of different approaches to planning of both zones with implied planning measures and instruments to mitigate the obvious differences in terms of levels of development to the so called “acceptable unevenness” [3].

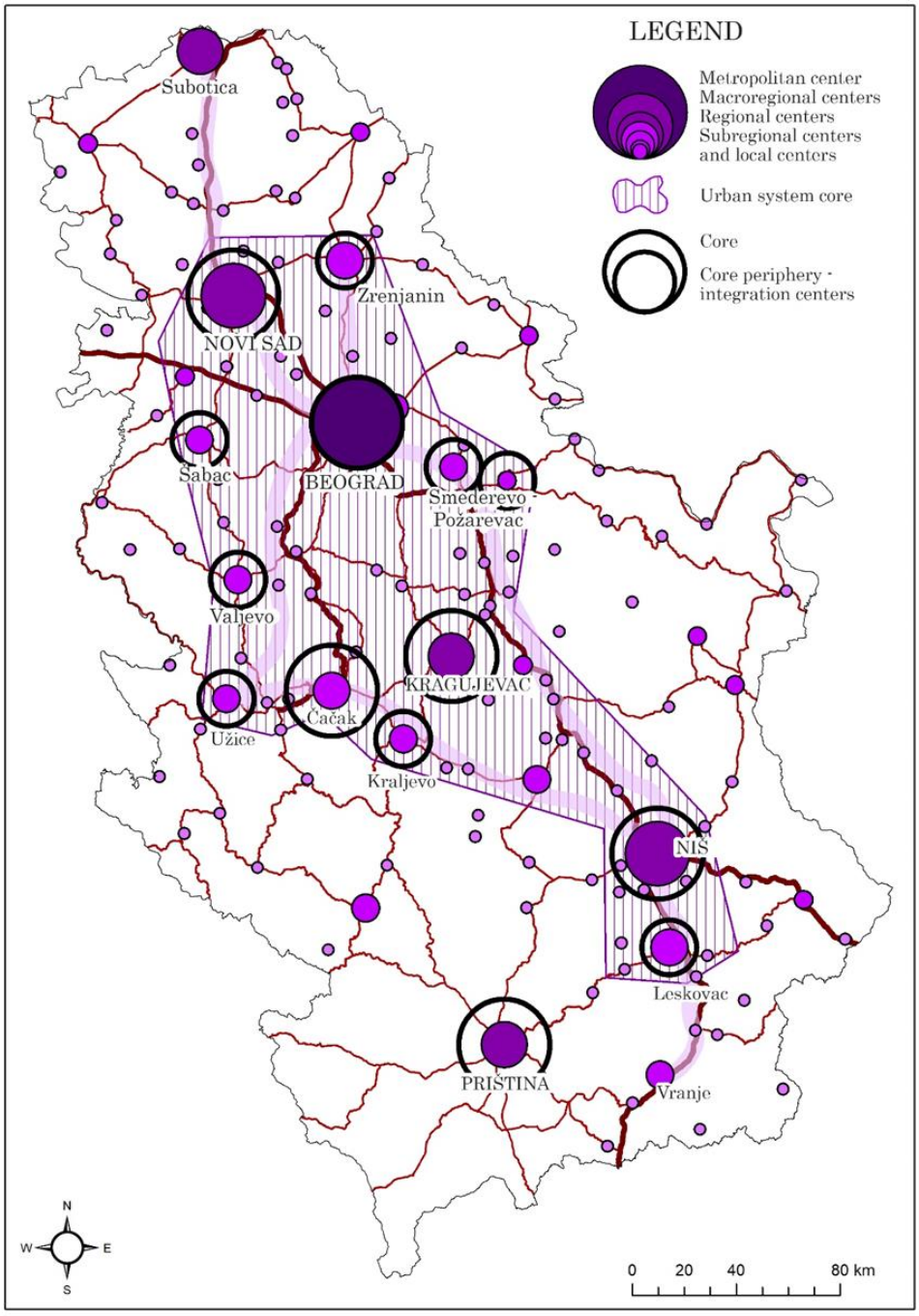

Figure 1. Spatial Development Dichotomy in Serbia: The “Core – Periphery” Concept [2]

With a large dose of generalization, it can be said that Serbia is a country in which, to a greater or lesser extent, the spatial-developmental dichotomy "core - periphery" (see: [4]) is expressed in all territorial-administrative and territorial-functional levels starting from municipalities - cities, through districts and larger regional associations to the state as a whole. Analyzes conducted for the purpose of reviewing the situation in the network of settlements in Serbia indicate the fact that, both in the settlement and in the socio-economic sense, two insufficiently coherent and inconsistent units emerged, a core with a more or less coherent network of settlements and periphery which lacks that attribute. The differences between the core and the periphery are broken into transitional forms

which, depending on the whole set of geographical, socio-economic, functional, administrative, and other characteristics, have different nuances and dimensions. Transitional forms form the semiperiphery, which is divided into fragments with the developmental intention of attaching to the nucleus and fragments that increasingly take on the characteristics of the periphery.

The core has the appearance of an irregular polygon, conditionally, limited by a line connecting Novi Sad, Zrenjanin, Požarevac, Jagodina, Niš, Kruševac, Kraljevo, Čačak, Užice, Valjevo, Šabac, Sremska Mitrovica, Novi Sad. North of the polygon is the influential sphere of Subotica, which will eventually join the core; in the southeast there is a tendency to integrate Leskovac, and to the southwest perhaps Pristina. The main, cohesive factor of the nucleus is its central part, which is truly fragmented, i.e.. divided into a highly urbanized part of the Danube-Sava development belt with the dominance of the influential spheres of Belgrade and Novi Sad, then into functionally urban areas of Kragujevac and Niš. A pericentral zone has been formed around the central part, which is differentiated into units of different levels of functional connection, socio-economic development, and integration with the center [2].

Within the core, there are "pockets" but also larger zones of underdevelopment in the form of smaller and larger enclaves affected by total depopulation, extensive agriculture, untimely substitution of industry based on outdated technology and management with a modern technological and management approach. and similarly. Almost all major cities in Serbia are located in the core (Table 1).

Table 1. Ratio of demographic sizes of the ten most numerous urban settlements in Serbia according to the 2011 Census [5].

City	Population	Index based on Belgrade population	Index based on previous city population
Belgrade	1.166.763	1.000	-
Novi Sad	231.174	0,197	0,197
Niš	183.164	0,157	0,792
Kragujevac	150.835	0,129	0,823
Subotica	97.910	0,083	0,649
Zrenjanin	76.501	0,066	0,781
Pančevo	76.203	0,065	0,996
Čačak	73.351	0,063	0,962
Novi Pazar	66.527	0,057	0,907
Smederevo	64.175	0,055	0,965

In relation to the core, the periphery is spatially larger, affected by intensive depopulation, population decline in both rural and urban settlements, low degree of urbanization, demographic fragmentation of settlements, economic recession, etc. It is divided into segments, i.e. influential spheres of regional and subregional urban centers, which often do not overlap or touch.

The periphery of central Serbia is a typical example of a problem area. It is demographically empty and economically underdeveloped. A large part of it has a border position. It is characterized by traffic isolation, fragmentation and dispersion of agricultural areas and weak organization of agriculture, inaccessible market of agricultural products, occasional or constant decline in the role of mining and energy-based genetics and metallurgy in population employment and economy (Bor, coal mines in eastern Serbia ... mines in western Serbia ...), traditional non-productive non-flexible industries, monostructural and non-diversified economy and the like (Bor, coal mines in

Eastern Serbia, Western Serbia...) traditional production non-flexible industries, monostructural and non-diversionary economy etc. [6]. Also, underdeveloped human resources - unskilled labor force, unfavorable educational population structure that forms a barrier to new technologies and innovations in the economy, depopulation and the aging of the population and the like. This is especially true for border and spatially and economically isolated areas that are at great distances from significant development centers.

However, it should be emphasized that urban enclaves have also developed within the periphery, whose centers have development potentials, sufficient population size, relatively developed human resources and public social infrastructure, urban development continuity, cultural identity etc. This primarily refers to Vranje, Pirot, Zaječar and Bor in the Region of Southern and Eastern Serbia, and to Prokuplje, Novi Pazar, Prijepolje, Priboj, Loznica in the Region of Šumadija and Western Serbia [6]. Until the 90s of the last century, these cities were the regional poles of both demographic and economic growth with a pronounced function of work in industry.

Once presented to the working team in the analytical phase of the Plan development, this initial concept aroused enthusiasm so that other planning solutions could be built and defined on it. But that enthusiasm soon faded.

PHASE 2: ABANDONMENT OF THE INITIAL CONCEPT - "NO ONE WANTS TO BE A PERIPHERY..."

Regarding the concept of the Plan in general, after a continuous discussion, the idea prevailed that the Plan should concentrate on those statements that can be preformed within the planning system. The plan should be more physical and less integral. Therefore, you should stick to your spatial domain in accordance with the project task. That the Plan must have a focus, that is, a basic idea, which must be agreed upon, and that this idea must be formulated through clear goals, was not disputable. It is debatable where the focus of the plan will be. Through discussions and confrontation of different views, all under the impression of devastating demographic projections resulted in a (temporary) view that demographic recovery should not be the main goal of the Plan, but only an indicator, which must be taken seriously. The demographic deficit will dictate to a greater or lesser extent many planning solutions. When the concept of core - periphery was considered as a proposal for the focus of the Plan, there was an immediate negative reaction from the representatives of the relevant Ministry, which is the client and financier of the Spatial Plan. Their position was explicit: during the public insight, there will certainly be a negative reaction in the public because "... no one will be the periphery". This led to hesitation among the members of the working team: first, instead of a clear core-periphery concept, a milder euphemism was chosen for the central part of Serbia and border, hilly-mountainous, poorly accessible areas, and in the next phases of the Plan the initial concept was completely abandoned. Instead, the ordering party of the Plan explicitly requested that the spatial aspects of the Serbia 2025 Plan be incorporated into the text and maps of the Spatial Plan of the Republic of Serbia as a new focus [7], especially when it comes to building and modernizing infrastructure. It is likely that the network of state roads will be the main variable in defining the spatial development scenario, i.e., the Plan as a whole, if there are no significant objections to the public inspection in March 2021. The zones along the roads will represent the zones of faster development changes. With the increase of the distance from the corridor, the intensity of changes in space and development possibilities decreases, as well as the demographic

potential. In that way, the criterion of increasing accessibility remained the only direct measure of mitigating spatial inequality in Serbia. As an indirect measure, there is a partial direction of spatial development at the local level through the land use plan, but given the weakness of local communities, it is a long-term and extremely uncertain endeavor [8].

Honestly, spatial accessibility has so far been one of the key dimensions of social development and public services, i.e. services of general / public interest. The ruling paradigm is that increasing the spatial availability of services in the field of social development reduces social exclusion, improves the quality of life and is one of the key factors in increasing social cohesion. In Serbia, however, the urban-centric model of public service organization has dominated for decades: 1) the basic criterion for organizing services is the number of users or population density, which results in public services being organized as a priority in urban settlements, without accompanying and complementary activities which makes them accessible also to citizens who do not live in these cities and to whom these services are not available in the place of residence (pupils and students' dormitories, mobile health services, mobile education services, mobile social support services, etc.); 2) models of organization of these services are adjusted to the cities (large facilities for a large number of users, stationarity, monofunctional facilities, lack of cooperation and joint programs of related services, high construction indices); 3) restriction of the right to use social protection services on the basis of land census (over 0.5 ha, regardless of the class / creditworthiness of the land); 4) services that are organized in rural settlements are, as a rule, substandard, of lower quality, in dilapidated and neglected buildings, not infrequently without basic installations (water, heating, sewerage); 5) the organization of public services follows the hierarchical position of the settlement (city) and its administrative-political function. The combined financing of public services from the republic and municipal budgets results in large differences in the funds for organizing public services [9].

In terms of innovative planning solutions, unfortunately, no progress has been made. It intends to confront the spatial aspects of social inequality and act with already seen and inefficient methods. It is indicative that it is an important idea to include zones of special interest in the Plan, of which almost all in the peripheral part of Serbia have also been rejected.

DISCUSSION

Thanks, to put it mildly, incoordination and the lack of a clear vision of territorial cohesion, socio-economic differences in Serbia are increasing. Leaving the social dimension in the conditions of transition, led to agglomeration in several large urban centers where the privatization of state-owned enterprises was more or less successful, especially in Belgrade, given the greater chances in the struggle for survival or enrichment that it provides. On the other hand, urban centers that did not have so much "luck" were left without most of the functions, not to mention the large number of rural settlements that have remained or will remain without people due to the insufficient attractiveness of agriculture. It is certain that these trends are normal, and that they follow certain phases of the development of modern society. What is painful for Serbia, and most of all dangerous, is that the differences are increasing - in Belgrade and several larger centers is the majority of the population, economic and management capacity and almost all finances, and in the rest (which cannot and must not be ignored) little of the above mentioned. There is a justified fear that Serbia as a whole, with all good intentions, will

not be able to "function" even by defining functional urban areas and measures for their management, because scientifically speaking, most of its territory is not covered by such areas due to underdeveloped functions of urban centers. When it comes to the declarative goals of reducing development disparities through the process of decentralization, primarily the proposed regionalization, a very sensitive and current issue of borders always opens for Serbia - first of all states, then regions that are not yet precisely defined. Apart from the border, the issue of the competences of future regions (NUTS level 2) is also unclear, because a certain part of the political elite insists, precisely because of the sensitivity of the issue of regionalization, that these are statistical units. However, neither the competencies nor the means for performing those competencies are decentralized to them, nor is the policy of more balanced regional development pursued on the basis of them. In order for the concept of protection and sustainable use of the territory to come to life in sufficient scope, it is necessary to change the course from the neoliberal economic approach which deepened the already existing territorial differences in Serbia towards the approach of the state of social welfare of all its citizens.

The issue of a new administrative or planning regionalization was omitted in the new Spatial Plan. The issue of regionalization of Serbia has always been topical, politically sensitive and has been frequently discussed in recent years. Addressing the issue of balanced territorial development is a key goal of any regionalization. It seems that such a cautious attitude is the result of two views: the first, that it is neither the time nor the place (domain of the plan) to raise such a big political issue again, and the second, that previous efforts in that direction were partly an infantile attempt to reach some additional funds from the European Union if foreign factors allow it, and partly a clumsy and probably disastrous way to solve some backward issues of territorial autonomy, status, political electoral mathematics, etc. The issue of regionalization is, of course, closely related to the issue of decentralization. Everything leads to the conclusion that instead of some functional decentralization, real decentralization will be only declarative, because there is no indication that the state is ready to share a significant part of its revenues to cities and municipalities as local governments or districts - rather we are witnessing a classic model of reconcentration. The territories that can count on some funds are the city of Belgrade, because it already has them and Vojvodina which will receive (or keep) serious financial income if the proposed Statute is adopted by the National Assembly of the Republic of Serbia. This will make regional differences even more pronounced.

When it comes to regional spatial plans made for the territory of Serbia, the principle of sustainability has been consistently copied from the Spatial Plan of the Republic of Serbia, and through planning measures, where appropriate, incorporated into priority and long-term solutions. The question remains to what extent these solutions are implemented in practice. The most critical in this regard is the Spatial Plan for the Autonomous Province Kosovo and Metohija, where it is explicitly stated that .... spatial planning should be in the function of sustainable development (p. 104), but immediately afterwards, serious limitations due to which such the goal is extremely difficult to achieve are listed on 40 pages [10].Without exception, all regional plans indicate a highly unbalanced and polarized territorial development within the borders of the region: thus, the problem of uneven spatial development from the national to the regional and even local level, and such a situation in space has existed for a long time [11].

More broadly, in the European context, the political debate on territorial inequalities is visibly structured around the contrast between "metropolitan" and "non-metropolitan areas". The decline in direct state participation in defining explicit spatial policies is a

trend in the EU, so that direct mechanisms of redistribution of money from richer regions to poorer ones have weakened [12]. At the same time, it seems that the European public is increasingly accepting social inequalities, so that the notions of the fight for social justice and against social inequalities are less and less heard. With reduced influence, European national authorities tend to help more "metropolitan" than underdeveloped areas. This is happening even in France, where after 50 years, Gravier's paradigm of Paris and the French desert has been abandoned. Beginning in 2005, when Paris was proclaimed as the national engine of development, large projects in the city began to be realized again and this process continues today [13]. It is clear to local actors in spatial development that little help can be expected "from above": if they hope for any development shift, local initiatives - "from below" - must be strengthened. Truth be told, France is a rich and spatially, well-equipped country. Accessibility to large cities is relatively efficient and fast enough: nevertheless, even in professional circles, there is a growing nostalgia for the good old days and strong state intervention in space, and DATAR has become something of a national legend. Maybe something in France will take a step back, but the experience is valuable for Serbia, with a too big Belgrade and a territory that is being equipped with infrastructure.

Speaking about the trend that the practice of spatial planning in Serbia "takes place as usual", it must be emphasized that there are several reasons for such a situation. It is not wrong to look for these reasons in the major socio-economic and political changes that took place in Serbia after 2000. Spatial planning has lost its significance after these and such changes, and that is a fact that almost all professional planners and urban planners find difficult to experience. As in other segments of social practice, radical changes have been introduced in spatial planning instead of gradual adjustment in accordance with real modest possibilities. The same thing happened in other countries that went through a post-socialist transition [14]. This has led to the dysfunction of the planning system and the reduction of the already high degree of disorder in space.

Today, the spatial plan in Serbia is done quickly and easily, because except formally, it does not oblige anyone [15]. The plan in Serbia today represents a labile balance between political (un)realism and pursuit of such a balance in space. The dangers of shortening the procedure are obvious - getting a permit at one counter, office for quick answers instead of expert control, replacing PR analysis, mimicry of public participation under the guise of higher interest (e.g. joining the EU or increasing the employment rate). Although weakened, the system maintained its internal balance in the first decade after the changes, because it took time to fully understand the new conditions. Hence a certain inertia, fueled on the one hand by the expected rapid entry of Serbia into the EU, and on the other hand by the inability of the authorities to constitute a new model of space management (remember that 20 years after the changes we still struggle with legalization and cadaster). Investor urbanism existed in full force even then and since then it has been a great headache for the professional community of planners.

The change in the internal balance of the planning system in favor of the Spatial Plans of the Special Purpose Area occurred gradually and almost imperceptibly. There was no key point of overthrow or change of the legal framework: simply the planning community, figuratively speaking, woke up one morning aware that the situation had changed. The reason that first comes to mind is that it is a natural thing: planning takes place in cycles and if one of them was completed around 2010, it was certain that there would be a certain flattening of activities [16]. However, the intensity of the activity did not subside, it only changed its focus. On the one hand, the enthusiasm for joining the EU and copying the

demanding rules introduced by the Community, which it is implementing less and less, is preoccupied with its internal problems. As always, world and European trends have spilled over into our backyard: general confusion on a global scale has led to sobriety at home. Being in a new situation, unfettered by outside rules, the state has resorted to pragmatism, which is an expected and realistic procedure for experts. The pragmatism of the state in terms of planning and use of space is reflected in the fact that this time the state has precisely defined its interests in space, and through the instrument of Spatial Plans of the Special Purpose Area with elements of detailed elaboration found a legal mechanism to put planning, design, until the issuance of building permits control. The process was completely exposed by drafting and adopting the Spatial Plan of the Special Purpose Area for the so-called Belgrade Waterfront: a project for which an urban plan (under the jurisdiction of the city of Belgrade) in the old system would be sufficient, has been raised to the national level [17].

By taking the competencies of the city administration into its competence, the state has shown that it cares little for the local community - if it can do that in Belgrade, it can do it in the whole country. This led to a situation where the state, under the guise of national interest, reserves and manages space that is attractive to it for any reason, without any interference from the local community (which is left with land for which the state has not expressed interest). In this way, the state became the main economic investor: by neglecting the issue of social inequalities in space in practice, it set a bad example for the private initiative as well.

CONCLUSION

Every serious discussion on the territorial development of Serbia implies initiating, and every serious planning action means resolving a whole series of issues that directly or indirectly affect territorial development, because spatial planning is such – complex and multidisciplinary. Hence, this shortened content presentation of the current situation and perspective answers to the most important problem of today - inequality - is only one of the many dimensions of the development of Serbia. The statement that in this respect the spatial policy continues as before by many participants in the development of the Plan was perceived as the only possible one, given the overall economic over-indebtedness of the country, empty funds, creeping pace of European integration and other factors, as well as the obvious lack of real and continuous strategic action based on a balanced vision of the state of rich citizens - factors that in relation to the domain of the National Spatial Plan can be called external. In other words, there are not sufficient preconditions to talk about a balanced territorial development of Serbia.

There is neither the means nor the will to direct those funds properly and continuously. Hence, the real scenario of Serbia's territorial development in the coming period will be characterized by further deepening of regional differences (e.g. underdeveloped South and developed North, peripheral regions will find it difficult to cooperate with similar regions on the other side of neighboring countries, and political will to permanently resolve territorial issues will fluctuate around the following: the vassal status of the state, lack of money and political election calculations. In these three issues, the spatial planning profession can do little except declarative statements that no one can hear. Therefore, the likely epilogue of this discussion will be the realization of the idea of two Serbia, at least when it comes to territorial development. Spatial planning should reactivate the welfare state policy as its basic permanent professional goal.

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URBAN AREAS OF SERBIA – A NEW FRAMEWORK FOR SPATIAL DEVELOPMENT

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ABSTRACT

Disproportions in the Serbian urban system, which were accumulated during the decades, manifested in unequal distribution of population, activities, highly qualified labor, accessibility of centers, have become more noticeable during the second decade of the 21st century. Concepts that were used in previous national spatial planning documents based their spatial development on the application of functional areas and functional urban areas without being able to provide balanced development – failing to implement politics of polycentrism. The national urban system of today has an irregular shape with clearly marked domination of the capital in all of the previously stated characteristics. In these circumstances, it is a necessity to seek a new instrument of spatial development that will provide "acceptable territorial imbalance" and prevent creating a further partition between the Belgrade metropolitan area and the rest of the territory. The purpose of this paper is to discuss a new framework of spatial development which is based on urban areas - using them as an instrument to optimize urban system and to contribute to territorial integration.

Keywords: urban areas, spatial development, integration, Serbia.

INTRODUCTION

The role and importance of urban areas in spatial development have been the subject of research of many scientists and research organizations for many years. Dynamic socioeconomic, demographic, and morphological changes that occurred between the city and its surroundings, which were a spatial manifestation of urbanization, industrialization, and deagrarianization, stressed the necessity to seek not only for the role of urban centers in the territorial integration processes but also areas under their influence – urban areas. According to Haisch & Müller [1], these areas are significant hubs of exchange of economic goods, people's circulation, and knowledge, representing the poles of development and initiators of economic and social changes.

The first step in the research of this problem is their definition and delimitation, and then a determination of their role in territorial development based on various parameters. Considering specific processes and their trends represented in Serbian geospace, but also relying on previous research on urban areas the aim of this paper is to point out the need and possibility of applying urban areas as an instrument of spatial development and territorial governing.

DELIMITIG URBAN AREAS – PREVIOUS RESEARCH

Due to the lack of a common unique definition, and bearing in mind that urban areas within national territories are formed in specific social and economic contexts, many countries have developed their own definitions of urban areas and indicators for their delimitation, which often differ substantially [1] [2].

Among the most significant researches that have been conducted and have found their application in spatial development are those conducted by ESPON (European Spatial Planning Observation Network), OECD (Organization for Economic Co-operation and Development), and the UN (United Nations). The research conducted by ESPON within the ESPON 1.4.1 Project [2], based on a functional approach, defines that the urban area consists of the urban core, the inner ring surrounding the core, and the outer ring that forms the outer boundary of the urban area. The OECD study that was developed in collaboration with the European Commission, based on a functional approach, redefined urban area definition by which it presents a functional economic unit which is characterized by a largely populated city and daily commuting zone whose labor market is highly integrated with the surrounding city [3]. The UN defines the border of an urban area according to the degree of economic and social relations with surrounding areas, which are identified based on data on related trade and daily migration [4].

The approaches used for delimitation of urban areas can be divided into three groups: administrative, morphological and functional. One or more of these approaches are used in European countries [2]

The administrative approach for delimitation of urban areas has proved to be inadequate, as it relies on strict administrative divisions and does not take into account the real needs of users of space or spatial structures. The most common parameters used in this approach were the number of inhabitants, administrative role, historical context, or legal decision. This approach was used in those countries which didn't have a formal definition of urban areas (Ireland, Czech Republic, Croatia).

The morphological and functional approaches have proved to be more suitable for delimitation of urban areas because they look at the urban area through a social and economic prism and take into account various indicators of their delimitation. The morphological approach uses indicators like the continuity of built-up area, land use, and even in some cases road density network [6] [7]. Among them, the most common was a combination of population density and number of inhabitants whose thresholds varied in different countries. The functional approach delimitates the urban core based on the number of inhabitants and number of employees. The inner and outer ring are delimitated by the number of inhabitants, the number of employees, the share of employees in the total number of employees, migration balance, intensive economic activities, etc. [2] [8] [9].

The first attempt of functional regionalization of Serbia was done in *The Spatial Plan of the Republic of Serbia 1996-2010* [10] which introduced the term functional area. Functional areas had covered the entire territory of the Republic of Serbia, and their boundaries coincided with the administrative borders of the municipalities. Data for daily commuting was not used as indicator of the functional dependence of surrounding settlements from an urban center.

The Spatial Plan of the Republic of Serbia 2010-2020 [11] introduced the term functional urban areas, according to the European practice of spatial planning, although Serbia is still an insufficiently urbanized country compared to Europe. In this document Data for daily commuting was used as an indicator for functional dependence of surrounding area

from the urban center. The conducted research was not carried out at the level of settlements, functional urban areas did not cover the entire territory of the Republic of Serbia, and their borders were given roughly without being based on precise delimitation. Recent scientific researches that preceded or were conducted after the development of these planning documents emphasize the importance of functional regionalization and use commuting data as an indicator of the functional dependence from the urban center [12] [13].

URBAN AREAS OF SERBIA AND THEIR TENDENCIES IN DEVELOPMENT

The settlement network of the Republic of Serbia represents a set of 6158 settlements, of which 4242 are in the area of Central Serbia, 467 in the area of Autonomous province (AP) of Vojvodina, and 1449 in the area of AP Kosovo and Metohija, among which 193 are urban-type settlements. The settlement network is characterized by heterogeneity and disproportions, manifested by unequal distribution of settlements, population, availability of centers, highly qualified labor, the share of the employed population, with marked concentration of population and activities in urban centers (about 60% of the population lives in urban settlements). Small settlements show domination in the size structure of settlements. In the network of urban centers, there is a disproportion between Belgrade and other centers, in most of the aforementioned characteristics. Only 28 centers in Serbia have a population of more than 30000, while the population greater than 100000 besides Belgrade are having only three centers (Novi Sad, Nis, and Kragujevac). In such an urban system, the absence of cities with more than 200000 inhabitants is noticeable, and the irregular Rank Size Rule indicates the irregular shape of the urban system. Considering the stated disproportions of the urban system, the question arises: to what extent are individual centers with their urban areas able to integrate space and enable "acceptable territorial imbalance"?

Urban areas for this research were delimited using the following model:

1) center of the urban area is the center of local self-government unit with a population greater than 30000;

2) influence area gathers settlements that are in the 45 minutes isochrone and have more than 33,3% of daily commuters to the center of the urban area.

Based on the above criteria, 28 urban settlements have been distinguished on the territory of the Republic of Serbia, representing the centers of urban areas. They are presented on Figure 1.

The largest urban areas in terms of population are the urban area of Belgrade, the urban area of Novi Sad, the urban area of Nis, and the urban area of Kragujevac.

The functional capacities of urban centers have been significantly reduced, which is reflected in the reduction of space under their direct influence. More than 2700 settlements (without data for Kosovo and Metohija) are not part of any urban area. It is noticeable that most centers of urban areas integrate mostly settlements that administratively belong to them, while only the influential areas of Belgrade, Novi Sad, Nis, and Kragujevac integrate a territory wider than administrative. On the contrary, some important urban centers such as Novi Pazar, Kraljevo, Bor, and Pirot fail to integrate even the settlements of their administrative territory. This statement is further supported by the analysis of the structure of daily commuters. Only Belgrade, Novi Sad, and Nis are destinations for a significant number of daily commuters from the territories of other local self-government units. Kragujevac, Vranje, Pozarevac, and Valjevo also have a certain subregional influence. Urban areas interfere, so some of them have the characteristics of

polycentric and hierarchically structured systems, such as Belgrade with Novi Sad, Pancevo, Smederevo, and Zrenjanin; Novi Sad with Zrenjanin and Sremska Mitrovica; etc. Some polycentric urban areas include monocentric urban areas like for example the urban area of Belgrade includes the urban area of Pancevo, which is a monocentric urban area since the largest number of commuters from this administrative territory migrates to the urban center Pancevo.

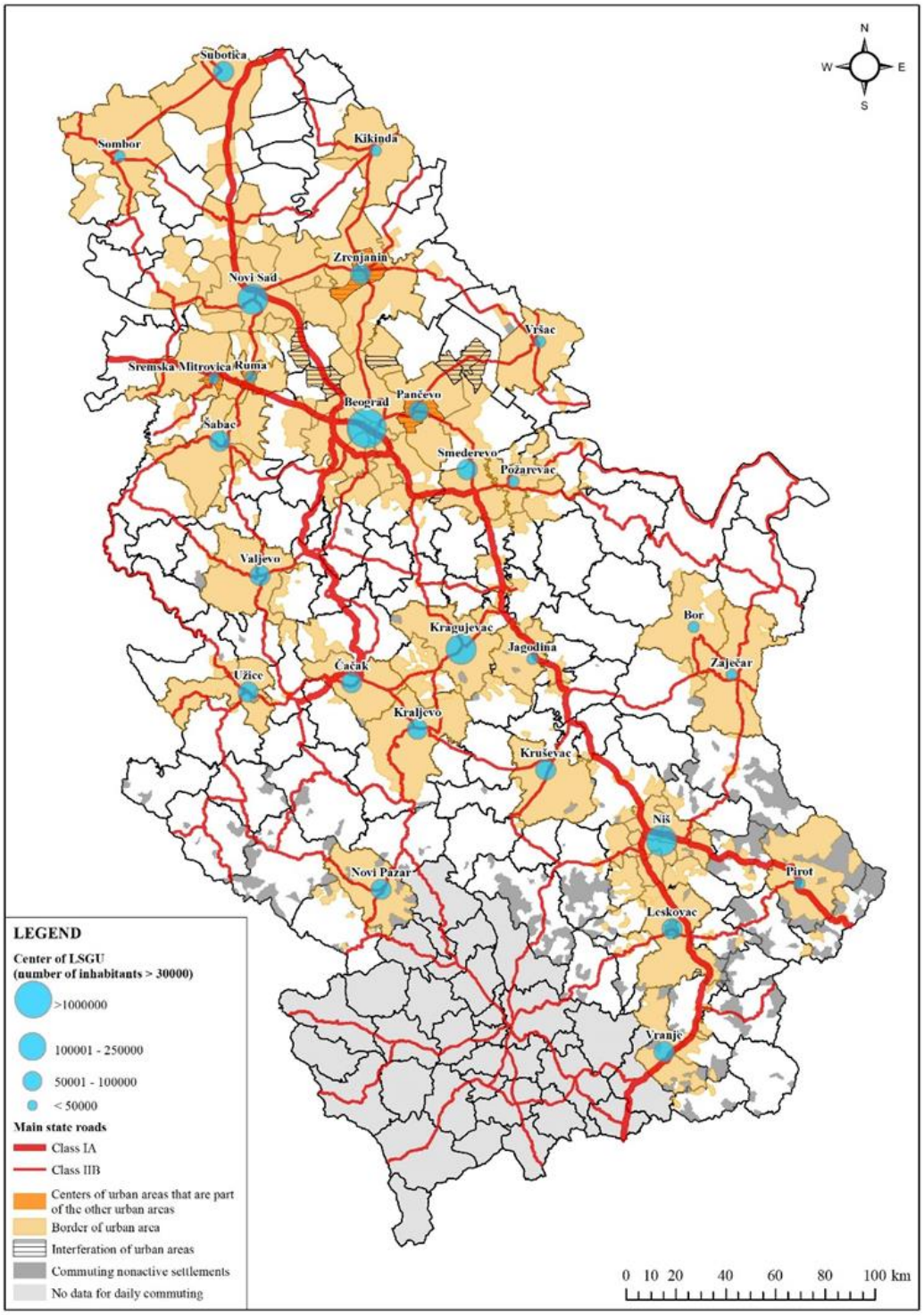

Figure 1. Urban areas of Serbia

SPATIAL PLANNING IN URBAN AREAS – INSTRUMENT FOR TERRITORIAL DEVELOPMENT

From the previously conducted analysis, it can be concluded that a large number of urban centers do not have the power to integrate a wider territory than the administrative, which is a consequence of the weakening of their functional capacities. This situation requires finding an instrument that would prevent further gaps and division between the dominant urban areas and the rest of the territory.

Strategic spatial planning is one of the main mechanisms for governing urban areas [15]. There are numerous examples in the world in which this instrument enables efficient governing of urban areas, whether it was related to the planning of common infrastructure projects in the field of transport, water management, use of resources (land, water), environmental protection, etc.

The approach of planning urban areas must be integrated, and a sectoral approach would produce more negative than positive consequences [15]. One of the representative examples of integrated strategic planning of urban areas is the Regional Plan for Land Use and Transport in Oslo and Akershus, which aims to provide an economically competitive and sustainable region at the European level; efficient land use based on the principles of polycentric development and preservation of green areas; a traffic system that would be efficient, environmentally friendly, accessible to all and which would minimize the use of cars [16].

In Serbian spatial planning practice, when planning the capacity of public services, infrastructure projects, land use, emergency management, the real users of space were not taken into account. Planning has been based on the number of inhabitants, based on administrative borders. This approach has proven to be inadequate and inefficient, because certain centers, due to negative demographic trends, have functional capacities that exceed the needs of users of the space they integrate, as is the case with Kragujevac. On the other hand, certain centers have functions that cannot supply the users of their space, which leads to numerous irrationalities, such as excessive exploitation of resources, overexertion, and frequent non-functioning of infrastructure systems, public services, etc.

CONCLUSION

Disproportions in the development of Serbian geospace manifested in unequal distribution of population, public services, highly qualified labor, accessibility of centers, infrastructural equipment, etc. require a new approach in solving this problem and abandoning rigid frameworks that are marked by administrative divisions. All these problems extend beyond the borders and require the mutual collaboration of local governments in finding solutions.

The fact that more than a half of the settlements in Serbia, according to the model applied in this research, are not integrated into any urban area is alarming. This points out the necessity of considering the approach of spatial planning for urban areas and finding adequate mechanisms for further development. Integral strategic planning based on the collaboration of local self-governments, considering diversification and internal differentiation of urban areas in terms of population size and morphological manifestation, is a topic that needs to be further elaborated and applied in the practice of spatial planning.

Acknowledgement
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INDICATOR-BASED APPROACH TO ASSESSING THE ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS OF PHOTOVOLTAIC PARKS IN ROMANIA. NORTH-WEST DEVELOPMENT REGION

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ABSTRACT

In Romania, the energy sector still largely relies on conventional sources (coal, oil, natural gas) whose extensive use pose significant threats to the environment and population. To avoid that, a process of capitalizing the renewable energy resources has been set in motion. Following Romania's EU accession, support schemes were granted to investors in the field of renewable energies and deadlines were also imposed to convert a percentage of conventional energy sources into renewable (32% by 2030, compared to 1990). In Romania, investments can be made in several types of renewable energies (wind, solar, geothermal, hydropower, biomass), depending on the regional particularities. This study is aimed at examining the environmental and socio-economic impacts of photovoltaic (PV) energy in the North-West Development Region (NWDR) using and indicator-based approach. NWDR has high values of sunshine duration sufficient for the development of 54 PV parks, spread over an area of 471 ha. The PV parks were mapped and analyzed spatially and statistically. Several indictors were selected and computed to pinpoint their environmental (distribution on main soil types; distance to forests, waters, natural protected areas) and socio-economic (e.g. distribution on land use/cover, distance to settlements, roads) impacts.

Keywords: photovoltaic (PV) parks, environmental impact, socio-economic impact, North-West Development Region (NWDR), Romania

INTRODUCTION

In recent decades, people have relied on conventional and unsustainable energy sources for all their activities and the result of burning fossil fuels has been the release of greenhouse gases into the atmosphere. The direct negative impacts associated with greenhouse gases is that of rising temperatures, but also the changes in the conditions of some wild habitats, rising sea levels, floods [1], and the occurrence of extreme weather events. The increasingly debated issue of climate change includes energy security and the methods used to prevent the effects of rising temperatures among its main topics. Renewable energy responds to the concept of sustainable development, thus to the need for safe, inexhaustible energy sources [2] and reduced environmental impacts. Over time, technologies that use various environmental resources to generate energy, i.e. water, sun, wind, biomass or the Earth's internal heat, have been developed. In Europe, the energy

obtained from renewable sources is an important component of the EU Sustainable Development Strategy, renewable energy and energy efficiency becoming the two key elements that support the sustainable energy systems [3].

In Romania, important sources of renewable energy (wind, solar, geothermal, hydropower, biomass) are found and exploited, but conventional energies still hold the majority in total energy production (65.9%). However, the legislative measures introduced after the EU accession, but also following the signing of the Paris Agreement on climate change [4], were meant to change the hierarchy of the types of energy used, so that the dependence on fossil fuels to acquire a smaller role compared to renewable energies. This is reflected in the targets imposed and assumed by Romania for the 2030 and 2050 horizons [5,6,7]. Although in the recent years the production of renewable energy has increased significantly, the provisions of the European Green Pact, recently adopted by the EU, require a rethinking of policies on clean energy supply in all economic sectors. It envisages the development of an electricity sector that relies heavily on renewable sources followed by the rapid decarbonisation [8].

Decarbonisation is one of the key transitions of Europe's commitment to reducing CO2 emissions to be achieved mainly through the integration of more renewable energy sources into the power system [9]. Within this context, the photovoltaic sector can make a significant contribution to the transition towards Low-Carbon Economy, while still enjoying a number of technical, economic or political advantages. However, one must have in mind that, besides the solar radiation, which is free and available anywhere on Earth, the development potential of solar energy is determined by the electricity demand, the policies of different states in terms of support or restriction, implementation costs and investment payback times, the climate change-related risks, the interconnection of transmission and distribution networks, as well as other technical, environmental, social and economic factors [10].

Nationwide, the solar energy registered the highest increase, over 900%, in the period 2013-2020 compared to other energy sources, even if in 2020 has the last but one position in the hierarchical structure, with only 2.4% of total energy, followed by from biomass with 0.86%. The benefits of the use of renewable energy have already been acknowledged and addressed in the literature, i.e. minimizing pollution, increasing economy, energy security, job opportunities etc., without overlooking some of its negatives [11,12,13,1]. Regional-level studies have been developed to quantify the spatial differences of environmental and socio-economic impact of photovoltaic (PV) parks/farms at various spatial levels: Romanian Plain [6], Southern Romania [5], Centre Development Region [7] and West Development Region [14]. The present study aims to complete and expand the series of regional case studies in order to provide a more detailed picture of the PV parks impacts in Romania.

STUDY AREA

The North-West Development Region (NWDR) occupies 14.3% of the country's surface and concentrates 12.7% of its population. The natural conditions, with the existence of relatively flat relief forms (parts of the Western Plain and Hills, Transylvanian Depression) and the sunshine duration values (2,100 hours/year) are sufficient for the development of 54 PV parks with areas varying between 0.26 and 96.7 ha. The PV parks were built in the 2013-2018 period and are spread over an area of 471 ha, having a total installed capacity of 197 MW. The uneven spatial distribution of the sunshine duration values (compared with the western and southern parts of the country) can be explained

by the presence of Carpathian Mountains that makes this type of energy difficult to exploit in areas with high fragmentation and slope declivity (Fig. 1A). This aspect determined the investors to direct the capital into the plain region (Western Plain), an area that accounts for over 50% of the power plants in the NWDR. However, the level of economic development involving a better quality of roads, a more developed energy network and a lower degree of bureaucracy (necessary in the development of photovoltaic parks), allowed Cluj County, despite lower climate parameters compared to Bihor County, to concentrate over 25% of the units built in the NWDR. Generally, the installed power have less than 6 MW with two exceptions: the largest PV park, built with an investment of approximately 105 million Euros, located in Satu Mare County and Lechința Solar Park (Bistrița-Năsăud County), which develops a capacity of 14.5 MW (Fig. 1B).

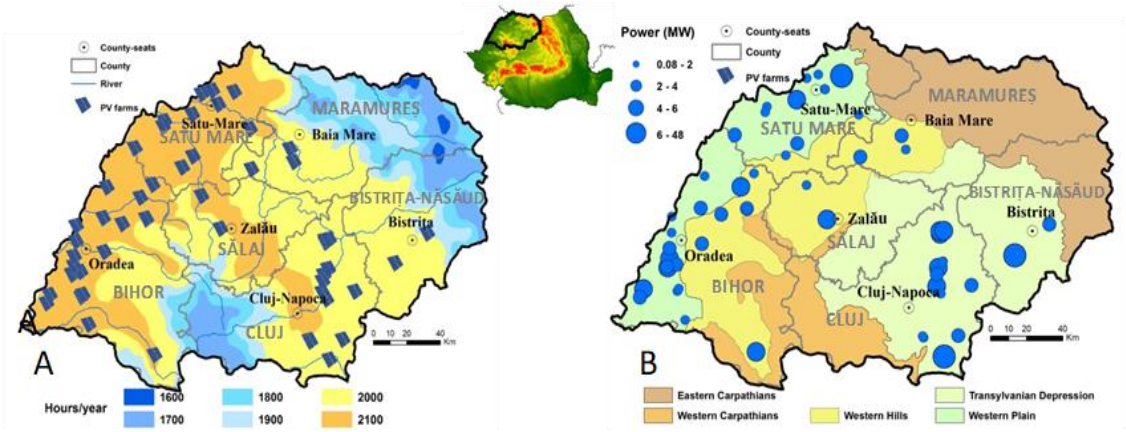

Figure 1. Sunshine duration (A) and PV parks distribution on relief units and at county level (B)

METHODOLOGY

The largest body of literature on renewable energy consider solar energy technologies as the cleanest, cost effective, accessible and environmentally friendly, yet taking into account some adverse consequences to safety, health and environment (e.g. [15,16,11,12,13,1]).

The dimension and intensity depending on the development phase: construction, installation, use, management etc. The resulted spatial and functional effects (positive and/or negative) apply to almost all environmental and socio-economic components: e.g. landscape, land use/cover, vegetation, soil, hydrology, investments, jobs [16,5,6,11,12,13,7,1].

For the current study, the authors computed several indicators to assess the PV parks impacts grouped into two main categories: environmental (distribution on main soil types, distance to hydrological network, protected natural areas, forests) and socio-economic (distribution on main land use/cover categories, distance to settlements, roads, and the solar electric footprint). Both quantitative and qualitative approaches were used to obtain an accurate assessment. Several stages were completed to perform this research: (1) mapping all PV parks in NWDR using the satellite images (Landsat 7 ETM and Landsat 8 OLI, 2018) and the records provided by the Romanian Transmission and System Operator (TSO) Transelectrica (e.g. installed power of PV parks, type of PV); (2) gathering information from field investigations (questionnaire surveys and interviews) in order to fill in the missing or incomplete information; (3) performing the impact assessment based on the calculation of the selected environmental and socio-economic indicators (Fig. 2).

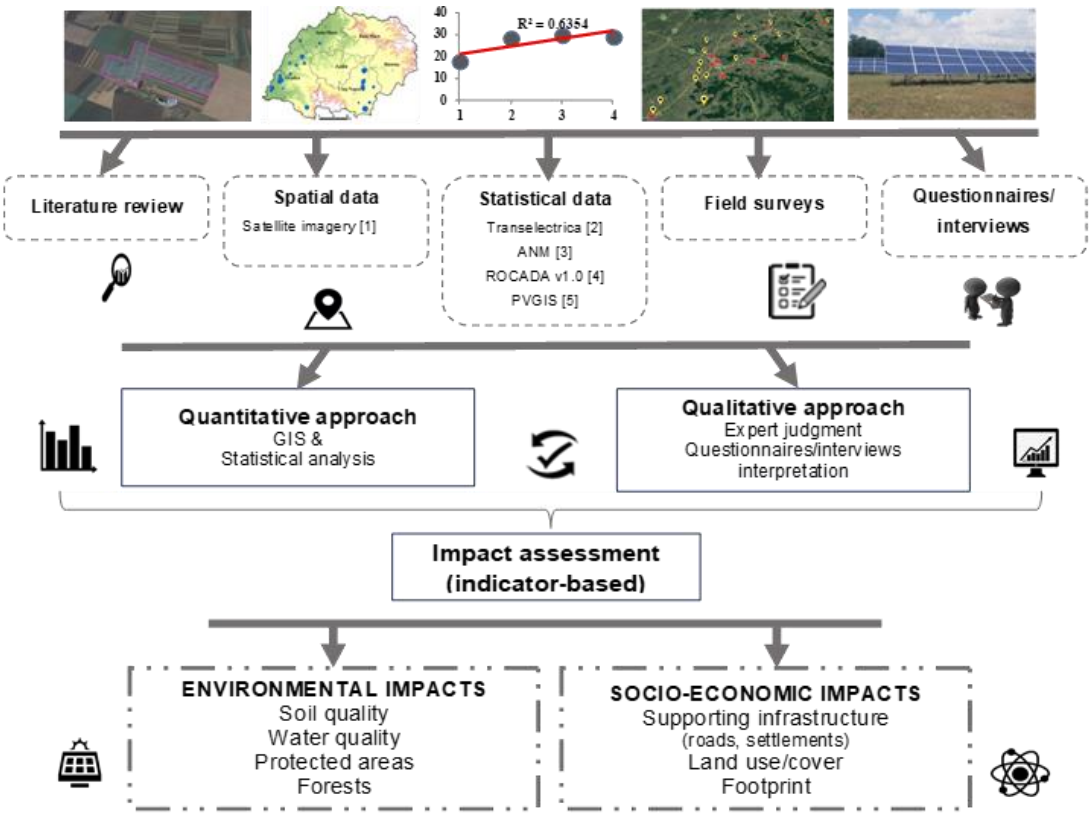

Figure 2. The methodological flow[12]

RESULTS AND DISCUSSION

PV parks have significant positive environmental impacts such as the reduction of GHG emissions and climate change mitigation [17,11,1], but also several negative impacts felt at the level of all components of the biotic and abiotic environment, i.e. air, water, soil, vegetation, fauna [17,18,19,15,11,20,12].

Soil is significantly degraded, especially during the construction phase in relation to the changes in land use/cover [1] and to the movement of the equipment and transportation [19,11]. Even if in the NWDR more than 50% of the total lands are poorly fertile or non-fertile, approximately 52% of the photovoltaic parks occupy lands with molisols or alluvial soils, recognized for the high degree of fertility/productivity. Moreover, only 13% of the total PV parks investments represent the reintroduction of uncultivated land into the economic circuit.

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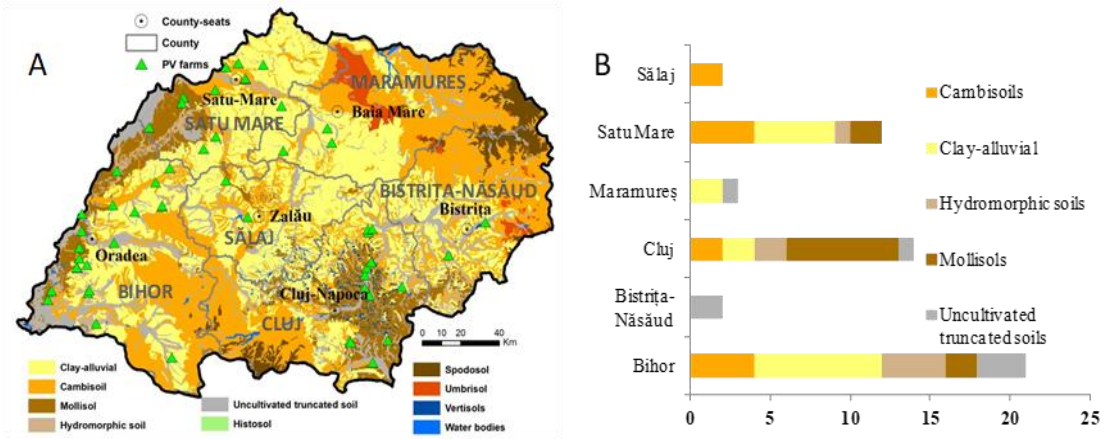

Figure 3. PV parks distribution on main soil types in NWDR (A) and at county level (B)

Dust is a drawback in the proper functioning of PV parks, reducing the productivity by 5-7%/year, even up to 10% in the droughty years, as the interviewed persons in charge with the maintenance of PV panels clamed. This requires periodic cleaning of panels and the large amounts of water, up to 60–99% of the total water used during the maintenance period [18]. In this respect, the proximity to the hydrographical network could be an advantage for the maintenance of solar panels. Over 60% of the PV parks are located at distances of less than 1km from the watercourses (Fig. 4). On the other hand, washing the solar panels with chemical detergents has other effects on the environmental quality such as damaging the structure and quality of the soil, biodiversity loss etc.

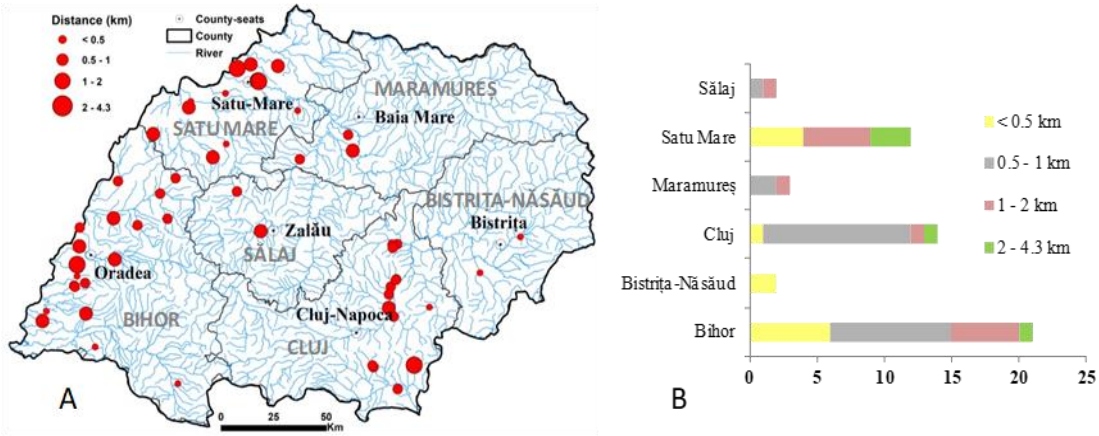

Figure 4. Distance of PV parks to water bodies in NWDR (A) and at county level (B)

Ecosystems are among the most affected by the activities related to PV farms construction, operation or decommission, studies generally indicating habitat and biodiversity loss, especially wildlife and birds among the key negative impacts [17,18,21,22,20]. In the study area there are 88 protected natural areas included in the Natura 2000 network, to which 170 protected natural areas of national interest are added. In relation to Natura 2000 sites, by positioning the PV parks in their vicinity, several impacts to local fauna and flora are expected, i.e. habitat degradation and loss, which are caused by fragmentation and edge effects, changing the ways of feeding and moving of animals, biodiversity loss. Within the NWDR there is only one case of overlapping a photovoltaic park over a protected natural area (ROSC0021-Ierului Plain); however over 50% of PV parks are located less than 5 km from natural protected areas (Fig. 5).

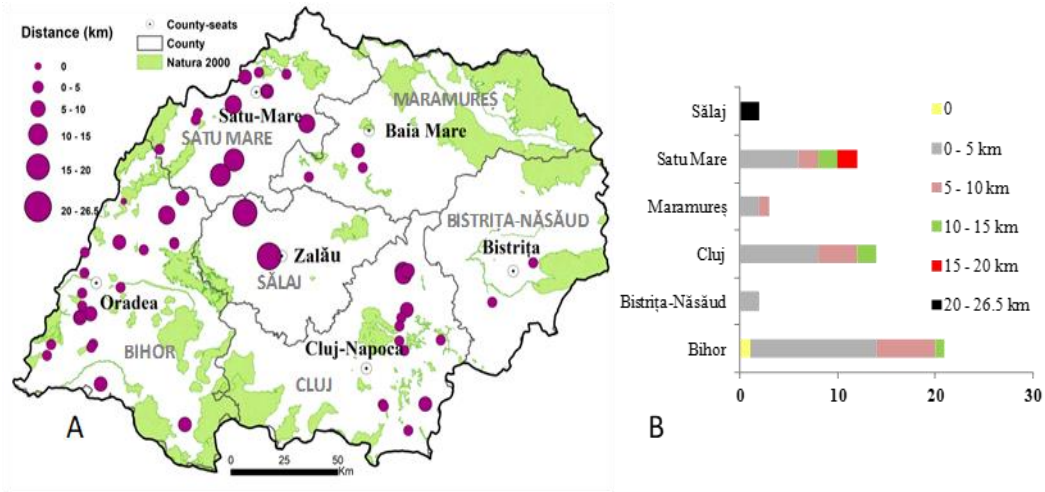

Figure 5. Distance of PV parks to Natura 2000 sites in NWDR (A) and at county level (B)

Unlike the proximity to Natura 2000 sites, in the case of forests, all PV parks are positioned at a distance of less than 5 km (Fig. 6). However, our analysis revealed that 80% were installed at least 500 m from the trees to avoid shading and, consequently, decrease the return on the investment.

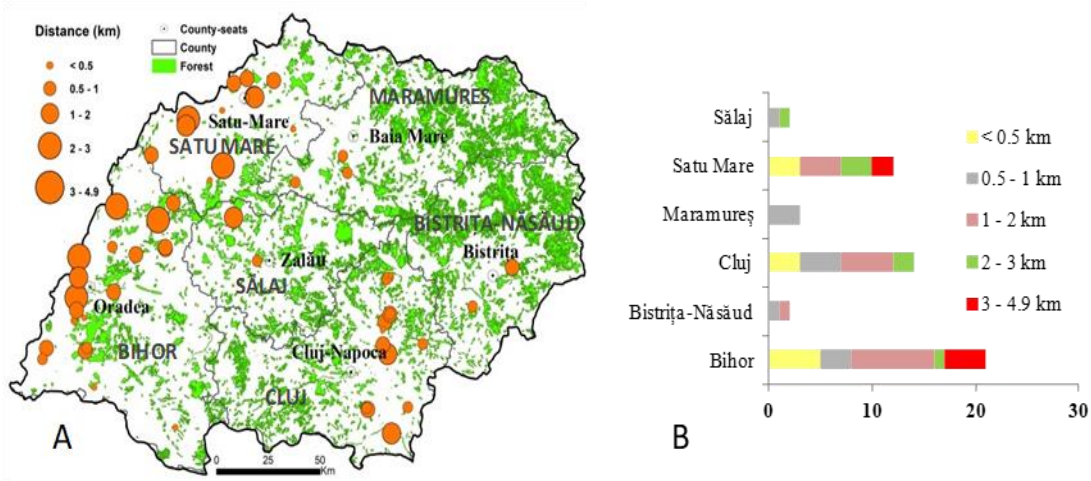

Figure 6. Distance of PV parks to forests in NWDR (A) and at county level (B)

The main socio-economic impacts of the PV parks that could be assessed using the indicator-based analysis are: distance to roads and settlements, hitherto considered as environmental impacts [5,6,7,14], here considered as supporting infrastructure for the economic investment; land/cover changes and the loss of farmland; and solar electric footprint.

The network of national and county roads facilitates the access to areas suitable for the construction of photovoltaic parks; most of investments were built so as to benefit from the existing access roads [5,11,6,7]. For this reason, over 66% of investments in the NWDR are located less than 1 km from roads, which reduces the costs (fast transportation, easy access of the equipment, less and/or no additional investments related to roads). As a result, all PV parks are positioned at a distance of less than 6 km from a main road, the road network of the region being very well developed (Fig. 7).

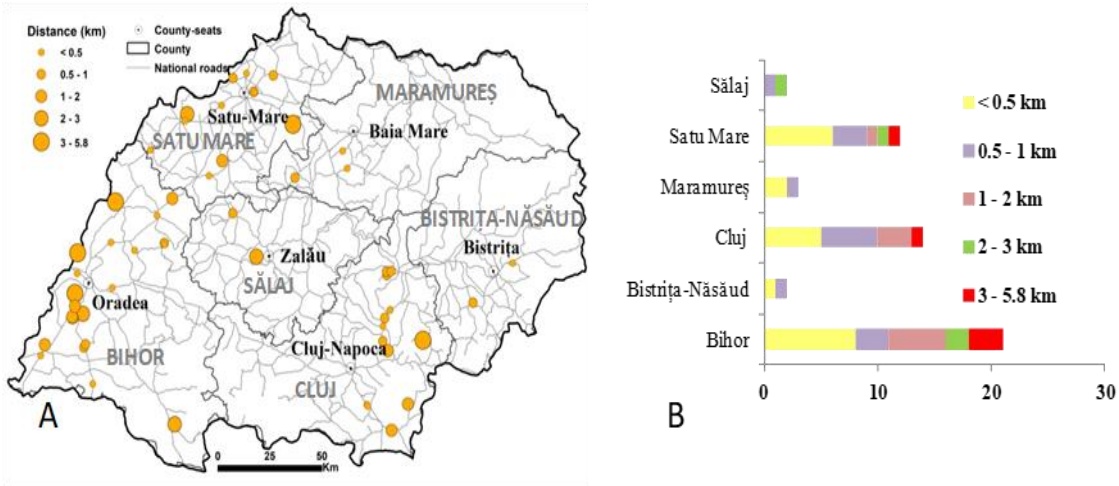

Figure 7. Distance of PV parks to national roads in NWDR (A) and at county level (B)

Considering the high cost for the construction of a photovoltaic park with a capacity of 1 MW (approx. 1.5 million Euros), the proximity to settlements and, implicitly, to the electricity network, was generally one of the conditions of the investment. For this reason, all solar power plants in the NWDR are located less than 2 km from inhabited areas (Fig. 8). Coupled with the high level of unemployment, especially in rural areas, investments in green energy can provide new jobs, for construction, security or maintenance. Our field investigations revealed that, in general, 1 MW installed requires, on average, between 5 and 7 employees to cover all stages of the entire life of the installation.

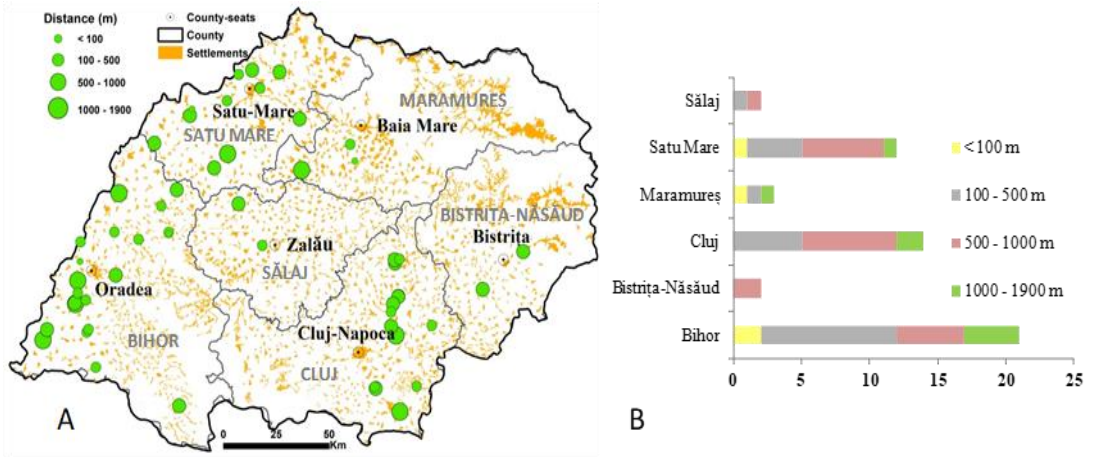

Figure 8. Distance of PV parks to settlements in NWDR (A) and at county level (B)

There are a number of factors that generally dictate the dimension of PV farms impact on land use/cover, i.e. topography, land use/cover type, distance from areas of natural beauty, size of the solar plant [17,19,16,18]. PV parks are usually known as being built on high value agricultural land [17,23,5,14,6,7], but also shrubs and grasslands [18,24]. In the study area, over 90% of the investments covered productive lands from an agricultural point of view, either covered with cereal or vegetable plantations, or intended for grazing (Fig. 9). Also, photovoltaic parks built on artificial land have replaced urban land, although there are many derelict industrial areas in the NWDR.

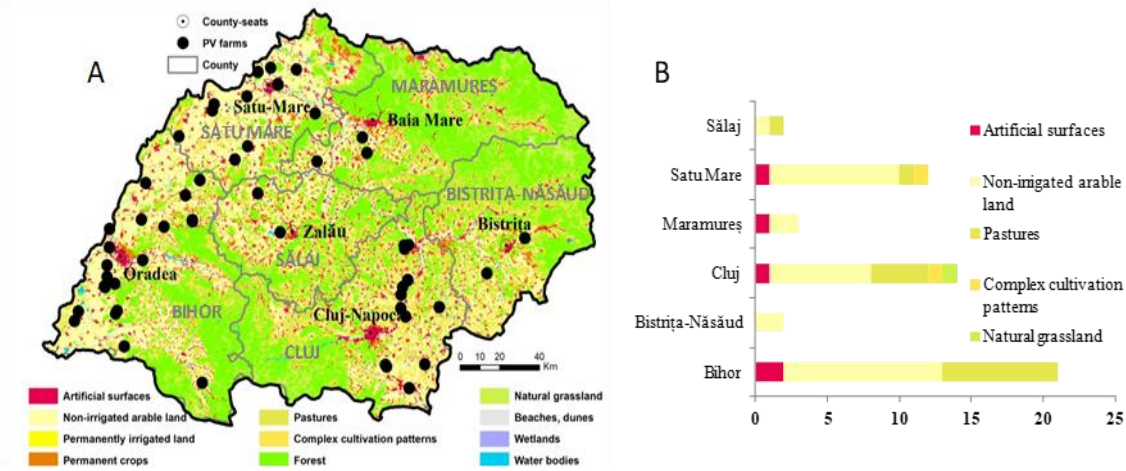

Figure 9. PV parks distribution on LUC categories in NWDR (A) and at county level (B)

The surface of photovoltaic parks and, implicitly, the amount of energy generated and introduced into the network, is a very important element for the quality of life by bringing added value for the local community, i.e. additional green energy, job opportunities for locals, decreasing the degree of pollution, increasing the attractiveness for investors, etc. The solar electric footprint explains the relationship between (1) the local communities, the first beneficiary of the solar energy produced by the PV parks located in a certain rural or urban settlement, and (2) the land cover category necessary to supply electricity from a PV park [7]. In the NWDR, there are no created patterns of the footprint of photovoltaic power plants, but there are large discrepancies between localities, being an unfair development in terms of the positive aspects mentioned above (Fig. 10).

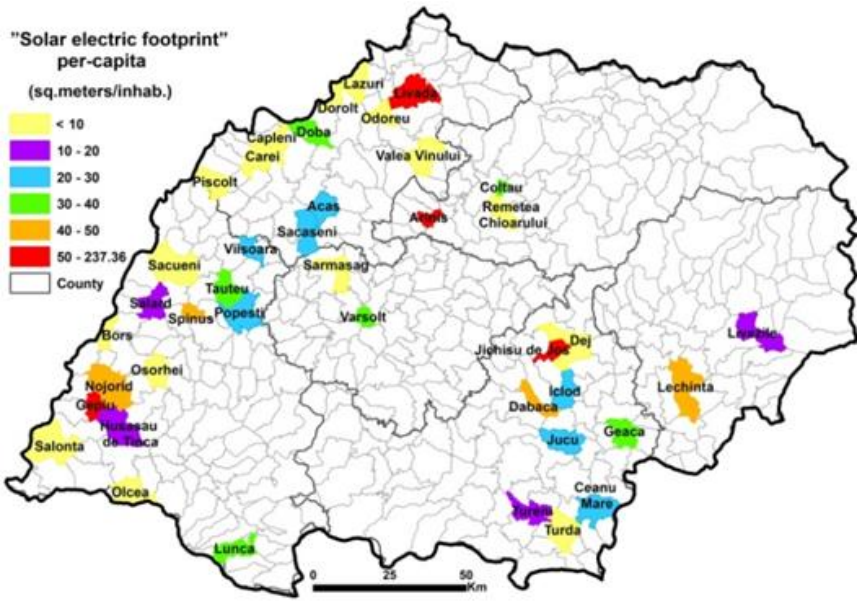

Figure 10. Distribution of solar electric footprint values in NWDR

For example, while at a population of about 7,000 inhabitants, Livada locality amounts to almost 1 million square meters of photovoltaic panels, Turda Municipality, with over 57,000 inhabitants, concentrates about 10% of this area. Such situations highlight an uneven development in the region, representing a low standard of quality of life for part of the population.

CONCLUSION

The favourable natural conditions (relief, sunshine duration) and the economic context (ability to attract investments) have made the North-West Development Region rank second in terms of capitalizing the solar potential after the South Development Region.
In terms of the positives and negatives of PV farms impacts, the findings of the current study pinpoint some key aspects of the relationship between PV farms and the environmental and socio-economic factors. Over 50% of PV parks are built on arable land with a high fertility degree which indicates a substantial loss of valuable land resource. Over 50% of the PV parks are positioned at distances less than 5 km from protected natural areas, which represents a potential negative impact through the harmful effects of overheating of the panels for bird and insect species, the transit of protected areas during construction phases, but also during use, for maintenance actions etc. On the other hand, the proximity to the supporting infrastructure (settlements and roads) has a special importance because it can have a defining role from the beginning of the solar PV installation and can reduce the construction and transportation costs; 66% of PV parks are located less than 1 km from roads. Moreover, PV parks bring about significant socio-economic benefits to the local communities, e.g. taxes generated by the PV parks, (green) jobs created during the construction/operation, investments and general impacts on the local economy etc. However, such evaluations require timely evaluations based on in-depth investigations to compensate for the lack of available statistical data.
The Regional Development Plan for the North-West Development Region (2021-2027) [13] has many references to the energy factor, but only in terms of increasing of the energy efficiency of dwellings, conventional resources (oil, coal, natural gas) or energy consumption per capita, without clear references to the renewable energy potential and valorisation. As a result, the outcomes of this study will bring necessary and useful information for the decision makers at local and regional level to consider renewable energy sources as alternative energy sources, but also as a way to protect the environment and provide socio-economic support for local communities.

Acknowledgement
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APPLICATION OF THE NRCS CN METHOD (NATURAL RECOURSE CONSERVATION SERVICE CURVE NUMBER METHOD) FOR CALCULATING THE MAXIMUM RUNOFF

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ABSTRACT

The NRCS - CN method for calculating the maximum runoff is widely used in hydrological practice due to its easy adaptation and application. The method is based on the perception that catchment conditions (soil cover, land use and climatic conditions) can be expressed by the number of a territorial unit called the CN curve. The main factors that determine the numbers of the CN curves are the hydrological soil group, land use, the method of soil cultivation, the hydrological conditions and the previous soil conditions.

In connection with this the purpose of this publication is: to calculate the maximum runoff during the flood occurred in the period 31.07. - 02.08.2014 on the Scut River near the town of Mizia by the NRCS - CN method.

For this purpose, a Geographic Information System (GIS) has been created, which includes the following layers: soil types and subtypes (soil map in M: 1: 200000), land use (map of restored property, 2013), average rainfall for the period 31.07.2014 - 2.08.2014 (information from NIMH and EA "Fight against hail"), slopes (digital terrain model, 2011).

The main results of the conducted research are the calculated volume and maximum runoff of the formed high wave, which flooded the town of Mizia.

Keywords: maximum runoff, NRCS - CN method, flood, GIS

INTRODUCTION

The NRCS - CN method is widely used in the hydrological practice due to its easy adaptation and application. The method was developed in 1954 by the USDA Soil Conservation Service (Rallison 1980), and is described in the Soil Conservation Service (SCS) National Engineering Hand-book Section 4: Hydrology (NEH-4) (SCS 1985). The first version of the handbook containing the method was published in 1954. Subsequent revisions followed in 1956, 1964, 1965, 1971, 1972, 1985, and 1993. Since its inception, the method had the full support of a federal agency and, moreover, it filled a strategic technological niche. Thus, it quickly became established in hydrologic practice, with numerous applications in the United States and other countries. Experience with the runoff curve number continues to increase to this date. [5], [6] ,[7], [8] The method is based on the perception that conditions in the catchment (topsoil coverage, land use and climatic conditions) can be expressed by the number of a territorial unit called the CN curve. The main factors that determine CS curve numbers are hydrologic soil group, land use, soil treatment method, hydrological conditions and previous soil conditions – Antecedent Moisture Condition (ARC) Classes .

In this regard, the purpose of this publication is to calculate the maximum run-off during the flooding that occurred in the period 31.07. – 02.08.2014 of the Skat River in Mizia by NRCS – CN method. The subject of application of the method is the Skat River, in the town of Mizia, which stretches in the Western subarea of the Danube hilly plain and is the largest tributary of the Ogosta River. (Fig.1).

Figure 1. Geographical location of the Scat River catchment

MATERIAL AND METHODS

A database has been created for the application of NRCS – CN method on the catchment area of the Skat River. The database includes the following GIS layers: soil types and subtypes[4], land use[3], average rainfall for the period 31.07.2014 – 2.08.2014 [2], slope gradients, digital elevation model, 2011, CN values for each hydrological group and the corresponding moist soil conditions (ARC III), reported from [1]. For each CN polygon, the so-called maximum retention potential – S (maximum potential infiltration of precipitation) [14] and surface runoff (Q) separately for each CN polygon, applying equation (1) and equation (2):

$$S = \frac{25\,400}{CN} - 254 \qquad (1)$$

$$Q = \frac{(P-0{,}2S)^2}{(P+0{,}8S)} \quad , \qquad (2)$$

where *S* is the maximum potential infiltration (mm); *CN* is the curve number corresponding to a type of land use; *Q* is a surface runoff (mm) calculated for each *CN* polygon; *P* is precipitation (mm).

[14] Displays this part of the precipitation that will infiltrate the soil with the relevant soil properties and land use type

The corrections of the *CN* values for polygons with gradients greater than or equal to 5 % shall be carried out by equations (3) and (4):

$$CN_{2a} = CN_2 XK \quad (3)$$

$$K = \frac{322{,}79+15{,}63(\alpha)}{\alpha+323{,}52} \quad , \quad (4)$$

CN2a is the adjusted *CN* value; *CN2* is the NRCS-CN value for moist soil conditions III (AMC); *K* is a coefficient; α (mm-1) is the slope of a slope.
The weighted (heavy) surface run-off for each sub-basin is calculated by equation (5):

$$\bar{Q} = \frac{\sum_i^n Q_i A_i}{A} \quad , \quad (5)$$

Where $\overline{Q}$ is the calculated weighted surface runoff for a sub-basin in (mm); Q_i is the calculated surface runoff for each *CN* polygon in (mm); A_i is the area of each *CN* polygon in (km^2).

RESULTS AND DISCUSSION

For the calculation of the maximum run-off, the following steps are performed sequentially:
Generation of hydrological soil groups and CN (soil - land use) map
For the definition of hydrologic soil groups (A, B,C D), the properties of soil types distributed in the Skat Basin are taken into consideration. In accordance with them, carbonate, typical black earths and alluviologic – meadow soils refer to hydrologic soil group A, leached black lands (weak, medium and strong) to hydrologic soil group B, degraded black lands – to group C and gray and dark gray forest soils to Group D.
Hydrologic soil group A includes soil types that have a low potential for surface runoff formation due to the high rate of infiltration of rainfall (1,8 - 3,0 m/24 h). Group B includes soil types with medium low surface runoff formation potential due to average rainfall rate (1,3 – 2,6 m/24 h). Group C includes soil types with medium high potential for surface run-off formation due to low rainfall infiltration rate (0,9-1,6 m/24 h). The last hydrologic soil group D includes soil types with a high potential for surface runoff formation due to the very low rate of infiltration of rainwater (0,09-0,03 m/24 h). The relative share of the individual soil groups in the basin of the Skat Is presented in Table 1.

Table 1. Relative share of hydrological soil types

Hydrologic soil types	**Sq. m**	**%**
A	232,1	21,52
B	424,3	39,35
C	174,2	16,15
D	247,8	23
Total area	**1078,36**	**100**

About 22% of the soil types distributed in the Skat River basin fall into soil group A, while soil groups C and D account for about 40% of soil types. The created GIS map of hydrologic soil groups is presented in Fig. 2.

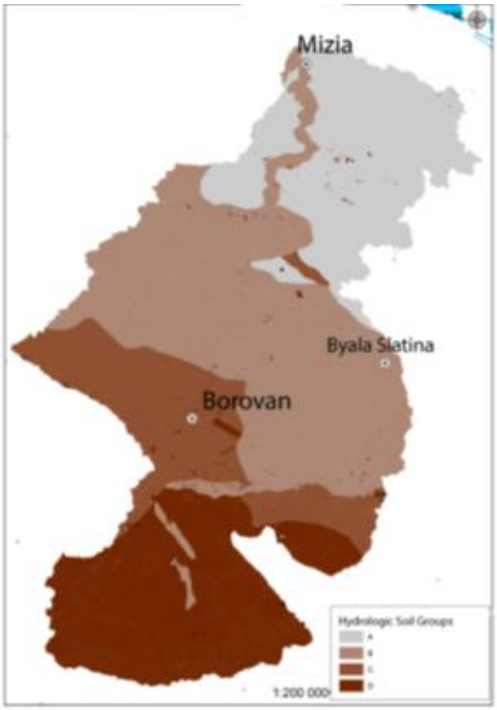

Figure 2: Hydrologic soil groups in the Skat River catchment

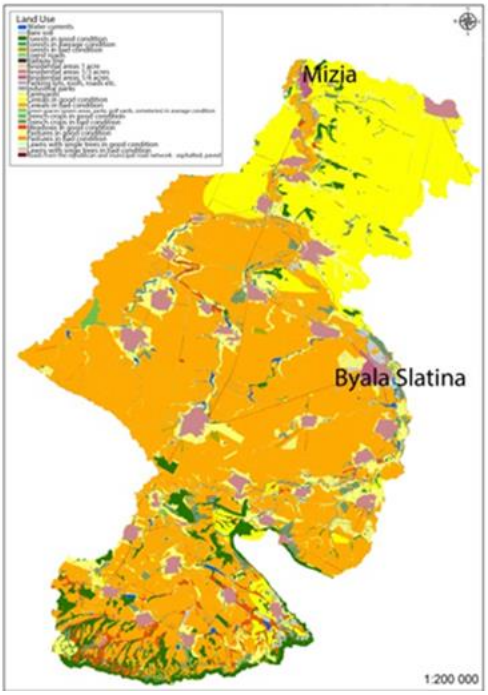

Figure 3: Land use in the Skat catchment

For the assessment of land use in the Skat River basin, the map of the restored property is used, relevance 2013[4] [15]. Its land use categories have been transformed into land use classes according to [3]. A total of 23 land use classes are allocated. The area of cereals is the biggest (70.5%), pastures (7.3%), forests (5.3%) and residential areas (5,3%) The relative share of the other classes is about 1% and less than 1%. The land use classes are presented in Fig.3.

To create the CN GIS map, the information from the soil hydrologic group map (Fig. 1) and the land use map (Fig. 2) are transferred in ArcView. Using the Xtools tool, the CN map was created. The CN map includes new polygons formed on the basis of the land use map and the map of hydrologic soil groups. For each polygon, a CN value is determined. The CN values determined are for the so-called average Antecedent Moisture Condition (AMC II). Using standard tables, the transition to CN values for the wet Antecedent Moisture Condition (AMC III) has been made. The CN values thus determined are recalculated for all CN polygons which have an average slope gradient greater than or equal to 5 %. (Fig.4). The main regularity is related to the fact that lower CN values are corresponding to the hydrologic soil groups A and B. In terms of land use classes with the lowest value are forests in good condition, meadows in good condition, pastures in good condition and with the highest value respectively the land use classes – parking lots, residential areas, paved streets and roads. The recalculated CN values in accordance with equation (3) and (4) are presented in Fig. 4.

The CN map is a mosaic of CN values due to different land use. About 62 % of the area of the basin has CN values between 81-90, 25.5% between 91-90 and 9.9% between 51-70. Only 2.2% of the area has CN values below 50. The analysis shows that cereal classes and perennial plants contribute the most to the formation of significant surface runoff.

[15] Provided by the Ministry of Agriculture, Food and Forestry

Calculation of the average rainfall for the Skat river catchment.
The average rainfall in the Skat river catchment was calculated on the basis of the information from the Department of Weather Forecasts (NIMH) and the Hail Suppression Agency on the amount of rainfall for the period 31.07.2014 – 2.08.2014 (Fig. 5). To do this, the Thiessen method was applied. [1]

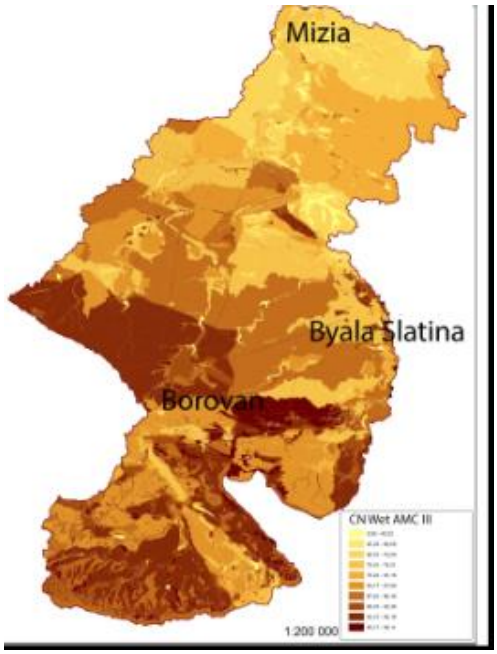

Figure 4: CN map of the Skat river catchment

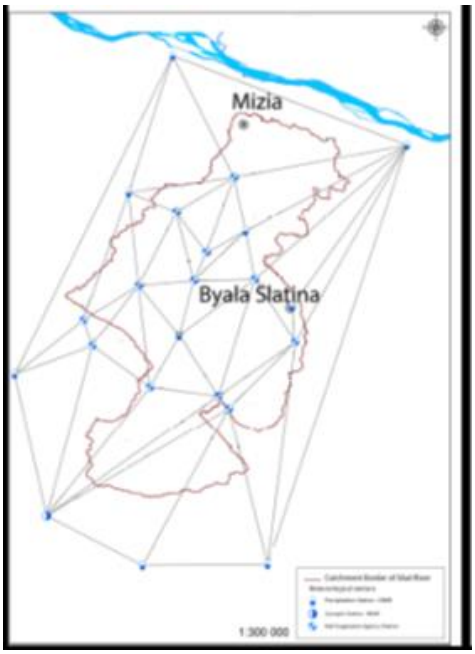

Figure 5: Location of stations and settlements and 24-hour rainfall amounts

The territorial distribution of precipitation is presented in Fig. 6 and the average rainfall is calculated at 114, 33 l/m2.

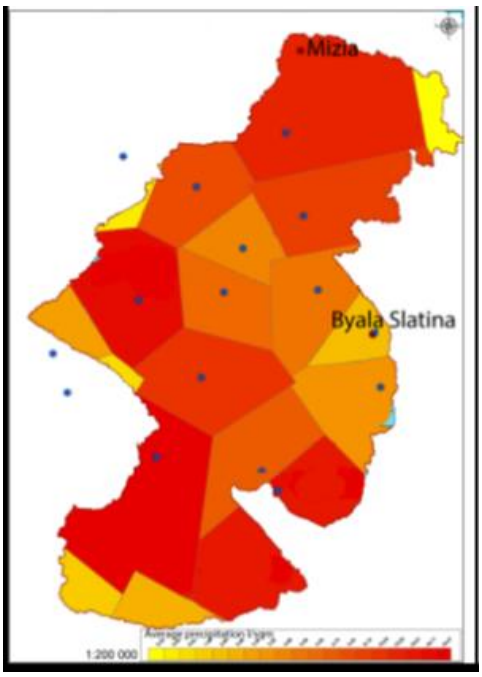

Figure 6: Territorial distribution of rainfall/precipitation in the Skat catchment area for the period 31.07.2014 – 2.08.2014

Calculation of the surface water runoff
According to equation (2), the runoff is calculated for the individual sub-basins. (Fig. 7)
The formed volume of the high wave, originating from the Skat River at the town of Mizia, is 74.3 million m3 and the formed maximum runoff - 587 m3/s.

CONCLUSION

The SCS curve number method is a simple, widely used and efficient method for determining the approximate amount of runoff from a rainfall even in a particular area. Perceived advantages of the method are: (1) its simplicity; (2) its predictability; (3) its stability; (4) its reliance on only one parameter; and (5) its responsiveness to major. runoff-producing watershed properties (soil type, land use/treatment, surface condition, and antecedent condition).

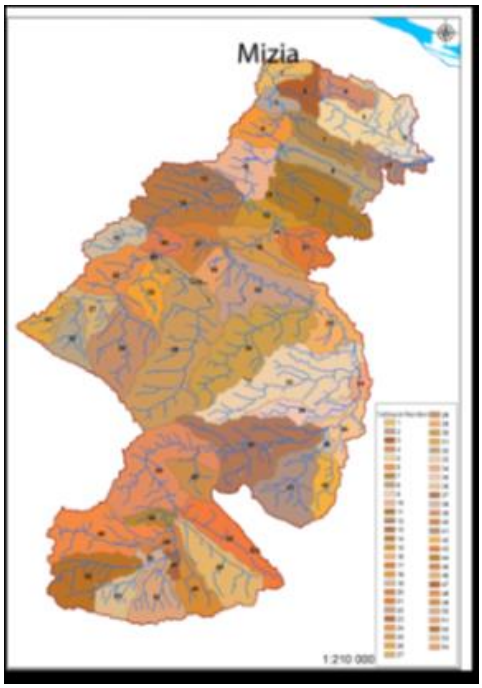

Figure 7: Sub-basins of the Skat river catchment

Perceived disadvantages are: (1) its marked sensitivity to curve number; (2) the absence of clear guidance on how to vary antecedent condition; (3) the method's varying accuracy for different biomes; (4) the absence of an explicit provision for spatial scale effects; and (5) the fixing of the initial abstraction ratio at $\lambda = 0.2$, preempting a regionalization based on geologic and climatic setting.

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CHRONOLOGY OF THE URBAN EXPANSION OF SHTIP

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ABSTRACT

The phenomenon of spatial expansion and sprawling of cities in one particular territory is a condition that has greatly influenced the contemporary city and society, from the physical/spatial aspect, social, as well as the aspect of urban development.
The topic of this study is the genesis and the matrix of the spatial development of Shtip and determining the cause-effect factors and results.
The main thesis of the study suggests necessity for introducing a program-spatial matrix/paradigm in the development, so as to regulate the spatial expansion of the urban web. The program-spatial matrix is associated with the segment of planning, or the introduction of the normative structure.
The work methodology is based on comparative analysis of the changes from a spatial-physical and a planning point of view. Due to the specifications of the region concerned, this study, in methodological sense, starts with providing documentary grounds, based on methods of collecting, documenting and analyzing the information found.
The conclusion of this study encourages the need for introducing a normative structure in the spatial development planning of cities in order to improve the spatial quality, the economic dynamics and the social cohesion.
The results of the study analyses ought to provide a clearer representation of the relations between the urban planning (spatial and general) and the space as well as the consequences of their implementation, or non-implementation.

Keywords: spatial development, spatial expansion, urban development, pole, axis of influence

INTRODUCTION

The topic of this study is the city of Shtip, a centre of a mesoregion according to Daskalovski and Markoski [3], i.e. a center of a macroregion on a national level – according to the Draft Spatial Plan of the East Planning Region [1], a pole of development with great influence, appropriate to its position in the region, i.e. the spatial-physical context in the geographical surroundings, as a phenomenon with its own specific individual development. For better understanding of the issue, an analysis of the natural-geographic, social-geographic and economic-geographic features of the space has been made. The spatial and urban city planning has been observed as a second segment. The city of Shtip is marked by nearly a hundred years of history of spatial planning. The spontaneous and non-regulated development of the urban web has been replaced by a process of urban development and urban planning, a process which started in the second decade of the twentieth century (1927). The planning documents are the result of the

inconsistent social-political conditions that existed in that particular moment, as well as of the position and the significance of Shtip in that particular territory. From 1927 until today five urban plans have been adopted, each of them covers the city integrally and defines its development as such. The plans have different content and qualitative characteristics. They represent the atmosphere, the aspirations of the officials in charge and the actual relevant legislation. In this study, different planning treatments are separately discussed in relation to the adopted plans, their decision on the boundaries of the urban-planning area as well as the city boundaries. The goal is to analyze the process of spatial and urban expansion of the city, with a special emphasis on the cause-effect relationships arising from the physical conditions.

STUDY AREA WITH BASIC GEOGRAPHIC CHARACTERISTCS

The city of Shtip is located in the East Planning Region (Nomenclature of Territorial Units for Statistics - NUTS level 3), one of the eight non-administrative units - statistic regions which arouse by grouping the municipalities from lower rank in administrative units in the Republic of Macedonia. [2] (Decision on determining the nomenclature of territorial units for statistics – NUTS, adopted by the Government of the Republic of Macedonia, “Official Gazette of the Republic of Macedonia” No. 158 from 28.12.2007, the last amendments and supplements were made in January 2014 (“Official Gazette of the Republic of Macedonia” No. 10 from 20.01.2014). This planning region covers an area of 3.538km2 (13,76% of the country’s territory) and has a population of 151.858 (9% of the population in the Republic of North Macedonia). The region consists of the municipalities: Berovo, Vinica, Delchevo, Zrnovci, Karbinci, Kochani, Makedonska Kamenica, Pehchevo, Probishtip, Cheshinovo-Obleshevo and Shtip. [1]

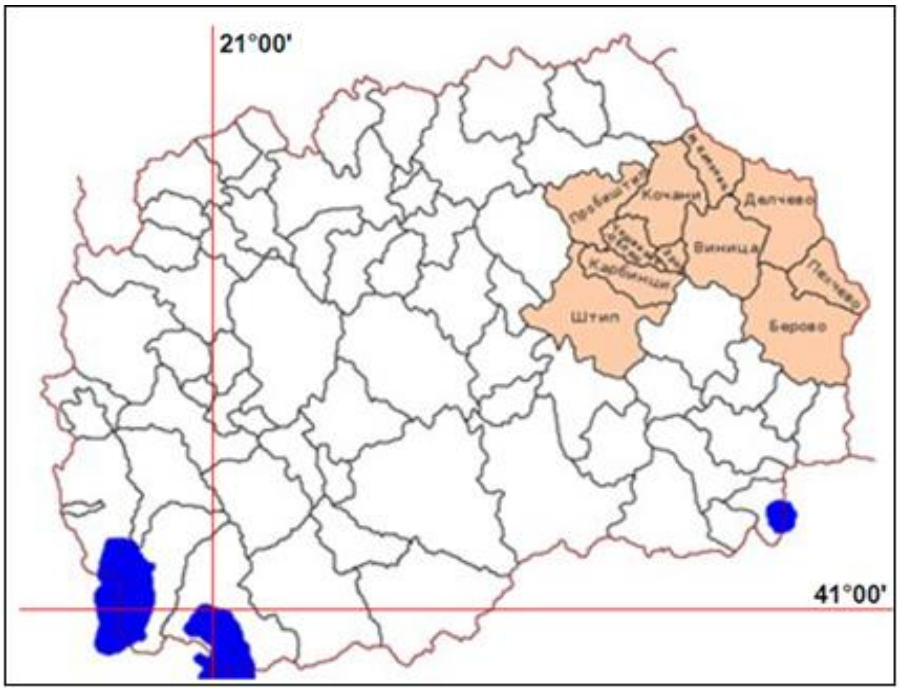

Figure 1. Map of the east region in Republic of North Macedonia, source http://www.eastregion.mk/

The municipality of Shtip is located in the middle course of the river Bregalnica, in the center of east Macedonia. Favorable features for the development of the city are the proximity of the main traffic corridors 10 and 8, as well as the position of the major traffic

arteries of importance to the country and the region. The routes connecting the Vardar Valley and Skopje with the eastern parts of the country and neighboring Bulgaria pass through Shtip, for which the openness of Ovche Pole is particularly suitable. The natural suitable corridors for traffic communication are the Ovche Pole- Kochansko Pole-Delchevsko Pole route in the east and the Ovche Pole-Kriva Lakavica Valley-Strumica Valley route in the southeast.

The city occupies the immediate area around Isarot on the riverbanks of the Otinja and Bregalnica, gradually rising up the slopes of the surrounding hills, giving the area an amphitheatrical appearance.

The relief structure of the municipality is characterized by various orographic features. From a morphostructural point of view, the following forms appear: flat terrains of Ezhovo Pole, parts of the valley of the rivers Bregalnica and Kriva Lakavica, hilly terrains of Mount Mangovica in the north, Serta and Konechka in the southwest and hilly and mountainous terrains of Mount Plachkovica in the east.

The city of Shtip is located on the erosive riverbanks of the rivers Bregalnica and Otinja, between the hills Isarot (395 m) and Merite (420) to the west, Kumlak (455 m) to the south, Karakush (425 m) and the hills of Plachkovica with the highest points of 384 m, 345 m, 339 m and 327 m, which close the space to the east. To the north and southwest along the valley of the river Bregalnica and northwest to Ezhovo Pole the area is flat and wide open, with an altitude of up to 300 m. The area of Ezhovo Pole, Prebeg, Gladno Pole and Dolni Bunar and that of the riverbank of the Bregalnica are mildly rolling areas with favorable topographical features. The area to the north and east is a distinctly hilly area intersected by gullies and prominent erosion processes. A striking feature of the area is the flow of the river Bregalnica. It flows through a gorge between the Merite and Isarot localities, and then erosive riverbanks appear again as it continues southwards. The river Otinja flows into the gorge of the river Bregalnica from the east. In summary, it can be emphasized that the area clearly distinguishes three parts: hilly terrain (10%), slopes (30%) and flat terrain (60%).

The wider area of the city has a complex geological structure. To the east and northeast, in Ezhovo Pole and Prebeg, the terrain is built of sandstone, clay, and marl. The Merite, Isarot and Kumlak hills are made of granite, and the Pluzhdino locality is composed of marly clay, sand and gravel. The terrain at the Letishte locality consists of deluvial and proluvial sediments, while alluvial sediments cover the terrain along the river Bregalnica.

The territory of the municipality is dominated by temperate continental climate with some influence of the modified Mediterranean climate through the valley of the Bregalnica. The average annual temperature is 12.9°. There are 72 days per year with ice occurrences. The average duration of sunshine is particularly striking, with 2376.9 hours per year. The area is dry, with 506.1 mm of annual rainfall on average. The summer period is marked by heavy rains. The average annual humidity is 67%. Fogs are a rare occurrence. The dominant winds are those from the northwest (5.2 m / sec) and southeast (6.7 m / sec).

From a hydrographic aspect, the city lies at the estuary of the Otinja River into the Bregalnica River. The Bregalnica, with a flow rate of 17.9 m3 / sec, is the main recipient of water in this area. In front of the city of Shtip, the river flow is flat with large meanders, and in continuation of the flow through the city a typical gorge is formed, and then downstream to the south it continues through a large erosive riverbank. The Otinja springs from Plachkovica (0.16 m3 / sec) and has the character of a torrential stream, with a large amount of water and a high potential torrential capacity. The riverbed of the Otinja is regulated in a length of 1600 m through the city. The wider area of the city is poor with

natural water sources. There is only one spring with a yielding property of 1 l / sec. To the south-east of the city there is an occurrence of thermal waters at the sites of Kezhovica and L'dzhi. The yielding properties of the springs are low, 1-1.5 l / sec, with a temperature of 52-60 degrees. Drilling has enabled a capacity of 20 l / sec. Kezhovica is a spa recreational centre. In the wider northeast part of the city there are 14 gullies with a torrential character which are not regulated. The water supply in the city is provided by the groundwater in the Fortuna, Shtip Lake and Ribnichki Cheshmi sites, which are adjacent to the Bregalnica, and their level is directly dependent on the level of the river flow, as well as the Zletovica system (first phase of water supply which is realized). With the construction of the Kalimanci reservoir on the Bregalnica there is no occurrence of floods.

Shtip is situated on the boundaries of the Ovche Pole agricultural area, marked by ploughed lands, vineyards, industrial crops and pastures. In the wider area, heterogeneous soil types are encountered, with the predominance of the second (in the northern flatlands) and third solvency class (to the east, west and south of the city on the slopes of Plachkovica). Soils of the first solvency class are partially present (alluvial lands northeast of the city along the Bregalnica, but on small areas). The agricultural land in the municipality of Shtip covers an area of 34762 ha, of which 13859 ha are arable land and 20903 ha are pastures. (Draft Spatial Plan of the East Planning Region)

The forest land in this area occurs in small enclaves in parts of steeper and more concealed places above 1000 m. Up to 500 m this land is degraded, destroyed and converted to pastures. Tall trees encompass a very small percent. The area is dominated by steppe-like pastures with high anthropogenic impact. They are rich in terms of flora, with a large number of endemic species, and are among the most important areas for winter grazing. As far as vegetation is concerned, the overall impression of the region is poor, desolate, deforested with dominant agricultural character and devastated forest areas on the slopes of Plachkovica. In the domain of urbanization and settlement system, the urban settlement occupies a special place, both within the municipality, and in the wider region and country. This region is no exception to the previously analyzed when it comes to the prominent process of deagrarization of rural settlements, with the occurrence of displacement of settlements (out of 43 rural settlements, 34 are active, while 9 villages have been displaced since 1991).

This process of depopulation has a tendency of growing. The process of urbanization is intense with elements of: highly concentrated urbanization type, large differences between the degree of urbanization and general development, great differences in size and in functional facilities of the settlements, prominent occurrences of illegal buildings, grouped into settlements of up to 30 ha, which strongly influence the concept of city development. The interregional analysis of the correlation between the level of urbanization and the value of GDP shows that the East Planning Region is in 4th place according to the level of urbanization, compared to the other 7 planning regions. [1] [6] [11] [13] [24]

METHODOLOGY FOR RESEARCH

specifics of the study area, the paper, in methodological terms, begins the first phase with establishing a documentary base by applying methods of collection, gathering, documenting and analysis of the gathered data, or method of acquisition. The primary sources are composed of spatial plans, urban plans, cartographic, cadastral, and other plans released by official state institutions, local self-government, State Archive, Archive

of the City of Shtip, Agency for real estate cadastre, planning institutions etc. Scientific papers, comments from scientific magazines, publications, monographies are also used as secondary sources.
The data gathered from different sources and of varying formats & structure has been processed by methods of generalization and systematization in order to produce comparable parameters which can be evaluated with the same approaches.
Comparative analysis is the primary method implemented to track and evaluate the changes in the spatial and planning aspect. Other relevant methods which have also been used are statistical, analytical and specialized software programs. For illustrative purposes tables and diagrams are applied.
The results collected in the research are presented as individual findings and in a cumulative view. The conclusions and recommendations of this research are a synthesis of the results and their comparison with the hypotheses and basic theoretical postulates.

RESULTS

Chronology of the urban expansion

Archaeological findings confirm the extremely long history of Shtip and its surroundings. The name Astibo is mentioned for the first time by the ancient chronicler Polienvo (III century BC). Then, it is mentioned as one of the most significant Paionian centers in written documents from the 1st century AD, during the reign of the Roman Emperor Tiberius. Astibo (the old name of the Bregalnica) is mentioned again in Tabula Peuttingemiana (ancient map from the 4th century), as a settlement on the road to Stobi - Pautalia (Kyustendil) - Serdika (Sofia). The settlement existed both in the late ancient and early Byzantine times, probably under the name of Stipeon, and in the Middle Ages the settlement was named Shtip. From 976 to 1014 Shtip was located within the borders of Samuil's state, afterwards it became part of Byzantium, Bulgaria, and Serbia until the arrival of the Turks towards the end of the second half of the 14th century when the medieval Shtip was finally conquered by the Ottomans in 1395.
The city is mentioned in 1620 as an Episcopal center. In 1661 the Turkish travel writer Evliya Çelebi went through the city and described it in his travelogues - “at that time Shtip was one of the economic and spiritual centers of the Christians in Macedonia.” Evliya Çelebi also mentioned that he had visited the old part of Shtip (Novo Selo) and wrote that the seat of the Metropolitan bishop of Kyustendil (Kanasian), Kratovo and Shtip was located there. In the 17th century Shtip had several inns, 540 shops and a bedesten, but the real development of the city began in the late 18th and early 19th centuries, when the city played a significant role in the development of trade between the seaside towns of the Aegean Sea and the inland of the Balkan. [26] [15] [16] [5] [23] [22]

Adopted urban plans

The planning period of the city’s development began with the first plans made after the liberation from the Ottoman Empire, more specifically, after 1927. Since then, four urban plans have been adopted for Shtip in which the city space is treated integrally, and one is in the process of being adopted:

- Detailed Plan from 1927, revised 1941-42 (1:500);
- General Urban Plan, prepared by Nikola Dobrovikj, adopted by the Council of the Municipality in 1963;
- Basic Urban Plan - Amendments from 1984;

- General Urban Plan – Amendments from 1999;
- Draft General Urban Plan (in the process of adopting)

Detailed Plan from 1927, revised 1941-42

The first official planning document for the city of Shtip is the Detailed Plan from 1927, developed when the city was within the then Kingdom of the SCS. There is not much data associated with this planning document. It was made as a geodetic survey map, with a scale 1:500. In the archive of the municipality of Shtip, the basic design data of the plan are available on 8 sheets, but in very poor condition [4]. Regarding the legislation, according to the periodization of Siljanoska, the plan belongs to the "period from 1914-1948: a period when the urban activity and the legislative material are established, through which an integral treatment of all aspects important for control of the spatial-physical development of the city is ensured " [18]. When the plan was adopted, the city authorities began with activities for its implementation. In this period, the city had about 15.000 inhabitants [9] [25].

Figure 2: Detailed Plan from 1927 (revised 1941/42), sheet no. 6. Source: Municipality of Shtip

From an administrative-territorial aspect, the city was the centre of the Bregalnica (Shtip) district until 1965, when the districts as secondary territorial-administrative units were abolished. The plan covers an urban area of approximately 97 ha [4].

Figure 3: Fragment with Adolf Hitler Street from the 1927 Detailed Plan. (revised 1941/42). Source: Municipality of Shtip

General Urban Plan (GUP), 1963

The General Urban Plan of Shtip adopted in late 1963 represents a revolutionary vision for the development of the city. It was made in specific post-war circumstances when the reconstruction of the ruined city began. The process of intensive construction of industrial facilities, housing and socially important facilities began in the period 1950-55. In order to ensure the planned realization of the further development of the city, a General Urban Plan was being developed. The author of the plan is Nikola Dobrovikj, a well-known Belgrade architect. The plan was intended for intermediate application, i.e. elaboration with detailed urban plans, which were characterized by direct transfer of the planning solution to a larger scale, without further analysis of adaptation of the concept of the existing state plan and the physiognomy of the terrain, which is perceived as one of the major drawbacks of the plan. Unfortunately, the base maps of this important planning document are no longer available. The plan data are taken from the documentation base of the subsequent plans. The planning area generally follows the existing state of the city, i.e. it stipulated only small expansions. This issue is now being criticized, as it was quickly proved that analyzes of the future development needs of the city were not well understood (given the importance and role of the city in the wider area), and the city tissue began to expand very quickly beyond the boundaries of the planning area, especially to the north of the city. The visionary shaped components are a major qualitative element of the plan. The Belobrd Prospect, located on the right bank of the Otinja, is significant for its spatial concept with highly emphasized physical structures, which, through total reconstruction, resolved the issue of important buildings with central city functions and residential buildings, in place of poor quality housing stock. The plan also has original ideas for resolving infrastructure systems, such as entering the city through a tunnel, relocating and running the Otinja outside the city, to the north of the city, through a tunnel as well. The construction of the city via the reconstruction of the existing tissue was partially realized in smaller intakes on the southern slopes of Belo Brdo and the central area.

Smaller complexes and settlements were built in the period 1960-1970, but they were characterized by inadequate levels of planning and implementation. In the period after 1971 the construction of large residential complexes for 7.500 residents began. The

planning and constructing of newer residential settlements was implemented with partial urban solutions, gradual improvement in the quality of urban documentation and technical documentation for infrastructure systems, but without a single concept of the city development as a functional whole. This created problems in the planning, development and implementation of functional facilities in the area.

Regarding the legislative framework, the plan was adopted in accordance with the 1953 Law on Urban Planning, which Siljanoska classifies in the "first generation" of urban laws, while Korobar classifies it in “a period of further decentralization of society and the emphasized influence of world experiences." [18][14] The process of migration of the population from the rural areas to the city was distinctively noticeable. In 1961 the city had 20.269 inhabitants. According to the census in 1981, it had 36.230 inhabitants, which is an increase of about 79% over a period of two decades. This phenomenon produces problems and collisions in the organization and the utilization of the land in the city, and therefore, the process of drawing up the Basic Urban Plan was initiated. The planning area of the GUP is approximately 630 ha (obtained by drawing the boundaries of the cadastral surveys from 1958) [11] [13].

Basic Urban Plan - Amendments from 1984

In order to perceive all aspects relevant to the existing situation and determine the development of the city, a complex systematic analytical approach was elaborated with a development of a spatial plan of the city and its territory. During this period Shtip is in intensive urbanization.

Figure 4. Basic Urban Plan - Amendments from 1984. Graphic appendix of the housing facilities
Source: Municipality of Shtip

The legislative framework for adopting the plan is defined by the 1978 Law on Spatial and Urban Planning, which Siljanoska classifies in the third period of legislation or "the period of enlarging the control instruments important for shaping the city space", while Korobar includes it in a “period of organization of the urban activity within the whole system of social planning" [18] [14].

Following the demographic trends, the spatial plan stipulates an increase of the population in the municipality of Shtip (encompassing the two present-day municipalities of Shtip and Karbinci), with a projection that in 2000 it will have 60.000 inhabitants, of which 50.000 (80%) will be in the city itself.

This plan was developed at a time when "the socio-political and economic system is characterized by unidentified ownership of the means of production and of the more significant material goods, as well as the contractual economy." [11] [13]

The spatial plan treats the city of Shtip as one of the poles of development in the Republic of Macedonia, which should carry the role of a development generator in the East Planning Region. With regard to the degree of urbanization, the high rate of 73.6% in 1978, the plan predicts that it will grow to 80% by the end of the planning period in 2000 (well above the national average of 70%). The programming concept for an optimal settlement system is based on the following principles:

- Decentralized type of urbanization in conditions of higher quality of urban standard;
- Stimulating functional differentiation of settlements, avoiding duplication of capacity;
- Planned aiming of population growth with spatial and economic development plans, environmental factors, specific role in the settlement system, etc.;

All this results in the planning of the municipality development based on a polycentric settlement system, which includes:

- An urban center with 80% of the population living there, as a carrier of social development;
- Semi-urban center - local center, nuclei as the main carriers of urban and spatial development, functionally equipped with elements of urban standard and capacities of secondary and tertiary sector, in order to reduce population pressure on the city;
- Rural centers, village community centers, with lower-level equipment, planned as future development centers and functional gravity poles in the immediate surroundings;
- Other rural settlements, for which a total depopulation is stipulated by the end of the planning period, i.e., 6% of the total population will live there.

Methodologically, the approach builds on the theory of a development centre in the regional planning. "These centres have three functions: a service centre function, an innovation centre function and a centre for encouraging development, a function of a social integration point." [21]

The plan places particular emphasis on industrialization, which it plans to develop within the two existing zones (the first extending between the city and the existing train station to the Tri Chesmi settlement, and the second along the road to Radovish, adjacent to the city). The existence of the railway with the existing passenger and freight train station in the city is of importance. The planning solution separates the two stations: freight and passenger, i.e., a new location for the passenger station is determined. The freight station provides direct connection to the industrial facilities in the “Sever” zone [11] [12] [13].

The BUP was developed as a typical zoning plan with great inflexibility when it comes to the appearance of functions and uses other than the basic zone, which in

implementation has proved to be a negative feature and has produced unintended development events.
The urban area of the plan covers an area of 2180 ha. The amendments to the Basic Urban Plan bring about development directions based on analyzes from the spatial plan. The basic goals of the Plan are: optimization of the size, structure and functions of the city organism; appropriate spatial dispersion of the housing, working and recreational areas, with maximum preservation of the quality of life and rational use of space; determining the optimal housing standard; planning optimal solutions for infra and supra structures; creation of a system of green park areas and protection and improvement of the environment. The analyzes show that unjustified planning expansion of the city boundaries has been made, as can be seen from the following data. A residential area of 430 ha is planned for residential use, with housing contents of approximately 100 ha or together with future housing space after 2000 - 664 ha (including contents of general standard, local centers ...), 70.3% of which was completed at the end of the planning period. The working zone is planned on an area of 330 ha (about 50% is realized). An area of about 510 ha is planned for parks, greenery, sports and recreation (about 44% is realized). The biggest difference between the planned and implemented situation is for central functions-facilities of social importance, i.e., of 75 ha planned, only 30 ha are realized. The city is undergoing a process of emphasized de-agrarization. The prediction of the plan for suburban settlements to be transformed into development centers with an increasing number of inhabitants, with a tendency to merge with the urban settlement, did not come true (Tri Chesmi, Chardaklija and Karaorman). The planned population density is 129 inhabitants / ha. [10] [11] [13]

General Urban Plan – Amendments from 1999

The General Urban Plan – Amendments from 1999 was drawn up as a revision of the planning solution from the Basic Urban Plan from 1984. The plan is a development document with indirect application through detailed urban plans, adopted in accordance with the 1996 Law on Spatial Planning and Urban Planning. The following are the basic continuing goals that apply for the period covered by this plan:

- Optimization of the size, structure and functions of the city organism, depending on the system of settlements in the municipality, the real city opportunities and respect for all the advantages of a regional development pole and a significant center in the urban system of the country;
- Appropriate spatial dispersion of the economic and non-economic capacities, while respecting the principle of coordinated compositional design of housing, working and recreational spaces, with the greatest possible preservation of living conditions as an important prerequisite for rational use of urban space;
- Optimal protection of the historical, cultural-historical and architectural heritage, but also their inclusion in modern life, respecting their values and eliminating the opportunities for them to become an obstacle to the harmonious development of the city;
- Protection against natural, technical, military and other disasters;
- Rational land use;
- Coordinating the interests of landowners and land users with guidelines for resolving potential conflict situations.

The plan covers an urban area of 2.039 ha, with a planning period of 10 years, i.e., a development projection by 2010. This plan, compared to the previous one, takes up less

space by 141 ha. The difference is due to the elimination of the heavy industry area covered by the "Jug" industrial zone and the protective greenery, and an increase in the area is predicted in the residential settlement of Sveta Nedela in the east (cluster of illegal construction of about 30 ha). The planned number of inhabitants by the end of the planning period in 2010 is 50.546, and in the rural settlements it is 5.000.

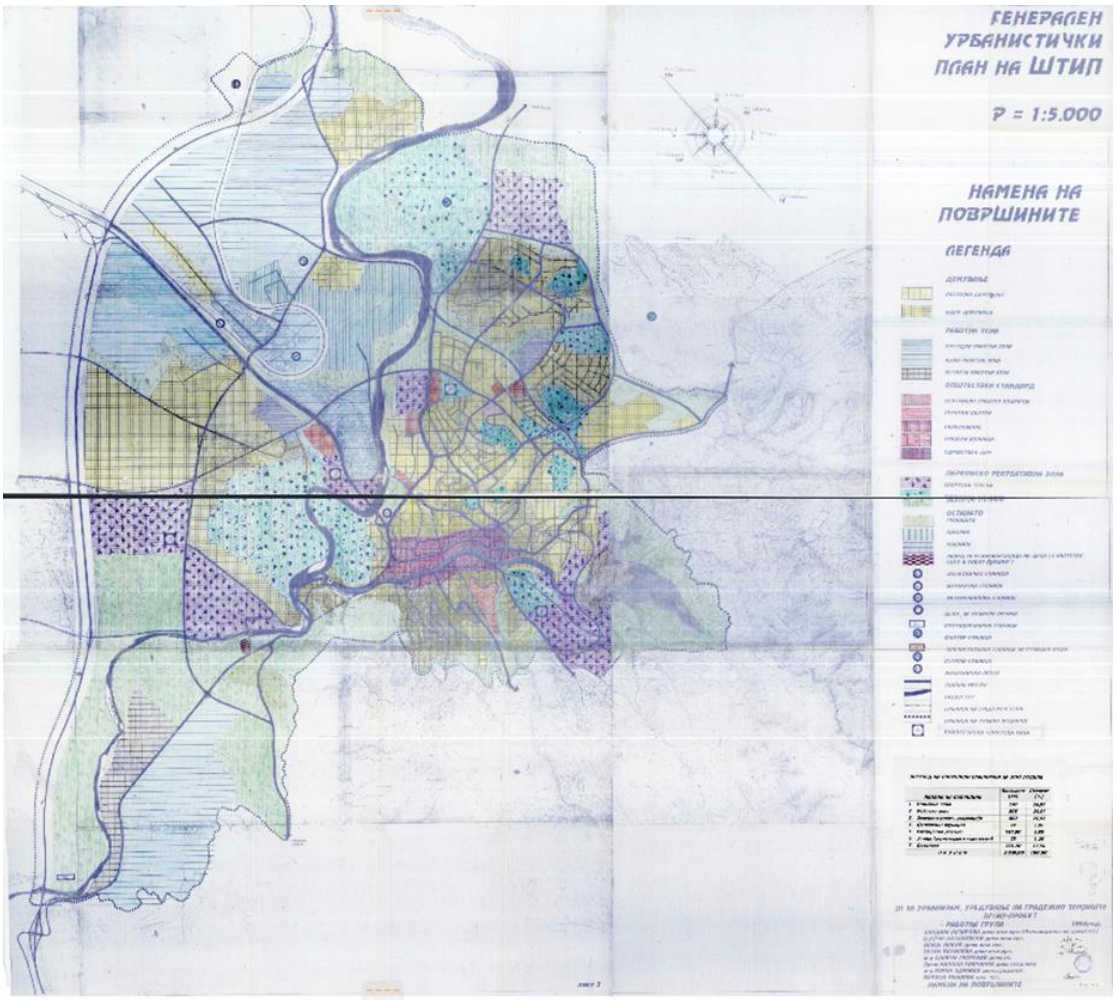

Figure 5: General Urban Plan – Amendments from 1999.
Graphic appendix – functions of areas. Source: Municipality of Shtip

The observations of the housing needs of Shtip in 2000 stipulated by the 1984 BUP were partially overcome in 1991 in terms of useful living space per capita and number of housing units. The plan achieves an average population density of 92 inhabitants / ha in 2010.

In terms of the construction system, the open system is predominant, as a way of urbanization in the second half of the twentieth century, and in the central parts a small scope closed system is also present. The basic organization of the housing zone is based on a planning-territorial unit called a residential or local community with 2.500-5.000 inhabitants covering an area of 15-30 ha which includes complementary housing contents. In the concept of spatial organization of the city there are three levels of centers

- Local community center (predicted in every local community)
- Regional center (predicted in three of the five districts) and

- City center (confirming the existing city center to perform functions of a higher and better quality level, complemented by functions of a regional nature).

The urban area organization differentiates three basic functional zones. Their location in terms of field conditionality is considered favorable, while their relation is not quite in line with the theoretical principles of the plan. The residential and working zones have a favorable mutual relation, with secured traffic links, with the Bregalnica riverbed between them, which is considered an advantage. The recreational zone is divided into sections which are stipulated to be in the periphery of the urban area i.e., the periphery of the residential zone, due to the impossibility of the environment and biological infrastructure to be infiltrated in the urban tissue more effectively.

Analyzes made for the planning purposes predict that the area of 508 ha planned for the working zone will not be feasible (not even 10% more of the existing state), but the justification for that is taken from the planning aspect, in order to purposefully occupy the space so as to prevent illegal construction. It should be noted that the plan defines a wider urban area, which reserves space for future development and a construction area smaller than the urban area.

Among the values created in the city that appear to be factors limiting the spatial development are clusters of illegal residential buildings in the industrial zones “Zapad" to the left and "Sever" to the right of the Shtip-Skopje route. Of these, the zone on the left of the road has the potential to integrate into the planning solution covering an area of about 40 ha, while the cluster in the industrial zone “Sever” cannot be integrated with residential function.

A qualitative factor of spatial development is the great area the city has already occupied. The existing monocentric model of the city limits the possibilities for expansion of the city centre, restricting its capacities and possibilities for it to develop along with the growing needs of the city. Expanding the urban web is predicted to the north and east. In order to overcome this situation, a decentralization of public functions is stipulated in the definition of the balanced development of the city, through the introduction of a system of centers. In addition to the city center, which is at the highest level, it is planned to develop larger local centers and to complete additional contents in the urban areas.

In the urban image the lack of green park areas is clearly expressed, as well as their inadequate distribution and the lack of connection within an organized system in the structure of the city. The current situation gives an average of 3 m2 per capita, which is a very low average given the planned norm of 25 m2 per capita. The plan stipulates an increase of green park areas with new sports and recreational belts along the rivers and their connection by line greenery with park-forest belts in an organized system, with planned areas of 500 ha (the inventory of 1997 established 226,1 ha) [13].

3.7. Draft General Urban Plan 2014-2024

The Draft General Urban Plan of the City of Shtip has been launched in 2014 and is still in the process of being adopted, i.e. it has no legal force (with planning period 2014-2024).

The manner of land use within the planning scope is conditioned by the created values and factors that synthesize the situation. Here we are primarily concerned with factors of demographic, economic, traffic, legislative-administrative, health-social and other aspects. With the good traffic connection, location, demographic growth and development, good position of the housing, working and recreational zones for the population, there is a need to develop new urban plans according to the current legislation

that determine the manner of land use within the planning area scope. Within the system of settlements in the region, the city of Shtip is planned to be a primary urban center, together with Kochani and Strumica. The capital interest of the city of Shtip is to develop the whole system of settlements in the region, to reduce the migration flows and the population growth not to go faster than the possibilities to meet the needs of the people. On the other hand, the distribution of economic capacities in the city is designed to be in a radius favorable for daily labor migration, thus achieving a favorable relationship between working and living space with an adequate traffic and communications system to efficiently manage spatial distances with a fundamental goal - integrating into a single functional and spatial city system and its narrower and wider surroundings.

In the process of drawing-up the Draft GUP Shtip 2014-2024 the most important goals in the preparation of the plan are:

- the formation of the identity of the City as a whole and of individual parts,
- efficient organization of the elements in the space, so as to serve the needs of the citizens,
- efficient traffic organization,
- environmental protection,
- activation of the parts of the city which have not been encompassed by the previous GUP of the city of Shtip from 1999,
- raising the quality of urban infrastructure, especially in the under-urbanized areas.

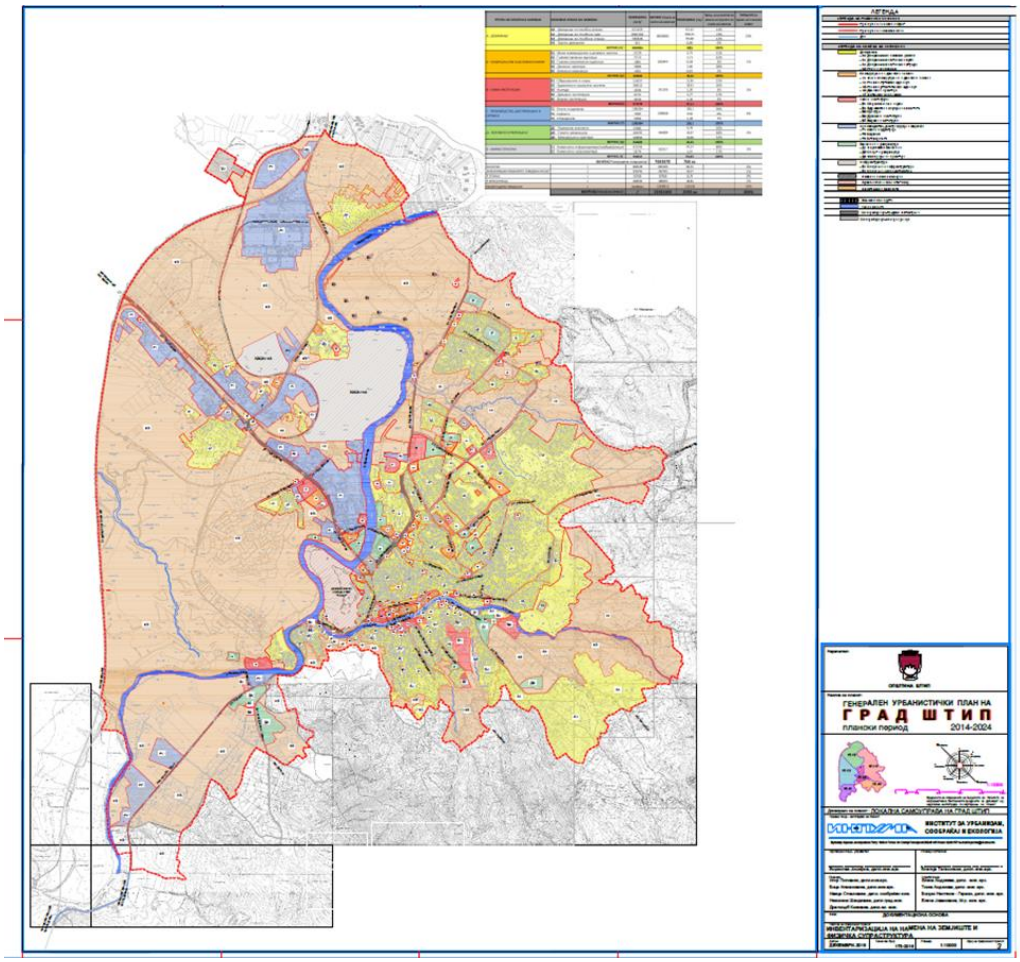

Figure 6. Draft General Urban Plan. Graphic appendix - inventory of construction land – existing condition in 2014. Source: Municipality of Shtip

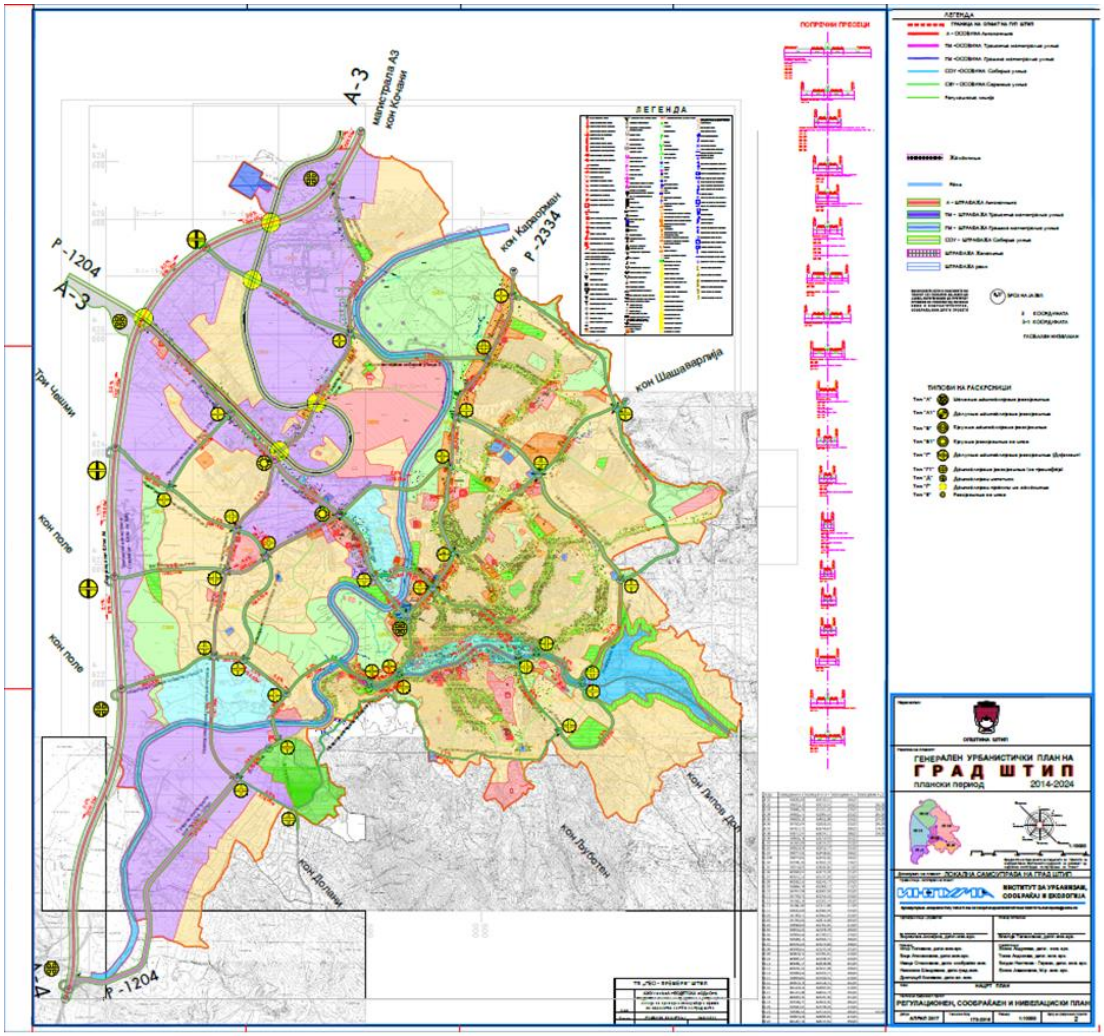

Figure 7. Draft General Urban Plan. Graphic appendix - synthesis plan. Source: Municipality of Shtip

The plan covers an urban area of 2292.13 ha, with a planning period of 10 years, i.e. a development projection to 2024. For the needs of the plan, a demographic analysis was made, which estimated the total number of inhabitants at the end of this planning period to be 58.427. This was taken as a starting point for the calculations (including students from the Goce Delchev University in Shtip).

The basic territorial division is performed according to the defined primary street network of districts, quarters and blocks. The city is divided into five districts (east, west, north, south and center), and each district is divided into an appropriate number of quarters. Within the quarters, smaller spatial units, i.e. blocks, are formed, which are also units for preparation of Detailed Urban Plans.

Land use designation in the General Urban Plan is done with the purpose class system according to Articles 24-33 of the Rulebook on Urban Planning Standards and Norms ("Official Gazette of the Republic of Macedonia", No. 142/15, 217/15, 222 / 15, 228/15, 35/16, 99/16 and 134/16). [17]

With regard to the represented specific zones in this draft plan, the balance is as follows: housing 926 ha, with planned density of 158.55 inhabitants / ha, commercial and business purposes 47.55 ha, public institutions 110.38 ha, production, distribution, services 523.55 ha, greenery, sports and recreation 324.29 ha. [10].

DISCUSSION-ANALYSIS OF THE URBAN EXPANSION

The development line of the territorial expansion of Shtip reflects the aggregate response of several variables. In the wide range of factors of influence, the dominant position is taken by the socio-political environment with a pronounced dynamics of change, the role of the city in the administrative-economic-functional context and its significance at the level of a certain territory, the legislative framework, the planning approach, the existing structure as a construction fund and conditions for implementation of the planning solutions.

Analysis of the fluctuation of the population number

Considering the demographic analyses in the planning period of the city, the part referring to the fluctuations of the number of the population, we come to the conclusion that when it comes to this issue, the city is going through several periods with different dynamics.
The first period is from the beginning of the twentieth century until 1948, when the number of the population showed a constant decline, so that in the course of fifty years the number of inhabitants decreased twice the amount. Of course, this decline is the result of the two world wars.
In the period after 1948 the number of population began to increase, so from 11361 in the 1948 census it reached 20269 inhabitants in 1961, i.e.it increased by 46%. This trend of constant growth continued until 1981 (33%), and then the population growth was less intensive (18%). As of the last census, growth has been reduced to a minimum average of 1.9%. It is concluded that in the period from the second half of the fifties to the eighties of the last century the dynamics of growth is the highest, and the number of population in the planned period of 1913-2002 has an almost threefold increase. [1] [6] [9] [10] [11] [13] [15] [16] [25].

Table 1. Population dynamics in the city of Shtip in the censuses from 1899 to 2002

year	1899	1913	1948	1953	1961	1971	1981	1991	2002
number of population	20.900	15.314	11.361	13.845	20.269	27.224	36.230	42.826	43.652
%		26↓	26↓	22↑	46↑	34↑	33↑	18↑	1,9↑

Sources of data: SSO Population censuses in the Republic of Macedonia (1948, 1953, 1961, 1971, 1981,1991, 1994 and 2002) [1] [6] [9] [10][11][13] [15] [16] [25]

The data above show that the BUP's prediction for the planned number of population by the end of the planning period was not realized (the BUP predicted a population of 50.000 for 2000, but according to the 2002 census, there were 43.652 inhabitants). With the GUP projections, it was predicted that in 2010 the population would be 50.546 (the data seems to be unrealistic as it is not based on recent census data). These comparative analyzes indicate that the prediction for the increase in the number of inhabitants was not realized as a result of the calm tendency of the large population growth rate in the period 1961-1981, reflecting a great mechanical influx and a high increase in a part of the population. [2][4][5][6][7]

Analysis of the territorial expansion of the city

The relationships that the city organism as a conglomerate has with its environment are complex. The developed city is an incentive for its own development, but also for the development of its surroundings and vice versa. Of particular interest is the gravitational area on which the influence of the social, economic, and other functions that are carried out in the city is felt. The size of the gravitational area directly depends on the

concentration of economic and non-economic facilities and activities in the city. Because of this, Shtip with its gravitational field covers the territory of the East Planning Region and with the excellent traffic connectivity and proximity of Skopje, builds on the created axis of influence, and its position is a prerequisite for synchronized and complementary development of the city. The favorable geographical location, the centrality in east Macedonia and excellent links with Skopje, Veles, Kochani, Radovish, enabled it to develop into a higher-rank centre, as a gravitational zone in a larger area of the territory of the east part of the Republic of Macedonia.
The analysis of the territorial expansion of the city is made with the help of a method of comparing the surfaces of urban areas of the urban plans. The obtained measurements are plan-by-plan and integrally discussed [4][10][11][13].

Table 2. Preview of surfaces of urban areas of urban plans.

Урбанистички план	Detailed Plan, 1927	State of cadastral surveys from 1958	Basic Urban Plan – Amendments, 1984	general Urban Plan – Amendments, 1999	Draft General Urban Plan, 2014
surface area (ha)	97	630	2.180	2.039	2.292,13
surface increase (ha)		533 (549,5%)	1550 (246%)	-141 (-6,4%)	253,13 (12,4%)

Source: author

Detailed Plan, 1927

The area of the 1927 Detailed Plan is 97 ha and it is a reflection of the existing situation of the urban web [4].

General Urban Plan, 1963

There are not graphic appendices from the 1963 General Urban Plan in the archives of the municipality of Shtip. For the purpose of this research, the information on the boundaries provided for by this plan has been taken from the cadastral surveys of 1958 and it is approximate. Drawing these approximate boundaries gives an area of 630 ha, thus reflecting the existing construction fund. This situation represents a rapid increase from the situation in 1927 by 549.5%, which is a result of the great increase of the industry in the city [11] [13].

Basic Urban Plan – Amendments, 1984

The amendments of the Basic Urban Plan from 1984 follow the planning concept of the previous plan from 1963 and they make a revision of the planning solution with respect to the current situation and configuration of the terrain. Regarding the planning area, it stipulates an increase of the boundaries of the BUP by 1550 ha. Compared with the planning area from the previous plan, the impact of the population growth rate in this period and the great migration pressure are evident. Because of this, the planner made the development projections for an area which is 246% larger than the area of the current plan in that period. The boundaries from the plan include zones of illegal housing, with the plan stipulating an expansion to the north and east of the city [11].

General Urban Plan – Amendments, 1999

The planning area of the General Urban Plan from 1999 follows the situation of the previous plan and makes minor changes regarding the territorial position of the

boundaries of the city. The subject of analysis in the process of drafting the plan is the situation of irrational land use, with small population density, and unjustifiability of the utilized land. Because of this, the plan revises the boundaries of the BUP and stipulates a reduction in the area by 6.4%, with the aim of adapting the current situation [13].

Draft General Urban Plan, 2014-2024

The planning area of the new General Urban Plan is in draft phase and the procedure for its adoption has not yet been completed. The area stipulated by this plan is 253.13 ha, an increase of 12.4% compared to the current plan.

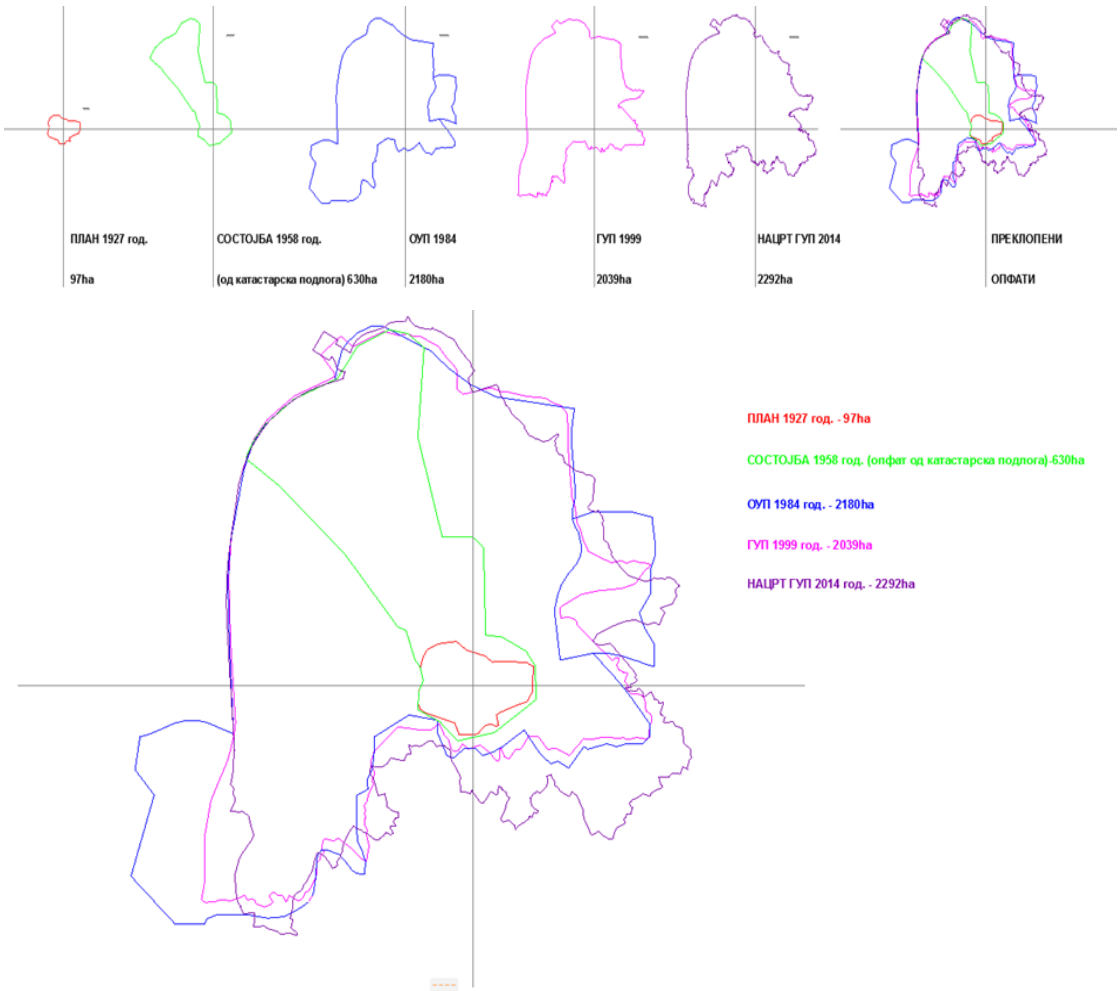

Figure 8. Overlap of planning areas of adopted plans. Source: author [4][10][11][13]

The following graphic display represents an overlap of the planning areas of all urban plans, for a clearer understanding of the boundaries of the spatial expansion of the city [10].

CONCLUSION

Having in mind all elaborations, it can be perceived that the development line of the city of Shtip, as a result of the planned treatment, begins in 1927, when a city that follows a European model is planned on the current surface of about 97 ha. The development continues along with the next plan in 1963, which stipulates an urban area of about 630

ha (state established from the cadastral records from 1958 obtained from the municipality of Shtip). During this period, there was a large increase of city boundaries, or about 6.5 times the boundaries of the previous plan. The tendency of the large expansion of the urban area of the city is also strongly emphasized in the 1984 plan, entitled Basic Urban Plan of the city of Shtip which stipulates an urban area of 2.180 ha, which represents a 246% increase in the city's boundaries from the previous plan. This growth line of the planning areas reaches its culmination with this plan, and in the next it demonstrates a different trend. With the 1999 General Urban Plan-Amendments (which is still valid), the city boundaries are slightly modified to fit the current situation, and for the first time are decreased by 6.4% compared to the previous plan. The last plan that is subject to analysis is the Draft General Urban Plan, which is still being drafted and adopted, covering an urban area of 2.292,13 ha. This means that with the planning development of the city of Shtip, during a time span of almost 90 years, starting from a present situation of 97 ha in 1927, it has reached a situation of 2.292,13 ha planned urban area. The city's area during this period of analysis stipulates a planning increase of the city’s boundaries by more than 23 times.

These figures, presenting the high rate of growth in the boundaries of Shtip (covering its territorial expansion) raise an inevitable question about the politics of sustainable development, rational use of the land and, of course, protection of the agricultural land and forests. This is especially true if we take the current situation with the inventory in 2014 into consideration for the documentation requirements for the development of the new GUP. The inventory shows that the area of developed land within the planned city area of 2.292,13 ha is only 728 ha, i.e. 1.359,3 ha (59%) represent undeveloped land.

The elapsed time, in which the transition process has been going on, has brought about major economic changes which generate structural changes in the city's development plans. The dynamics of this process has implications for the creation of new spatial relationships and conditions the need for planned articulation of the city space. The alteration of spatial constellations necessarily requires the evaluation of the urbanization process, the territorial and morphological development of the city, the re-examination of urban processes, the spatial consolidation and the establishment of a consistent urban model.

Due to the complex structure involving different segments and their interrelations, there is a need of all-inclusive analysis. In this way, we can obtain an integral representation of the occurrence and its meaning in general. The research has to provide the mutual relations, the conflict points and the negative effects of the urban expansion of the city web, at the expense of the elements for sustainable development and rational land use, protection of agricultural land and forests. When determining the proper program-spatial matrix as a tool for spatial planning, apart from all aspects of the existing situation, the inventory, the relations in the urban web, the relations between the urban and rural sections, the needs, the spheres of interest, the possibilities for alternative and multipurpose use, as well as the conflict points in using the land, the developing line should be based on the strategic theses of the European Union for spatial planning. They are mainly oriented towards polycentric and balanced spatial development, integration of the urban and rural environments, territorial integration in the international functional regions, providing competition in regions based on strong local economies, improving communication infrastructure between the population, the community and the economy. This can be done if all aspects of protecting and enhancing the environment and the cultural goods are taken into account [1][4][10][11][12][13] [19][20].

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INTEGRATION OF SATELLITE, GIS, AND GAMMA-SPECTROMETRIC ANALYSIS DATA TO STUDY THE DISTRIBUTION OF MOBILE PHOSPHORUS IN GRAY FOREST SOILS

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ABSTRACT

Estimation of P2O5 (mobile phosphorus) distribution in the arable soil layer is significant when planning effective application of phosphorous fertilizers. Additionally, it is necessary to understand soil erosion impact onto the P2O5 variability in soil material. We conduct our study in the experimental area located in the basin of Sukhaya Orlitsa River (European part of Russia, Orel region, Orel district). The territory belongs to the periglacial zone of the Russian plain, where the paleocryogenic landforms are presented (block elevations, inter-block depressions of watershed surfaces, ravine complexes on the slopes). The paleocryogenic microrelief is clearly visible on very high resolution satellite imagery. Chernobyl origin caesium-137 acts as a marker of washed gray forest soils, and makes it possible to estimate a soil washout degree. The study is aimed onto design of GIS-based methodology for estimation of washout and redistribution of the soil material and its components.

The use of 0.5-1 m/pix satellite imagery, GIS-based representation and analysis (GIS is a Geographic Information System), gamma-spectrometric and agrochemical analyses allowed us to draw the following conclusions. In poorly washed soils in block elevations and watersheds of micro-ravines a caesium-137 reserve in under-plowing soil layer (layer under 24-25 cm) does not exceed 4-10%. Mobile phosphorus content in the arable soil layer in these areas is low (less than 8 mg/100g). It can be explained by the repeated plowing and moving of soil on the blocks and watersheds of micro-ravines, reduced soil moisture, and low content of organic material in the soil (humus content is less than 4%). Additionally, we made a number of experiments confirmed that the content of mobile phosphorus in the arable soil layer of micro-ravine thalwegs is higher than in watersheds (for washed and washed/washed-in soils). Our hypothesis assumes that in wet plowing furrows and micro-ravines the remains of agricultural plants are buried and decomposed (humus content here is more than 4%). Consequently, the phosphoric acid compounds are accumulated in the arable horizon of thalwegs, and P2O5 content here reaches 15-21 mg/100 g.

Keywords: Soil Runoff, Surface Erosion, Radiocesium Method, Arable Horizon, Soil Sampling

INTRODUCTION

Effective use of phosphorus fertilizers assumes an understanding of the soil erosion impact onto the variability of P2O5 (mobile phosphorus) content in the soil material of arable layer. Additionally, understanding of a picture of its spatial distribution is

necessary when formalizing recommendations on the of phosphorus fertilizers application in specific area. It is known that within area of grey forest soils large volume of fertilizers (in the cases of their systematic application) lead to the phosphorus reserve exceeding of 15 mg per 100 g of the soil material. However, in the conditions of eroded soils phosphorus reserve decreases.

It is known also that Chernobyl origin caesium-137 can be applied as a marker of soil washout degree. Washed soils are characterized by reduced value of specific radioactivity of caesium-137. This effect is produced because of the erosion and decrease of the upper (arable) soil layer, while plowing brings up the material of the lower soil layer that is not contaminated with caesium. As a result, the radioactivity of the integral soil sample is lower in comparison to the unwashed soils. So, the caesium-137 marks the arable soil layer due to its non-exchangeable absorption by the soil material and (in fact) absence of its vertical migration through the soil layer (while mobile phosphorus is redistributed along the soil profile).

Mapping of the lateral distribution of caesium-137 and mobile phosphorus and estimation of the dependencies between distribution of mobile phosphorus and radioactivity of caesium-137 have to make possible an assumption on erosion processes influence onto the phosphorus state of grey forest soil.

DATA AND METHODS

The work is based upon the data of experimental studies conducted in 2016-2019 on the agricultural area located in the Oryol district of the Oryol region, in the basin of the Sukhaya Orlitsa River (52°59' N, 35°57' E). The area is located in periglacial zone of the Russian Plain, where the paleocryogenic landforms are presented widely (block elevations and inter-block depressions on the watershed surfaces, ravines on the slopes) [8].

We attracted very high resolution satellite imagery (available publically on the Google Earth - https://www.google.com/earth/) to detect and verify detection of such paleocryogenic landforms, as on open arable areas these landforms can be detected visually basing on differences in soil moisture and consequent differences in its color in the satellite image. Satellite imagery were used in combination with topography survey data analysis to detect the landforms.

Chernobyl origin caesium-137 was used as a marker of washout degree of gray forest soil. Data of agrochemical and gamma-spectrometric analysis of soil samples collected in the area allowed us to gain some insights about the possibilities and limitations that appear when applying caesium-137 to estimate content of mobile phosphorus in the arable soil layer. Soil sampling was conducted using layer-by-layer and integral techniques in a 0-25 cm layer. Data were combined and mapped in the ArcGIS for desktop software (https://www.esri.com/en-us/arcgis/products/arcgis-desktop/overview).

RESULTS AND DISCUSSION

Figure 1 shows locations of soil sampling points mapped onto a fragment of a satellite image. The area is covered by arable field and located on the slope of the southern exposure. Content of mobile phosphorus in the arable layer (0-25 cm) was estimated basing on the agrochemical analysis of collected samples. It can be seen that several zones can be allocated in the area basing on surface vertical curvature [2] and values of mobile phosphorus content. Zone #2 is located on the watershed surface. It is characterized by

low values of P2O5 in the arable layer (6.2-7.2 mg per 100 g of soil material). These soils can be recognized as plowed-eroded medium-cultivated. The flat watershed surface is easier for plowing and can be plowed deeper, consequently the humus is mineralized [3]. The humus content in this soil material is less than 4%. The low content of mobile forms of the phosphorus in the soil material of watershed surface by can be explained both by their removal through the crop harvesting and by soil erosion processes.

Zone #4 is located down the slope. P2O5 volume increases here and reaches 20.6 mg per 100 g of soil material. The slope is corrupted by erosion furrows. It is not recommended to apply phosphorus fertilizers in this part of the slope. Increase of soil fertility in this erosive zone can be explained by that the nutrients are brought here with washed-in soil from the above-located areas.

There is a slight decrease in P2O5 content in the zone #5, but it remains 1.5-2 times higher than on the watershed surface. For this zone, the inverse interdependence of mobile phosphorus and caesium-137 radioactivity is detected (Fig. 2). This dependence can be explained as follows. In the washed soils of the ravines, content of caesium-137 decreases, and P2O5 remains high due to introduction of washed in soil material alongside with phosphoric acid compounds from the upper slopes.

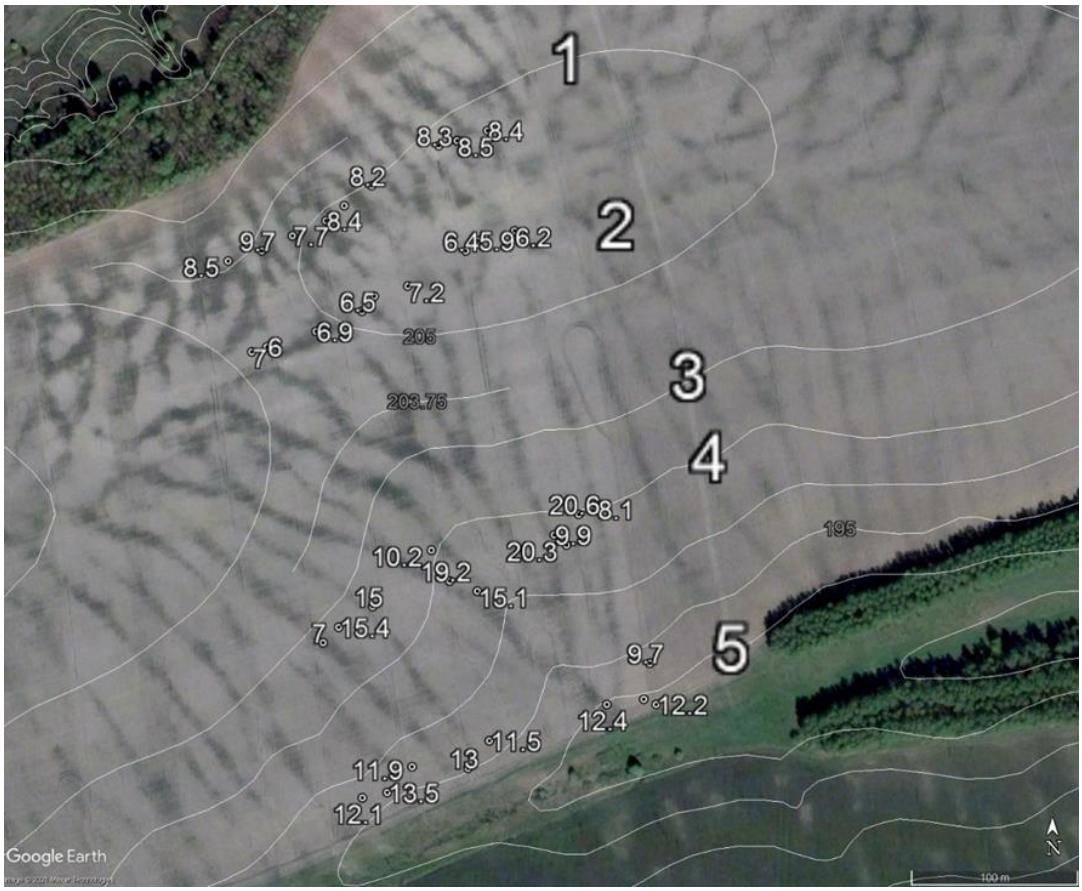

Figure 1. Zones (1-5) of the southern exposure slope, allocated accordingly to the mobile phosphorus content in the soil material (phosphorus content in mg per 100 g of soil material is marked by labeled marks of soil sampling points)

Zones #1 and #2 located on the watershed surface are interesting to be estimated for the common behavior of caesium-137, humus, and mobile phosphorus. Soil samples were collected here using layer-by-layer collection technique (per 2 cm) in 2017. Figure 3

shows that the sampling points were located in block elevations, in inter-block depressions, and in thalweg of the plowing furrow.

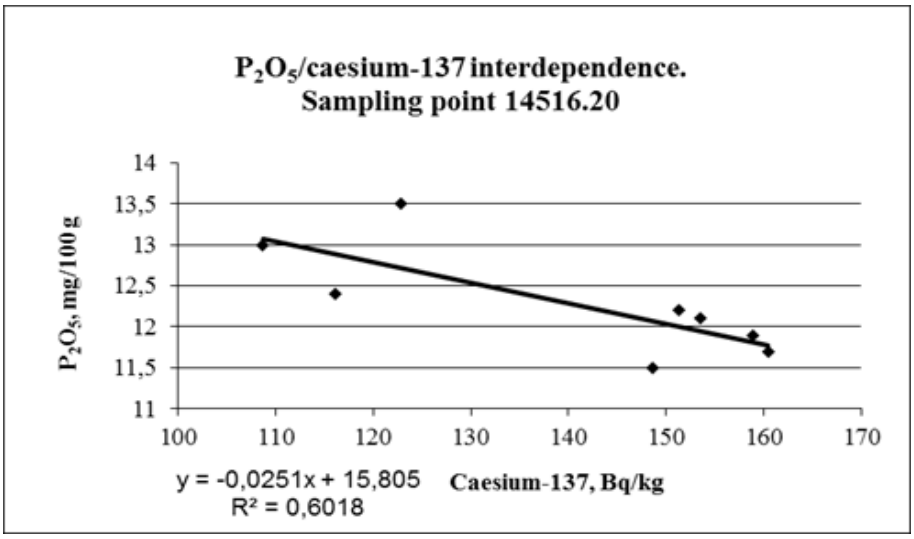

Figure 2. Interdependence of mobile phosphorus and caesium-137 radioactivity in zone #5 (accordingly to the Figure 1)

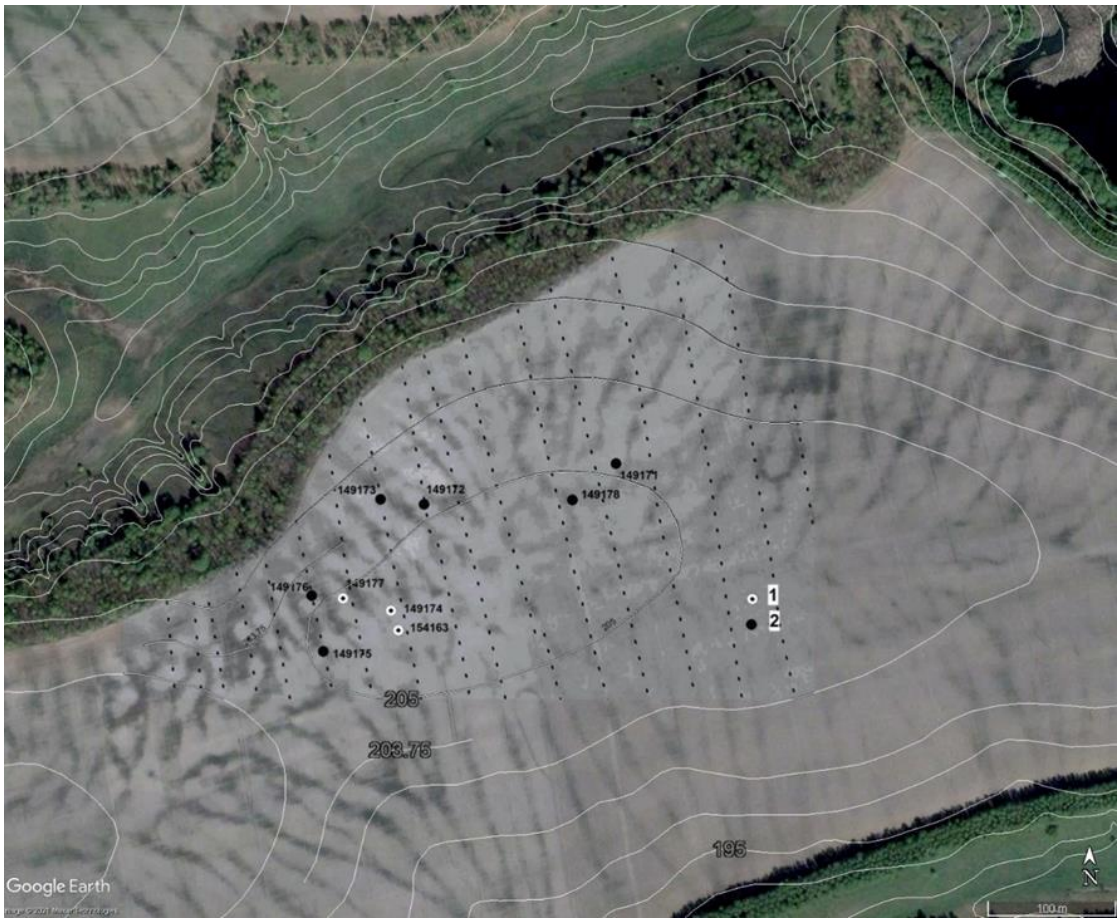

Figure 3. Soil sampling points (1 – samples to determine reference value of caesium-137 radioactivity, 2 – other sampling points); dotted lines represent locations of the plowing furrows in 2014; point 149171 is located in plowing furrow of 2003 (it is detected as a barely discernible light strip in the satellite image)

The very high resolution satellite image (Fig. 3) shows that the heterogeneity of the watershed surface is caused by paleocryogenic origin block elevations and inter-block depressions [1, 5-7]. Impact of paleocryogenic origin microrelief onto the erosion processes we considered in previous publications [6]. We showed that increased values of the caesium-137 specific radioactivity are confined to the unwashed or weakly washed soils of block elevations or to the micro-watersheds located between ravines on the slope. The humus volume in these areas is reduced due to the nutrients removal with the crop phytomass and the mineralization of humus. In conditions of deep plowing, the seeds are shown to a greater depth, and the yield is increased. All these lead to humus reserve decrease in arable layer.

Soil sampling was made layer-by-layer in the watershed area (Fig. 3) in order to detect differences between mobile phosphorus distribution on the depth of the arable soil layer of unwashed soils in block elevations, and of the washed/washed-in soils in inter-block depressions. Sampling points (numbered as 149171, 149172, 149173, 149174, 149175, 149176, 149177, 149178) were located both in the block elevations (light areas in satellite image) and in the inter-block depressions (dark areas), 400 samples were analyzed in whole. Each sample was subjected to gamma-spectrometric and agrochemical analyses (caesium-137 radioactivity, humus volume, soil acidity, mobile phosphorus content were determined).

Diagrams of the caesium-137, humus, and mobile phosphorus on depth distribution (Fig. 4-6) were plotted. These diagrams helped to detect a number of features of the caesium-137, humus, and mobile phosphorus distribution.

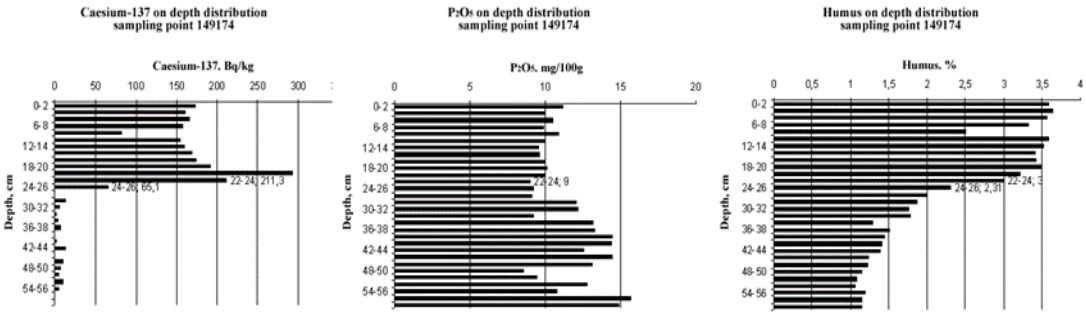

Figure 4. On depth distribution of caesium-137, P2O5, and humus at the sampling point 149174 (block elevation, unwashed soil)

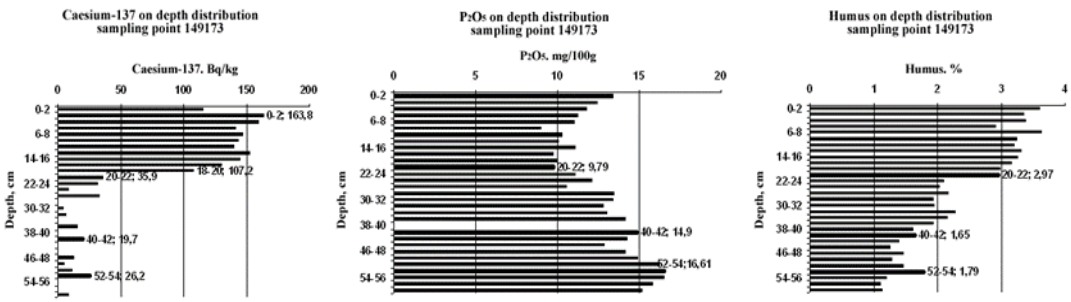

Figure 5. On depth distribution of caesium-137, P2O5, and humus at the sampling point 149173 (thalweg of the plowing furrow in the block elevation, slightly washed soil)

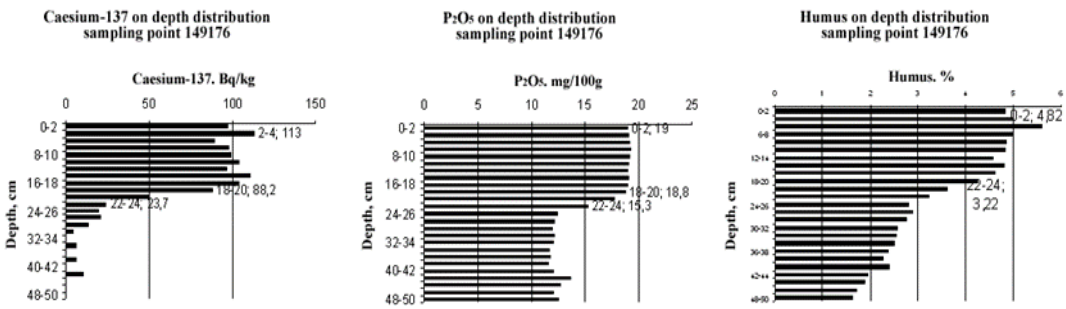

Figure 6. On depth distribution of caesium-137, P2O5, and humus at the sampling point 149176 (thalweg of the plowing furrow in the inter-block depression, medium-washed / washed-in)

Figure 4 shows low humus content (2.5-3.6 %) at the sampling point 149174 (block elevation), due to that the soil here is plowed-out. Humus, is carried out by plants and mineralized during agriculture use of the field (humus content in the arable soil layer is 3.5-3.6 %). The pH varies between 4.7-4.8 (the soil is slightly acidic). The specific radioactivity of caesium-137 in the 0-24 cm soil layer is 173.2 Bq/kg (it indicates that the soil is unwashed). The plowing horizon is sharpen, located at the 24 cm on depth). Right above this horizon maximum value of caesium-137 radioactivity (291.9 Bq/kg) is presented, due to the accumulation of soil moisture contaminated by caesium on the compacted surface of the horizon. Such a distribution of caesium-137 on depth (that is characteristic in the watershed surface) we also noted in previous studies [7]. The caesium-137 reserve in the 0-24 cm soil layer is 457248 Bq/m2 (457.2 kBq/ m2). “Unrecorded” reserve in deeper soil layer (bellow 24 cm) is insignificant (a little more than 5%).

This sampling point can be used to establish the reference value of caesium-137. It is important to note that the point is located outside the plowing furrows. The caesium-137 and humus content decrease in the sub-plowing layer (starting from 25-26 cm), while mobile phosphorus increases to 12.03 mg/100 g starting from 28 cm on depth. Its values increase to 15 mg/100 g and more on depths deeper than 56 cm. Since the humus content on these depths is small (1-2.3 %), the increase of P2O5 can be explained by an increase of clay particles content in these layers. P2O5 (introduced with fertilizers) is released during denudation and interacts intensively with colloidal particles of clay minerals, its content increases under the arable soil layer. In the arable layer, decrease of mobile phosphorus content is explained by its release to the phytomass formation.

A small peak of P2O5 on 28-30 cm depth (12.03 mg/100 g) coincides with a small peak of caesium-137 content (12.6 Bq/kg) on the same depth. It can be assumed that the vole mice carried and buried food residues from the surface through underground passages, and these residues produced small peaks of both caesium-137 (collected on soil surface) and organic origin phosphorus.

The mobile phosphorus content in the under-plowing horizon on a block elevation not corrupted by plowing furrows is slightly higher than 15 mg/100 g (56-58 cm soil layer in Figure 4), while a different situation is observed at the sampling point in the thalweg of plowing furrow in the block elevation (sampling point 149173 in Figure 5). Low value of humus content in the plowing layer (2.6-3.7 %) also indicates position of a sampling point in a block elevation. The radioactivity of caesium-137 in the arable layer is 140.5 Bq/kg. The soil here is plowed-out and slightly washed. The arable soil layer is “shortened” by 2-3 cm (its thickness is 22 cm) accordingly to the humus-based estimations. The content of mobile phosphorus in the arable layer is 9.79-13.5 mg/100 g (higher than at the point

149174). On a depth, the P2O5 increases to 16.61 mg/100 g. This increase can be explained by the burying of crop residues in the plowing furrow.
The sampling point 149176 (Fig. 6) is located in a plowing furrow in inter-block depression. The soil here is a mid-washed/washed-in. Low specific radioactivity of caesium-137 in a 0-20 cm soil layer (99.9 Bq/kg) indicates the soil as washed. Plowing brings the soil material from the lower horizons not contaminated with caesium-137, and it cause a low specific radioactivity of caesium-137 in the arable layer. The washed-in soil is indicated by the19 mg/100 g and more P2O5 content in the soil layer above 24 cm. This is higher than in the block elevation at point 149173. A sharp P2O5 decrease is observed on a 26 cm depth. Apparently, the washed in soil material and the buried (in the plowing furrow) crop residues caused the enrichment of the arable soil layer with phosphoric acid compounds and humus (to a 22-24 cm depth). A humus content is higher here than at the block elevation (3.7-4.82 %, to a 22 cm depth). pH value is higher than 5 (the alkaline soil nature is due to the enrichment of the soil with crop residues).
An increase of the mobile phosphorus content in arable soil layer may be observed instead of a decrease in a washed soil material in thalwegs, where a decrease of caesium-137 specific radioactivity indicates an increase of soil washout degree (0-25 cm soil layer in Zone 5, Fig. 2). This interdependence coincides with the results obtained by Marusova [3]. It is also important to emphasize that Marusova concludes that the degree of soil erosion of cultivated gray soils can be estimated basin upon the content of mobile phosphorus in the arable soil horizon. Therefore, the caesium-137 can be considered as an appropriate marker of soil washout degree when studying the slope surface microrelief impact onto the soil nutrients loss (due to erosion). If the caesium-137 estimation can identify the loss of mobile phosphorus, it can recommended to be used in studies of the soil nutrient losses spatial distribution due to erosion.

CONCLUSIONS

The caesium-137 reserve does not exceed 4-10 % in the under-plowing soil layer (down to the bottom of Soviet-era arable layer – 30 cm [4]), in the areas of unwashed and slightly washed grey forest soils in block elevations of the watershed surface.
The mobile phosphorus and humus content in the 0-25 cm arable soil layer is reduced due to the plowing-out of the soil, in the areas of unwashed and poorly washed soils confined to block elevations and to micro-watersheds (where the caesium-137 content increased).
The caesium-137 content is reduced while mobile phosphorus and humus are increased due to the crop residues burying in the plowing furrow thalwegs in slightly washed soils of block elevations.
Increased humus and mobile phosphorus reserve are noted due to their introduction with washed in soil material and the influence of buried crop residues, in the washed soils of inter-block depressions intersected by plowing furrows where the caesium-137 content is low.
Two characteristic zones can be distinguished when zoning lateral distribution of mobile phosphorus along the slope. Humus and phosphorus values are low on the watershed surface (area of the block elevations not corrupted with plowing furrows) due to nutrients removal when harvesting and soil plowing-out, while the specific radioactivity of Chernobyl origin caesium-137 is high here.
Interdependence of the mobile phosphorus content and caesium-137 specific radioactivity (that indicates the degree of soil washout) is reversed at the slope base, where erosion furrows and plowing furrows corrupt the surface. It appears due to an increase of washed-

in soil material amounts removed from the watershed surface along the ravine thalwegs, while it enriched with mobile phosphorus associated with colloidal particles of clay minerals.

Chernobyl origin caesium-137 can be used as a marker of soil washout, when studying the impact of erosion processes onto the variability of mobile phosphorus and humus content in the soil material. However, detailed study is necessary to estimate interdependences of caesium-137 and agrochemical parameters of gray forest soils differentiated in washout degree.

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TOWARD METHODOLOGY OF PREDICTIVE MODELING OF THE GROWING SEASON DYNAMICS

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ABSTRACT

We applied the Normalized Difference Vegetation Index (NDVI) as an indicator reflecting dynamics of vegetation cover growing. NDVI time series were derived from the Terra/MODIS satellite imagery (MOD09A1 product was used, available from the open archive of the US Geological survey). Data for 2006-2016 were used. The ground test plate is located in the Karelia Republic, Russia (61°,7218 N, 34°,3689 E). Moving average method with three inflection points was applied to ensure a piecewise monotone smoothing of NDVI time series. We also applied meteorological data (surface air temperature, average daily precipitation, average snow cover height – collected at Petrozavodsk meteorological station in 2006-2016). Used meteorological data were derived from the website of the Russian Federal Service for Hydrometeorology and Environmental Monitoring – ROSHYDROMET (http://meteo.ru).
As a result, we designed a methodology for selection and processing (including initial compilation, smoothing and interpolation of time series) of remote sensing and meteorological observations to generate training data and control datasets demanded by artificial neural network. Obtained results demonstrate that neural network trained using meteorological data can predict NDVI values. Less than 15% relative error of the NDVI prediction was gained at our ground test plate.

Keywords: Remote Sensing, NDVI, Artificial Neural Networks, Predictive Modeling

INTRODUCTION

Application of artificial neural networks to reconstruction of the vegetation indices time series have became popular study direction in recent years. Usually, authors [2,7,9] discover the technique as an approach to alignment, smoothing and direct analysis of vegetation indices data obtained from remote sensing observations.
Our study [6,12] is directed onto investigation of artificial intelligence technologies application to estimate and predict dynamics of vegetation cover. Such predictions are demanded in agricultural planning [11]. General goals of current stage of the described research activities are to design and verify artificial neural network able to predict vegetation cover dynamics. We use remote sensing and meteorological data to train the neural network, as a number of studies [4,5], including our previous studies, shown a potential of complex analysis of meteorological and remote sensing data.

DATA AND TOOLS

At the current study stage, we derived NDVI time series from the Terra/MODIS satellite imagery (radiance data, MOD09A1 product [13]). Data for 2006-2016 were used, as it was the period covered with continuous below described meteorological data time series.

In our experiments, we operated with the NDVI data produced using standard well-known NDVI formula:

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

where, *NIR* – near infrared reflectance (841-876 nm wavelength), *RED* – red reflectance (620-670 nm wavelength) [10].
NDVI was calculated using ArcGIS for Desktop software. Python scripting was applied, scripts were run in built-in ArcPy interpreter. Time series NDVI (Fig. 1) were obtained in the ground test plot for 11 years from 2006 to 2016. The ground test plate is located in the Karelia Republic, Russia (61°,7218 N, 34°,3689 E).\

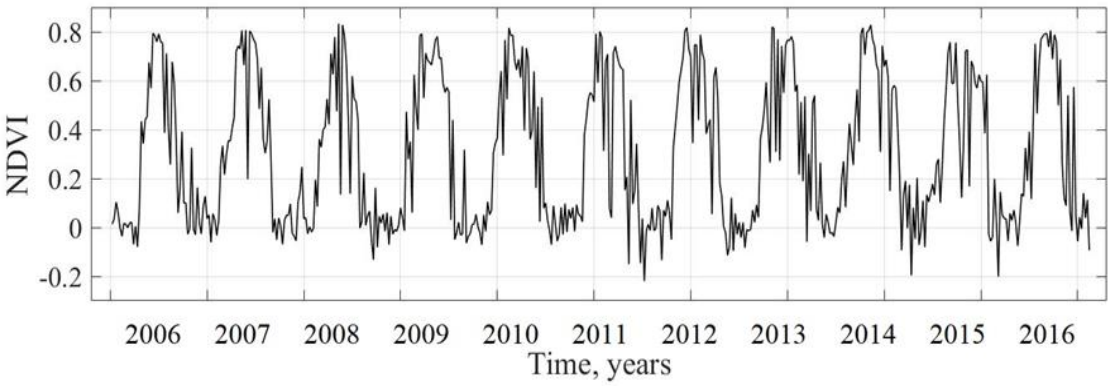

Figure 1. NDVI values at a measurement position in the ground test plot for 11 years

Geographic conditions and differences in illumination geometry and surface observation conditions cause noise in NDVI time series. As a result, preliminary processing of satellite data is required [1]. We propose to derive the NDVI time series from original reflectance data using a moving average method with three inflection points. This technique ensures piecewise monotonic smoothing of the NDVI time series. The moving average method involves replacement of each value in the time series with the averaged neighbouring values of the series separated by moving window of selected size. The selection of the window size was carried out empirically (Fig. 2). Minimal NDVI distortion was obtained with averaging by 7 neighbouring values (window size is 7). Smoothing was performed using the MATLAB software. The smoothed NDVI time series were interpolated to 1-day time resolution series using cubic spline function in MATLAB, while some other authors conclude that polynomial approximation is an appropriate technique when reconstructing remote sensing data [8].
In analysis, we applied also meteorological data collected at Petrozavodsk (ROSHYDROMET) meteorological station in 2006-2016. Daily average surface air temperature, precipitation, and snow cover height values were retrieved through the ROSHYDROMET website (http://meteo.ru) and composed into the 1-day time resolution time series.
Artificial neural networks (ANN) are posed as an effective tool for the consolidation and prediction of information. We used multilayer feedforward neural networks (multilayer perceptron) to build ANN-based predictive model. The AAN is implemented in the MATLAB [3]. Networks of this type have one-way connections from the input to the output layers of neurons, and are often used to predict and approximate nonlinear functions.

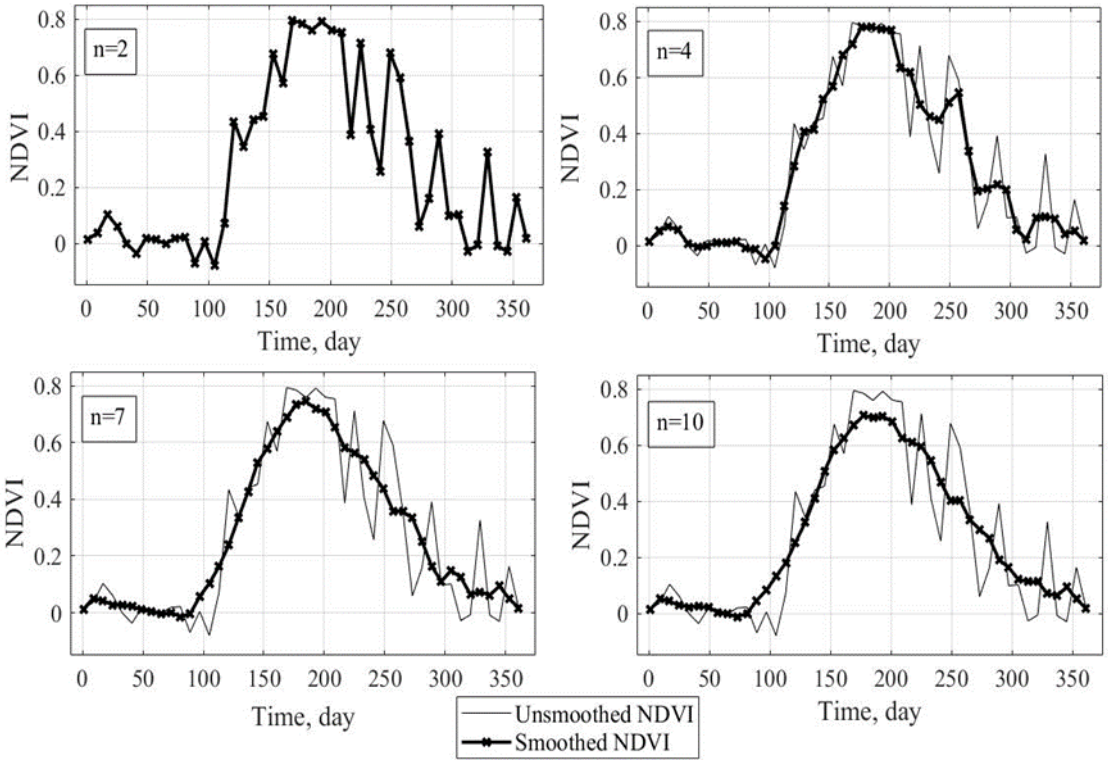

Figure 2. NDVI time series smoothing, selection of the moving window size

DATA PROCESSING AND RESULTS

A methodology is proposed for the selection and processing of remote sensing and meteorological observations data. It incorporates formation, smoothing and interpolation of time series datasets to generate data for training artificial neural networks (Fig. 3). It corresponds to the traditional processing chain of ANN-based analysis, and assumes selections of indicators (predictors) from the meteorological (climate) in-situ observations accordingly to our study context.

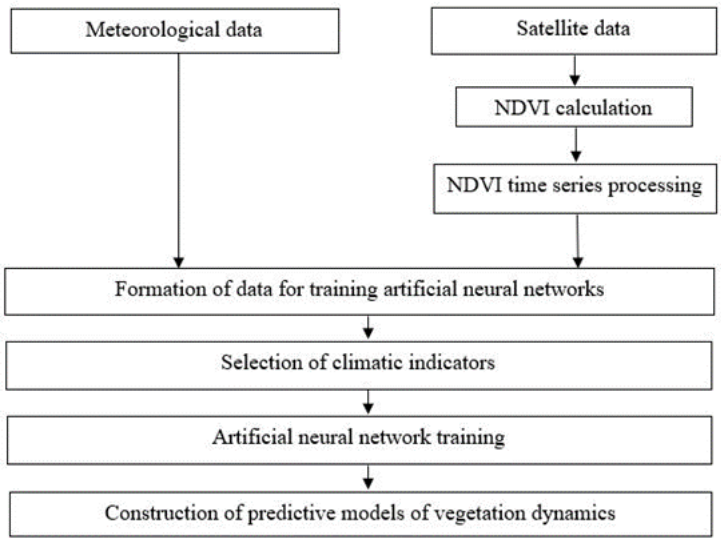

Figure 3. Data selection and processing methodology

The supervised learning was used to train the neural network. The training was carried out using error back propagation method [1]. Satellite data were used jointly with meteorological data at the training stage. A set of meteorological time series were placed into the model as the neural network input, and the preprocessed NDVI time series were placed as the reference output (neural network training scheme is shown in Fig. 4). Training on different type meteorological time series was performed repeatedly. Table 1 summarises the data used to train the ANN.

Figure 4. ANN training scheme

Table 1. Example of the data series used to train the ANN

	Input				**Output**
	Day of the year	**Surface air temperature**	**Precipitation**	**Snow cover height**	**NDVI**
2006	1	-2.3	0.0	35	0.0135
	2	-2.6	0.0	33	0.0222
	…	…	…	…	…
	365	-6.7	0.0	3	0.0539
2007	1	-0.2	7.1	5	-0.0266
	2	-0.1	1.0	7	-0.0072
	…	…	…	…	…
	365	1.9	0.0	4	0.0226
…					
2016	1	-12.4	1.1	3	0.0516
	2	-15.9	0.0	4	0.0523
	…	…	…	…	…
	365	0.4	0.7	13	-0.2040

Training on day of the year, surface air temperature, precipitation, and snow cover height time series was performed to select an optimal number of hidden layers of neurons in ANN. The quality of neural network training was determined by the average relative errors in NDVI prediction for the entire period and for the periods during which the index value exceeded 0.2. The time series example of the observed and predicted NDVI for 11 years with 10 hidden layers is shown in Fig. 5.

The average relative error for the entire period was 22%, and for the periods during which NDVI exceeded the 0.2 value was 11%. ANNs with 10 hidden layers were also trained on different combinations of meteorological indicators. Best results were obtained by ANN training on all four indicators (including the day number). However, its application can be difficult practically due to a possible time shift of the growing season.

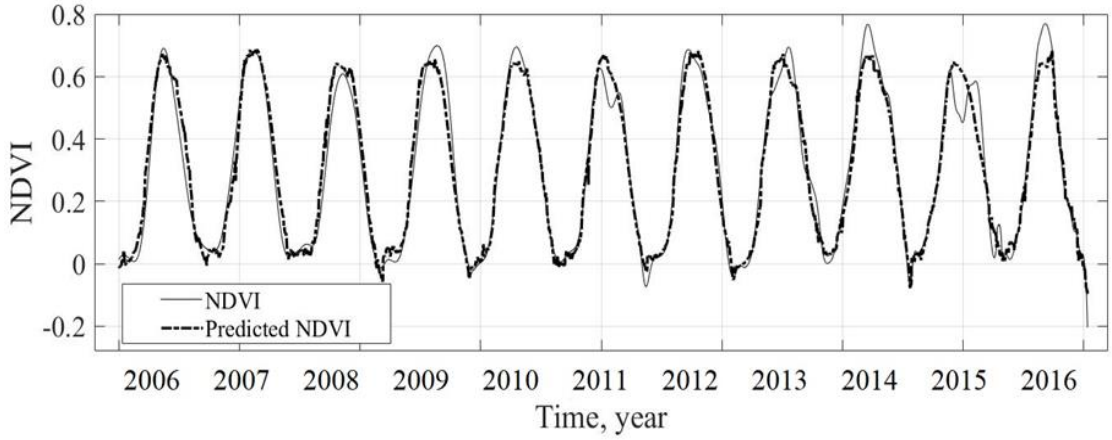

Figure 5. The time series of the observed and predicted NDVI

DISCUSSION

To test ANN-based models, NDVI prediction was carried out on the basis of continuous year-size meteorological time series outside of the training sample period. Year-size NDVI time series was predicted, thus the NDVI forecasting situation was modelled (Fig. 6).

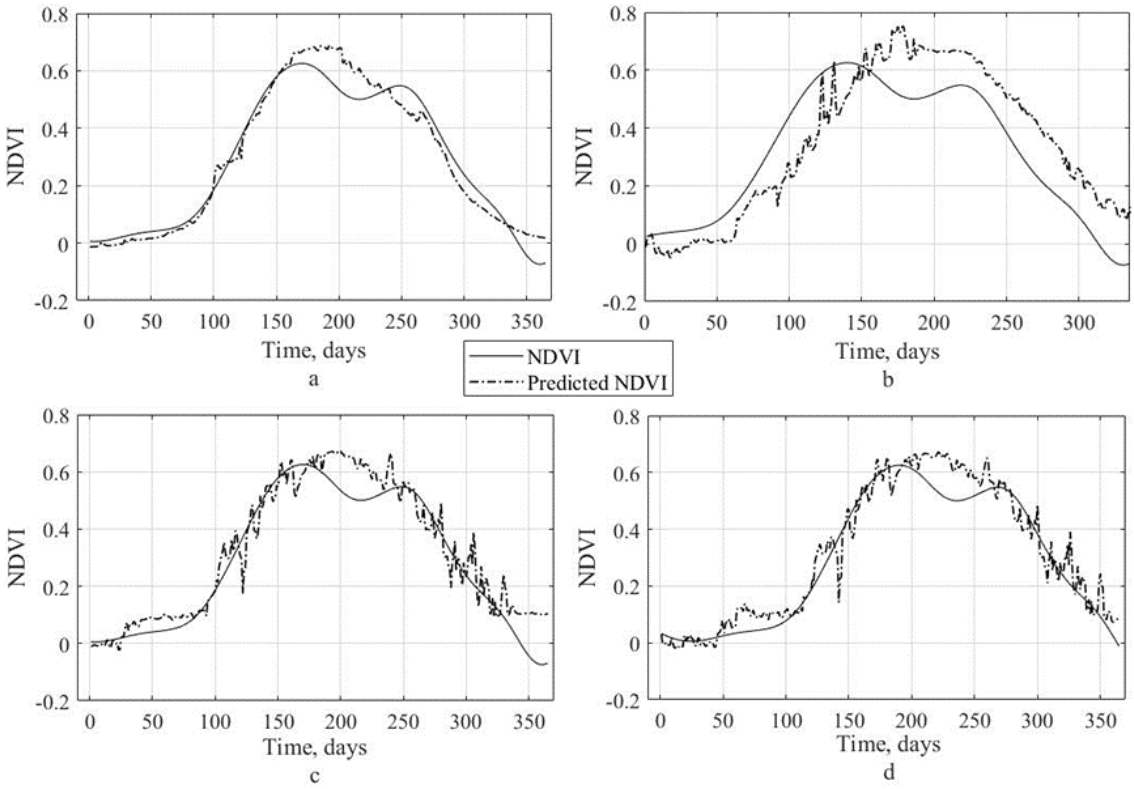

Figure 6. Observed and predicted NDVI time series in 2011

Figure 6a demonstrates the example of 2011 time series derived from satellite data and predicted by ANN based on four parameters (day of the year, daily average surface air temperature, daily average precipitation, average snow cover height). The average relative error in the period during which the NDVI exceeded 0.2 is 9%. However, if the

meteorological data time series are shifted in time (due to a weather anomaly, for example), the ANN prediction can be incorrect (Fig. 6b). Therefore, we can exclude the day number series and train ANN on three parameters. The time series predicted on three parameters is shown in Fig. 6c. The average relative error in the period during which the NDVI exceeded 0.2 is 14.1%. In this case, NDVI prediction becomes insensitive to the time shift of the meteorological parameter time series. Figure 6d demonstrates the forecasted NDVI time series shifted by thirty days to the right. The prediction quality is not changed that can be important when predicting the dynamics of vegetation cover in new areas.

Smoothing was proposed to reduce the noise level of the predicted NDVI time series. The smoothed computed and predicted NDVI time series are shown in Figure 7.

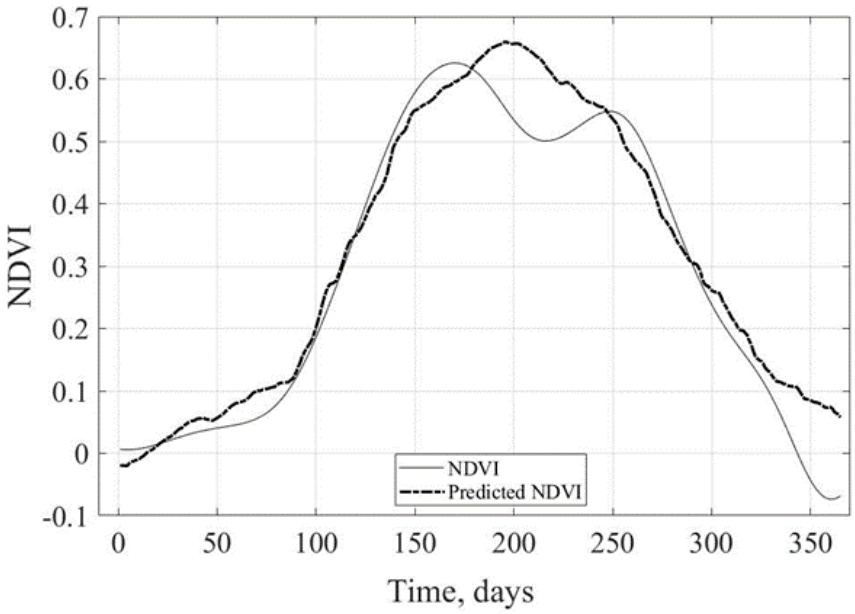

Figure 7. Observed and predicted NDVI time series in 2011

The average relative error in the period during which the NDVI exceeded 0.2 was 13.7%. The area under the time series graphs (for values above 0.2) can be used as an indicator of the total vegetation cover activity. The areas can be estimated as 106 and 115 units, respectively for the computed and predicted graphs. In this case, the error is estimated as 8%.Current results demonstrates (at least) partial applicability of proposed approach. However, additional testing and collection of modelling statistics on different test areas are needed to be realised as a part of future work.

Acknowledgement

Meteorological data were retrieved from the Russian Federal Service for Hydrometeorology and Environmental Monitoring – ROSHYDROMET (http://meteo.ru). The MOD09A1 Version 6 product is a courtesy of the NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC), USGS/Earth Resources Observation and Science (EROS) Center (https://lpdaac.usgs.gov/products/mod09a1v006/).

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SPATIAL INVENTORY OF ARCHAEOLOGICAL RESOURCES IN DOBROGEA USING GIS IN ORDER TO QUANTIFY THE HISTORICAL TOURIST POTENTIAL

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ABSTRACT

Dobrogea is a historical region of Romania that includes a great diversity of archaeological resources, imposing a spatial inventory in a different way from the current ones. This study proposes the use of GIS technology in terms of organization and structuring of archaeological resources made available by the National Archaeological Record of Romania. The integration of data in online mapping applications can help to create a stronger link between the tourist and the tourist location, which has positive implications for the regional economic development. The results of the study consist in a spatial database of the fortresses, Roman camps and other archaeological resources from Dobrogea having as main role the exposure of the historical tourist potential of the study area. The information obtained will contribute to future studies for the implementation of digital methods to increase the tourist attractiveness of these archaeological resources.

Keywords: Tourism, Dobrogea, archaeology, GIS, inventory

INTRODUCTION

Although Geographic Information Systems (GIS) began to be used in archeology after 1990, mapping has always been one of the main practices in the analysis of archaeological sites[1]. GIS is mainly used in the collection of archaeological data and less for the transmission of information and tourism promotion, even if the potential of this technology is very high[2].

This paper presents the inventory of archaeological data set from the historical region of Dobrogea, Romania. The elements of the archaeological hertiage will receive spatial references which will help to create interactive maps. Thus, we want to use technology to develop the cultural tourism of the analyzed region. For this, mapping of the archaeological resources is an important step.

Dobrogea is a region with a very diverse history due to the many nationalities that have lived here over the millennia. Greek settlers built here over 2500 years ago the first cities on the current territory of Romania[3] and in the year 46 B.C.E. Dobrogea became a territory of the Roman Empire being the first region of Romania that was annexed to Rome[4]. Many settlements and fortresses were built in the next historical periods:

Dacian-Getic, Greek, Roman, Byzantine and Medieval. This aspect highlights a very rich archaeological fund which creates opportunities for the development of tourism and also for the regional economy.
The best known project for mapping archaeological resources at the national level, not only in Dobrogea was coordinated by Bogdan Șandric and is called Cartographic server for the National Cultural Heritage[5]. This project presents a wide set of scientific information, being a very good source of data for researchers. Through this study, we aim to extract information about archaeological sites which have a high tourist potential and to create a spatial database for interactive maps applications made especially for tourists.

MATERIALS AND METHODS

In order to make an inventory as accurate as possible in relation to the proposed objectives, it is necessary to select those archaeological elements that can be a tourist attraction (fig. 1.), a parameter greatly influenced by their state of conservation. Archaeological discoveries and research for the Dobrogea region are objectively presented in the archive of National Archaeological Record of Romania (RAN), supported by Ministry of Culture[6].

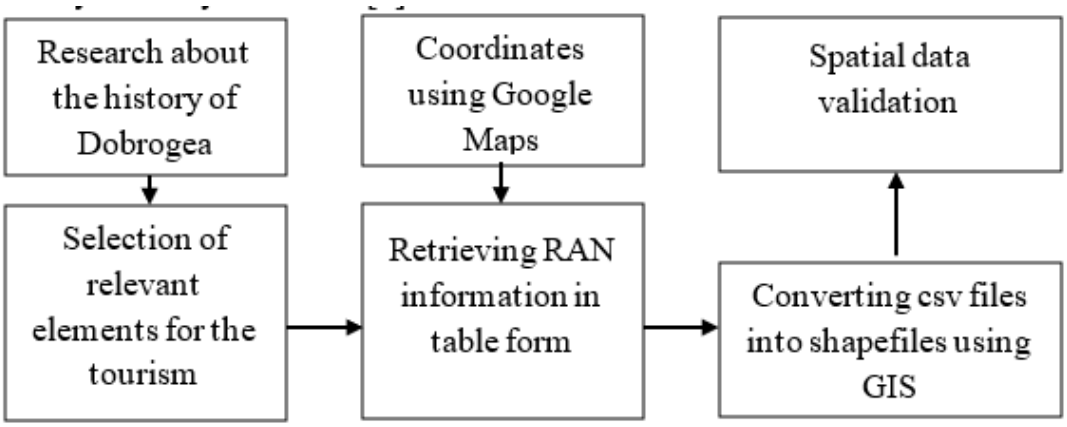
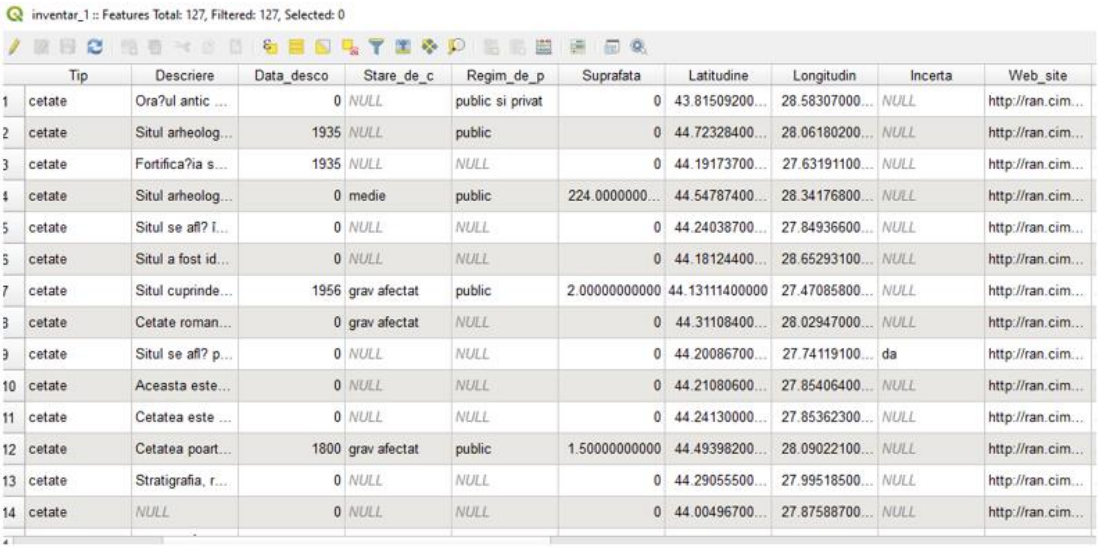


Figure 1. Scheme of work steps for obtaining the desired spatial data

The description of the archaeological resources includes information about the city/village where it is located, the county, the year of discovery, the historical period, the occupied surface and the geographical coordinates in WGS ’84 projection obtained using Google Maps (fig. 1). We also created a classification based primarily on the historical period, which will help us to create interactive methods for rendering historical information from Dobrogea to increase the attractiveness of web GIS applications.
The initial data taken from different sources will be grouped in tables using Microsoft Excel, two columns being intended for geographical location (latitude and longitude). By transforming the tables into CSV files, the information will be spatialized in the open-source software QuantumGIS 3.12, based on the two columns where it’s stored information about latitude and longitude (fig. 2).
Statistical and economic data are taken from the online portal of the National Institute of Statistics, Tempo Online. These can be downloaded as tables in XLSX or CSV files and then inserted into GIS[7].



inventar_1 :: Features Total: 127, Filtered: 127, Selected: 0

	Tip	Descriere	Data_desco	Stare_de_c	Regim_de_p	Suprafata	Latitudine	Longitudin	Incerta	Web_site
1	cetate	Ora?ul antic ...	0	NULL	public si privat	0	43.81509200...	28.58307000...	NULL	http://ran.cim...
2	cetate	Situl arheolog...	1935	NULL	public	0	44.72328400...	28.06180200...	NULL	http://ran.cim...
3	cetate	Fortifica?ia s...	1935	NULL	NULL	0	44.19173700...	27.63191100...	NULL	http://ran.cim...
4	cetate	Situl arheolog...	0	medie	public	224.0000000...	44.54787400...	28.34176800...	NULL	http://ran.cim...
5	cetate	Situl se afl? l...	0	NULL	NULL	0	44.24038700...	27.84936600...	NULL	http://ran.cim...
6	cetate	Situl a fost id...	0	NULL	NULL	0	44.18124400...	28.65293100...	NULL	http://ran.cim...
7	cetate	Situl cuprinde...	1956	grav afectat	public	2.00000000000	44.13111400000	27.47085800...	NULL	http://ran.cim...
8	cetate	Cetate roman...	0	grav afectat	NULL	0	44.31108400...	28.02947000...	NULL	http://ran.cim...
9	cetate	Situl se afl? p...	0	NULL	NULL	0	44.20086700...	27.74119100...	da	http://ran.cim...
10	cetate	Aceasta este...	0	NULL	NULL	0	44.21080600...	27.85406400...	NULL	http://ran.cim...
11	cetate	Cetatea este ...	0	NULL	NULL	0	44.24130000...	27.85362300...	NULL	http://ran.cim...
12	cetate	Cetatea poart...	1800	grav afectat	public	1.50000000000	44.49398200...	28.09022100...	NULL	http://ran.cim...
13	cetate	Stratigrafia, r...	0	NULL	NULL	0	44.29055500...	27.99518500...	NULL	http://ran.cim...
14	cetate	NULL	0	NULL	NULL	0	44.00496700...	27.87588700...	NULL	http://ran.cim...

Figure 2. Part of the database entered in the QuantumGIS software

RESULTS

The database created includes 127 elements of the archaeological heritage of Dobrogea. Each incorporates information about the name of the archaeological site, the code for the list of historical monuments (where applicable), the RAN code, the year of discovery of the site, the historical period, the state of conservation, but also the geographical coordinates (table 1). Based on these spatial references, we obtained a vector point layer.

Table 1 Some of the archeological sites that have been inventoried

Archaeological sites	County	City/Village	Category	State of Consevation	Historical Period	Area (ha)	Property type	Latitude	Longitude
Antiq city of Callatis	Constanța	Mangalia	Fortification, fortress	-	Greek, Roman	-	public & private	43.815092	28.58307
Histria	Constanța	Istria	Settlement	good	Greek, Dacian, Roman	-	public	44.546798	28.773503
Carsium	Constanța	Hârșova	Settlement	medium	Dacian, Roman, Medieval	-	public	44.681706	27.951732
Aegyssus	Tulcea	Tulcea	Settlement, fortress	bad	Dacian, Roman, Medieval	54	public & private	45.271095	28.490863
Hamlyris	Tulcea	Murighiol	Settlement, fortress	good	Greek, Dacian, Roman	3	public	45.024929	29.197761
Argamum/Orgame	Tulcea	Jurilovca	Settlement, fortress	medium	Greek, Dacian, Roman, Medieval	120	public	44.854222	28.590694
Capidava	Constanța	Capidava	Settlement, fortress	bad	Dacian, Roman, Medieval	1.5	public	44.493982	28.090221

The most numerous, but also the best preserved historical vestiges in Dobrogea are located near the Danube river, on the shores of the Black Sea, and near the Lagoon Complex Razim-Sinoe. The higher popularity of the cities in the eastern part of the region lies in the high flow of tourists from the Black Sea coast (fig. 3).

Also, the spatial analysis indicates a weak development of the tourist infrastructure in areas with high density of archaeological elements (center and north of Tulcea county, west of Constanța county). The tourist accommodation establishments are grouped in the eastern part of the region, where the largest number of tourists is registered. In addition,

many historical sites are degraded by agricultural activities, demolition, animal action, and museums exist only in a few ancient cities. Analyzing the aerial images, but also through field observations, it is evident the more and more accentuated degradation of the ancient ruins. The tourist potential is obvious where several historical vestiges are grouped in a small space, but the analysis of the tourist infrastructure shows us an important barrier in capitalizing on this potential for economic development.
Archeology is a field where Geographic Information Systems have applicability and can help capitalize on the tourist potential. By using geospatial technology we can find ways to promote tourist elements less known to tourists. Spatial data provide an overview of the analyzed element and can generate solutions to solve social, economic, historical problems, in this case.

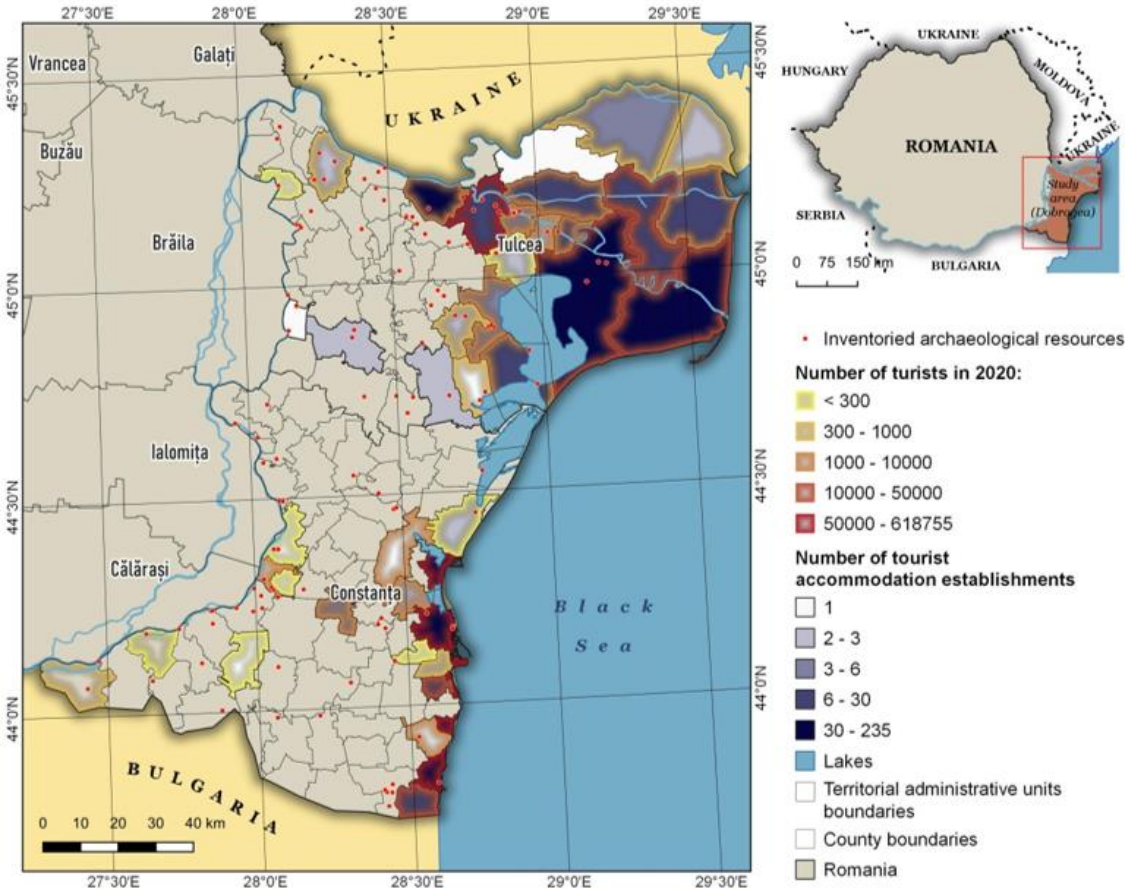


Figure 3. The correlation between the spatialized archeological heritage[6] and the tourist infrastructure from Dobrogea[7]

CONCLUSIONS AND DISCUSSION

Through this study we managed to inventory the archaeological resources in Dobrogea in a cartographic way to create the database necessary for future GIS and web GIS projects for the development of tourism in Dobrogea. GIS includes a set of tools with applicability in many fields, including tourism and archeology. Adding spatial information to historical relics helps us to understand population dynamics or factors involved in the spread of peoples in different historical periods, but also gives us insights into future geography studies on this historical subject. The advantage of using spatial information is the ease with which data can be manipulated and processed so that deeper conclusions can be

drawn. Another advantge is the fact that spatial database can be updated easily. The methodological approach presented in this study compared to those in neighboring countries or regions aims to create a database that allows easy construction of interactive maps. For this, we have introduced a wide range of information for each archaeological objective identified in order to make the most accurate classifications in order to be able to make easy classifications of these cultural vestiges [8][9][10]. GIS techniques can be a very useful way to make the most of existing tourist resources in an area, and together with other management measures can maximize the economic resources of tourism resources[11][12].

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IMPACT OF SOCIO-ECONOMIC DISPARITIES ON REGIONAL PLANNING AS A RESULT OF THE COVID-19 PANDEMIC

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ABSTRACT

The purpose of this report is to identify the deepening socio-economic disparities resulting from the COVID-19 pandemic. Based on an analysis of the existing problems in the demographic and socio-economic development of the municipalities in the Republic of Bulgaria, the emphasis is on opportunities to stimulate the regions and their gradual economic and social recovery to pre-pandemic levels. Attention will also be paid to the strategic planning for the reconstruction of the regions and the projected development for reducing the inequalities of the territorial-administrative units in the country in the medium and long term. In the decade to 2030 on the agenda in Bulgaria will be the need for territorial and administrative reform in line with the demographic and socio-economic situation of the country. In addition, the next programming period 2021-2027. Efforts will be focused entirely on stimulating recovery opportunities from the COVID-19 pandemic and the expected financial and economic crisis. Conducting any study to identify the problems arising from the COVID-19 pandemic in the field of regional development would help to implement an effective regional policy, both by the central executive and by local governments. For the restoration and normalization of the socio-economic relations, special attention should be paid to the improvement of the process related to the development of strategies for territory management and utilization of the areas adjacent to the lands of lagging municipalities. On the other hand, it is necessary to perform a comprehensive analysis in order to assess the development of municipalities in the Republic of Bulgaria and to determine trends and prospects for recovery and catching up with the regions in the European Union. This process presupposes, on the one hand, the development and testing of new assessment models, and, on the other hand, the reorganization of the management of the national territory and its constituent territorial-administrative divisions. As a result of the COVID-19 pandemic, discussions on redefining the concepts related to the deepening disparities between the individual territorial-administrative units should be brought to the forefront, rethinking a number of existing programs and strategies in the assessment of the planned, expected and achieved results from the program financing with funds from the structural funds of the European Union and the provided financing and / or co-financing from the central budget of the country.

Keywords: urban planning, regional economic growth, regional development, spatial planning

INTRODUCTION

In the coming years, the main prerequisite for the creation and development of a sustainable competitive economy will be based on the capabilities and capacity of the

national economy to cope with external shocks, adapting as quickly as possible to changes in its environment. Definitely, the economic impact of the pandemic will develop over a longer period of time, and we can expect a significant part of active business to fail in its desire for faster recovery, although in many countries this failure is delayed by stimulating government policies and subsidies provided. The looming economic crisis will undoubtedly lead to some long-standing changes in the way people and companies move, organize and operate. Particular attention should be paid to the global processes of digital transformation, which can be seen both as a threat and as an opportunity for a country like Bulgaria. The problem for a country like Bulgaria is related to the continuing slow pace of digitalization of its economy, which risks increasing its backwardness, both regionally and globally. For this reason, it is extremely important for the executive to take a number of steps towards building the necessary digital infrastructure, a process that must be accompanied by the provision of opportunities to build the required modern digital skills of the population. As a result of the COVID-19 pandemic, a discussion will have to be launched on rethinking the role of the education system in the information society. Especially considering that the 21st century one gets instant access to any information. On the other hand, Bulgaria will have to focus significant efforts and resources on creating and providing a favorable environment for the development of innovative enterprises. This means that, as a matter of priority, the country will have to promote the digitalization of economic activity and the introduction of e-government in order to achieve certain prospects for catching up with its significant lag behind other EU member states.

Main problems in identifying and planning the socio-economic potential for the reconstruction of the regions

In order to achieve a strong economic development of the regions in the country after the end of the COVID-19 pandemic and to achieve economic growth that reaches levels of over 5% on average per year, the central executive authorities will have to implement a series of reforms to improve both the institutional framework and to create conditions for efficiency gains. In addition, regional opportunities should be planned to increase investor interest and activity and attract foreign direct investment in the lagging regions of the country. In this regard, priority should be given to specific integrated measures by central executive bodies, as well as by local governments to attract foreign direct investment to the lagging socio-economic regions in the country, especially in smaller municipalities. At the beginning of the pandemic and the declared state of emergency in the Republic of Bulgaria, the current account deficit increased to EUR 40 million in March 2020, as compared to March 2019, when it was EUR 25.2 million. As for the first quarter of 2020, the current account is positive and amounts to EUR 501.6 million, with a surplus of EUR 229.9 million for the first quarter of 2019. There is a decrease in exports of Bulgarian goods by 140.3 million euros (5.9%) on an annual basis, which is probably due to the emergency situation related to the pandemic of COVID-19.

While the balance on the current and capital account of Bulgaria in September 2020 is negative and amounts to 116.3 million euros, while compared to September 2019, when it has a surplus of 432 million euros. For the first nine months of 2020, its current and capital account is in surplus of 1.3908 billion euros, which is half of the surplus for the same period in 2019, when it amounted to 2.7806 billion euros. For the nine months of 2020 foreign direct investment amounted to a total of 729.6 million euros, with a contraction of foreign direct investment in the country by 30.9% compared to the same

period in 2019, where foreign direct investment in the country amounted to 1, 0563 billion. While the data for January 2021 show that the trade balance is negative at EUR 33.1 million (0.1% of GDP) with a deficit of EUR 79.2 million (0.1% of GDP) for January 2020. A, exports for January 2021 decreased by 3.6% or 89.9 million euros and is 2397 million euros, while compared to January 2020 when it was 2486.9 million euros. From the above data it is clear that the process of economic recovery and reaching pre-crisis levels will take considerable time, and we can expect that the recovery period of the country's economy will begin probably in 2022. Of course, the very process of economic recovery must be seen as a function of limiting the economic activity of enterprises in the current 2021. as a result of the continuing restrictions for economic entities related to the still uncontrolled situation with the COVID-19 pandemic in the first quarter of 2021, and it seems that the normalization of socio-economic life in the country will probably occur only in 2022, as to achieve economic recovery in the country, it must be planned in parallel with recovery processes to eliminate economic imbalances between regions and stimulate economic activity of enterprises. Expectations of a continued decline in private investment as a result of the ongoing crisis will be monitored until the right conditions are created for a gradual recovery of European markets. And, in order to achieve accelerated economic growth in the individual regions of the country, the administration's efforts during the ongoing crisis should be aimed at identifying and overcoming obstacles to possible investor interest in the individual regions of the country, paying special attention to strong socio-economically lagging regions. The creation of conditions for the faster recovery of the country's economy must be accompanied by the preparation of a specific strategic action plan, which will contain specific measures, including both changes in the regulatory framework, aimed not only at further easing the conditions for doing so of business in the country and stimulating the process of recovery of economic entities, but the measures should be aimed at creating conditions for attracting and increasing the share of foreign direct investment in the least developed regions of the country. A crucial part of the policies for planning of the recovery process from the Covid-19 pandemic is „the reduction of vulnerability, which is related to the susceptibility of human development: human life, economy, social organization, and the physical aspects of the environment. Although public and economic vulnerability are perceived as the most important components of vulnerability, it is very important to take into account the significance of the biophysical basis for human life - the environmental and physical aspects of vulnerability and to deal with them in an integrated way. The vulnerability is integrally analyzed by its factors (exposure, susceptibility and resilience) and dimensions (social, economic, environmental and physical). The integrated vulnerability of a territory is measured as a combination of the factors listed above. All of them can be represented by a set of indicators, whose selection should be reasonable and well-grounded. The set of indicators should allow measurement of the vulnerability factors for each of the vulnerability dimensions“[1]. „The social vulnerability represent the socio-economic aspects of vulnerability, for instance, demographic structure of the population (age, education, occupation, awareness and access to information, family structure, etc.), organization of the population and communities, etc. The cultural-political vulnerability is related to the cultural heritage exposed to risk (physical and metaphysical cultural wealth), and the institutional strength of the political systems (trust in governmental structures, governmental support to disaster risk management, transparency of policies and systems, etc.). The economic vulnerability deals with the exposure of economic activities at risk,

e.g. spatial location of economic activities, production of goods and services, etc. Environmental vulnerability reflects the fragility and exposure of natural elements at risk: ecosystems, protected areas, sensitive environments such as forests, wetlands, biodiversity, etc. The physical vulnerability represents the strength and design features of key infrastructural elements at risk, i.e. critical infrastructure (emergency reaction centres, shelters, medical facilities, social and cultural meeting points, etc.), transport infrastructure (roads, railways, airports, harbours, etc.), and facilities and life lines (supply and communication networks, etc.)[2]. The COVID-19 pandemic has produced several unprecedented effects around the world and has adversely affected the transport sector, which has experienced a drastic reduction in passenger traffic across all different modes of transport. With physical interaction being the key medium perpetuating the spread of the virus, government decisions have been pivotally centered on either discrete decisions or combinations of decisions to curtail or block mobility [3], [4].

Problems with the implementation of the planning process

Problems with the implementation of the planning process may include, first of all, the development of basic tools, taking into account existing and future services, such as accessibility and parking management in busy central urban areas, integration of public transport schedules, etc. On the other hand, the difficulties of smart planning are related to the determination of quantitative and measurable indicators to show the level of change. „Cities are centers of modern societies and civilization. They create a lot of value, but a lot of resources are consumed. The city itself is a multifunctional and complex object that can be represented as a demographic, ecological, transport, administrative-territorial and industrial production system. Unlike a conventional city, the smart city actually means a "digital" city - a concept that has so far no unambiguous definition. Experts' views, however, are united in the fact that a smart city should not be perceived in the narrow sense as a city packed with technology. The technologies in this case are rather a means of achieving a common goal, namely the creation of a comfortable urban environment. Structurally, the "smart" city is a system of interacting systems. Such interaction of a huge number of systems requires openness and standardization, which are the basic principles of creating smart cities. A "smart city" project, lacking openness and standardization, is soon becoming clumsy and expensive. Some of the technologies involved and defining smart city are high-speed optical, sensor, cable and wireless networks necessary for the realization of the benefits achieved thanks to intelligent transport systems, smart electrical networks and smart home networks [5].“ The “smart cities” is a new concept and it measures not how smart the city is, but the city’s efforts to make itself smart—sustainable development, sound economic growth, and when the urban system adapts itself to the users’ needs. The smart city concept incorporates good urban planning, use of digital technologies, networks of technologies, networks of people who work together well, a change in the way of thinking, the transformation of the city governments for successful smart cities and applying the participatory approach [6]. The smart region really means the "digital" region - a concept that has no clear definition so far. However, experts agree that the smart region should not be seen in a narrow sense as a technology packed region. Rather, technology in this case is a tool, an instrument for achieving a common goal, namely the creation of a comfortable regional environment. In our opinion a Smart Region is a large area, of mixed urban and non-urban use, where smart technologies have been deployed to benefit the economic growth, quality of life and wellbeing of citizens in the territory in

connection with sustainable development and climate changes. Making a region "smart" is most often based on implementing urban innovation in three main areas. These are transport to improve residents' mobility and reduce congestion by offering alternative modes of transportation, an environment that includes water management, energy, air quality and waste, and the overall improvement of the lives of people who they live in the city [7]. The adoption of the knowledge as a resource, such as the material, energy and financial resources of the enterprise, as well as its optimization and utilization, provide a competitive advantage for the organization. In addition, knowledge is a highly liquid resource that can easily be transferred to a product and / or traded, but is an asset that ages rapidly in today's dynamic conditions of development of science and information and communication technologies, which determines the need for permanent investment in training and enhancing the skills and competencies of the employees of each organization in order to increase competitiveness. A turbulent environment requires and forces the organization to generate and have the necessary knowledge to be flexible and to have the ability to react quickly and adequately to emerging changes. The accumulation of knowledge in the organization is the result of the ongoing process of training and accumulation of experience by the organization's employees, but they can be lost immediately by leaving, retiring or "internally displacing" capable employees. The transformation of knowledge into assets requires, it to be preserved, shared and transferred, integrated into the business processes, management practice and culture of the organization[8]. But for the creation of the smart region really means "the "digital" region - a concept that has no clear definition so far. However, experts agree that the smart region should not be seen in a narrow sense as a technology-packed region. Rather, technology in this case is a tool, an instrument for achieving a common goal, namely the creation of a comfortable regional environment. In our opinion a Smart Region is a large area, of mixed urban and non-urban use, where smart technologies have been deployed to benefit the economic growth, quality of life and wellbeing of citizens in the territory in connection with sustainable development and climate changes. Making a region "smart" is most often based on implementing urban innovation in three main areas. These are transport to improve residents' mobility and reduce congestion by offering alternative modes of transportation, an environment that includes water management, energy, air quality and waste, and the overall improvement of the lives of people who they live in the city"[9]. The presentation of the opportunities for planning and implementation of projects in order to improve the socio-economic conditions in the small municipalities is „directly dependent on the spatial planning on the one hand, and on the other hand on the planning of specific measures to be implemented in the next programming period 2021-2027. In hierarchical terms, spatial planning on the territory of the country covers three levels, namely national, regional and local or even spatial planning, which refers to particular individual settlements (mainly municipalities). We can say that our country is late in adopting concepts of spatial development because at national level, a National Concept for Spatial Development was adopted in 2012, which lays down some of the basic principles of spatial planning in the European Union and at the same time it is perceived as the first document of its kind in the country that has been prepared and adopted in the last three decades. The elaborated National Spatial Development Concept replaces the complex national spatial planning scheme provided by the Spatial Planning Act, while regional planning according to the Spatial Planning Act provides for the elaboration of regional concepts and spatial planning schemes from which one was drawn up with a range of five

municipalities until the adoption of the National Concept. However, when we take a snapshot in a structural and content plan at a local level, regarding the availability of municipal spatial planning plans, we can see that fewer than half of Bulgarian municipalities have such, but of course the situation is different when we look at the existence of elaborated and adopted municipal development plans, which obligation is imputed and regulated by the Regional Development Act. According to the signed Toledo Declaration in 2010, which focuses on the implementation of an integrated approach to planning the development of European cities, the Ministry of Regional Development introduces a new planning tool with the idea of integrating different sectors of urban development in Bulgaria by launching procedures for the elaboration of Integrated Urban Plans reconstruction and development developed in accordance with the Regional Development Act. In general, we can state that the purpose of these plans is to make them an integral element between development plans and development plans at the local level [10], [11]".

Discussion

This study aims to provoke a scientific discussion on the future socio-economic recovery and development of lagging regions in the Republic of Bulgaria, as on the one hand it can't yet be declared that the pandemic has been controlled as a result of COVID-19, on the other hand, we cannot unambiguously determine the socio-economic consequences for the individual regions of the country as a result of it. In this context, the territorial units should consider the possibilities for taking proactive measures and formulating recovery policies, plans and strategies, which may include the use of public-private partnership opportunities on the one hand. On the other hand, individual municipalities may consider cooperating to create comparative competitive advantages and attract strategic investors in the socio-economically lagging regions of the country. Certainly, individual regions should not rely solely on the opportunities provided for the use of direct funding from European Union funds and programs. And they need to prepare timely strategies and plans to support local businesses and to attract strategic investors in their territory. A number of discussion issues remain unresolved, one of which is: What approaches, techniques, models can be used by the administrative-territorial units for their faster socio-economic recovery and the creation of appropriate conditions for attracting foreign direct investment on their territory?

CONCLUSION

The continuing deepening of the socio-economic differences between the different regions of the country shows that the well-developed administrative-territorial units are limited compared to the lagging regions in the country. Indicative of the existence of large disparities in the development of the country is the development of the capital and the South-Western planning region, where in fact almost 50% of the country's GDP is concentrated. At the same time, the socio-economic development of the other alternative economic centers and balancers of the capital, namely the cities of Plovdiv, Varna and Burgas, is significantly lagging behind. On the other hand, there has been an increase and deepening of social and demographic problems in a number of regions, which unequivocally shows that the regional policies pursued so far have had a contradictory result, which is dictated on the one hand by the way decisions are made by the bodies of the central executive power, which often excludes the local government from the process of planning and decision-making regarding the conducted regional policy in the country.

In the next programming period, it is extremely important for the central executive to focus on the problems of the lagging administrative-territorial units, which must be purposefully financed and assisted in their struggle to recover from the socio-economic crisis they will face as a result of the pandemic caused by COVID-19. In addition, undoubtedly a national priority for the next decade must be to take measures and plan policies to deal with the demographic crisis or at least to keep the economically active population in the lagging socio-economic administrative-territorial units of the country. The displacement of large masses of young people from the villages aggravates the age structure of the rural population and improves the age structure of the urban population. Migration of young people from these settlements leads to reduced economic potential and worsening demographic potential [12]. “Due to the economic crisis, the situation of immigrants in Europe at this time is particularly difficult. One of the most frequent reasons for immigration is the demand for employment, but as employers usually dismiss first employees and workers, the most severe consequences of the economic downturn are felt by immigrants, especially in the countries hardest hit by the crisis” [13]. Certainly, the resolution of the problems arising from the COVID-19 pandemic requires states to “recognize the links between the promotion of universal health coverage and other foreign policy issues, such as the social dimension of globalization, cohesion and stability, inclusive and equitable growth and sustainable development and sustainability of national financing mechanisms, and the importance of universal coverage in national health systems”[14]. A global pandemic Covid-19 led countries to take aggressive action regarding social management and crisis governance management system. The case of a pandemic discovered in Wuhan provides a lesson for the government worldwide to adopt. However, the government system in every country has its characteristics. The strengthening country's capacity system is vital in the regional autonomy system as well as the collaboration between central and local government in terms of containment of the spread of the pandemic. The biggest challenge in a decentralized government system that arises is that the administrative system that is tiered from the central government to the lowest level of government has caused a miss communication between regions[15]. In this case "frame in global health governance is an important issue in a case of pandemic disease because when a frame has been raised, the policy response that arises will also lead to the existing structure"' [15][16].

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SECTION

TEACHING & EDUCATIONAL GEOGRAPHY

HIGHER EDUCATION IN THE FIELD OF REGIONAL DEVELOPMENT – E-LEARNING AND TRAINING FIRM APPROACHES

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ABSTRACT

Higher education is important for economic growth especially for the rapid development of regions. Using different approaches in the education process develops skills that can be used in both science and practical moments. Compelling both of these methods of study is the key for regional growth for economically developing counties like Bulgaria. The scientific approach of study is not useful for that moment of economic development. The reason is hidden in low investment opportunities in innovations for small and medium-sized enterprises and scarce of free cash. That is why businesses want from universities graduated students with practical experience. Often this requirement is impossible because of the specific business activities and additional teaching is needed. In that case, the dual approach will be the best opportunity. This approach includes a practical aspect of the science and simulation it with real operations. Students in the field of regional development must have complex knowledge in the area of economic, social, politics, and geography. These areas of study help for future regional economic growth.
Now the pandemic situation in the world put higher education in online mode. The universities moved to e-learning platforms like Moodle, Teams, Zoom, etc. The main problem is related to a few obstacles. First, most of the universities did not use the full functions of that platforms. Second, most of the teachers are not learned how to use them. Third e-learning processes have weak spots – cheating, non-direct contact with the students, etc. Fourth the main challenge would be the quality of the teaching and learning.

Keywords: regional development study, e-learning, training firm, higher education

INTRODUCTION

In this pandemic situation the teaching process is faced to a new challenge. Using different teaching approaches like blended, hybrid and online learning are the only way for education. We all know that face-to-face approach is not possible at time. But It is very important because of the direct contact for the students and academics. The main question now is which teaching approach is the best for the students? This question is hard to be answered because of the few reasons. First, all of them have advantages and disadvantages. Second, some universities are neither prepared for digital era nor their academics. Third, it is hard for the students to learn digitally. That is why the mixture between the approaches may be is the best way for education. The author’s opinion is that the hybrid education approach fits best to the situation. In the era of digitalization, we all understand that we use smartphones, computers, other smart devices but we are using them only for fun. Most of us do not use the full potential of these devices.
There is another problem in this digital era which is not solved in the past. It is related to the practical education. All employees want students with practical experience and strong

analytical skills. But it is hard to be done in some reasons. First, the practical skills are specific for every single business. Second, university education helps to be formed complex knowledge which can be used in practice. The students must know where to find the information. Third, students are learned how to deal with huge amount of information for less time. All of that form a specific need. That need can be covered by forming a training firms which can learn students to those specific skills.
Almost one year without face-to-face teaching we can see some problems so far. The problems both university and school are almost the same. But in the schools system regional educational inspectorates (as a lower management structure) create the conditions for the normal functioning of the system (organize the training, provide teachers, provide control and regulation, maintain the qualification of the teachers).[1]

Learning approaches – face to face; blended learning; hybrid and online study approaches.
In this pandemic situation the teaching process is faced to a new challenge. Using different teaching approaches is must. In this time face-to-face approach is not possible. It is very important because of the direct contact for the students and academics. Almost one year without face-to-face teaching we can see some problems so far. First, because of the age of the academics most of them did not have digital skills. Second, some students do not participate active in the lection courses and seminars. Third, educational function of the education is hard to be done fully. Fourth, students need more digital skills for education. The importance of face-to-face education is crucial for collaboration between the students and soft skills development. The EU survey including the following teaching and learning approaches:
Blended learning: A model combining face-to-face classroom teaching and the innovative use of ICT technologies. Experts often associate blended learning with the redesign of the educational environment and the learning experience, thus contributing to the creation of a “community of inquiry”.[2]
Hybrid Online and face-to-face instruction are integrated, with a substantial amount of “seat time” in the traditional classroom substituted with internet-based activities.[3]
Online Nearly all instruction, interaction, and activities take place online; may or may not include a face-to-face orientation or proctored exam(s). .[4]

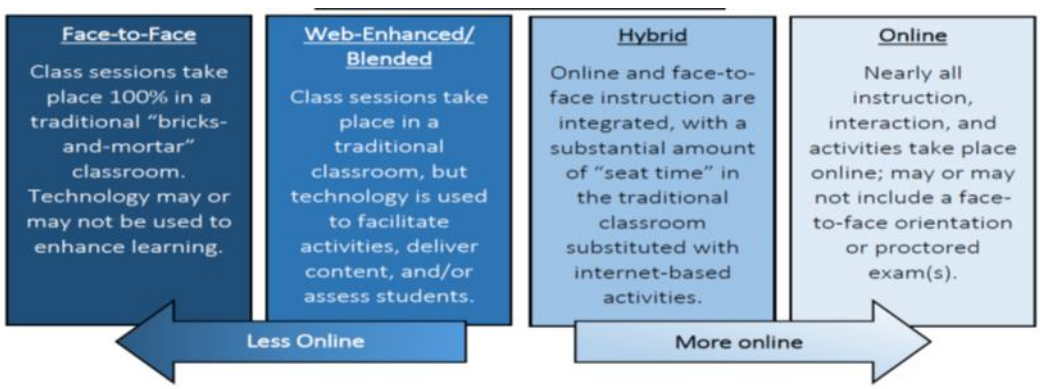

Figure 1. Online Learning Spectrum [5]

In contrast the Bulgarian situation can be presented in the following image.
Image 1. We work and study from home [6].

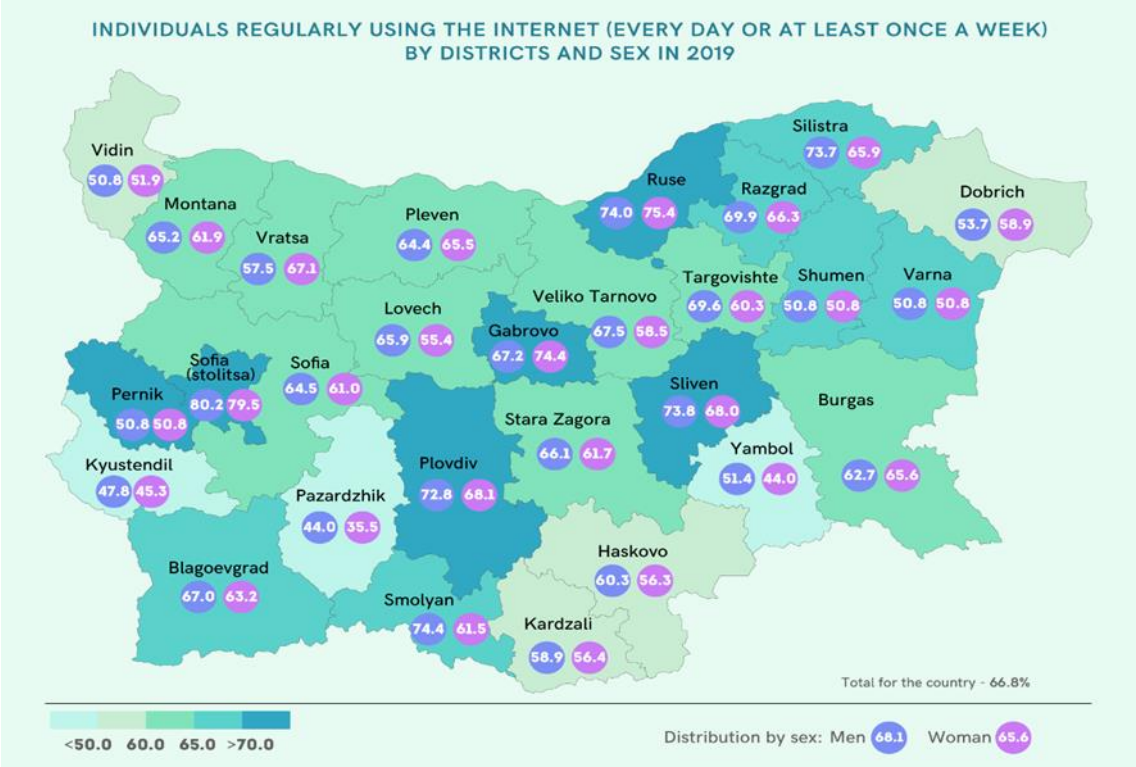

Figure 2.

The map shows disproportions for accessing the internet both education and work. It means that access to the digital platforms for some regions in Bulgaria are not the same as the others which are more developed /For example Sofia - stolitsa, Plovdiv, Ruse/. This is indicator which is showing that the students do not have the same chance to use internet for educational needs to overcome this problem some authors make relation to the economic. Reducing disparities in economic development of the different regions of Bulgaria requires a comprehensive strategy based on the principles of cohesion policy. Investments should be oriented and to the less developed regions and municipalities in order to avoid their backlog. One of the possible measures in this direction is the implementation of decentralization. With its use possible part of direct taxes to be collected and managed by local authorities, but it must function in the current levels, without additional charges. This would provide more funds for the needs of municipalities, including the implementation of programs of economic and social purpose [7].Using the mixture of teaching and learning approaches is very important. It means that students will have access 24/7 for learning. It will help academics to present information more interactively.

That is why the author's opinion is that hybrid learning and teaching approach must be advanced both bachelor and master degree. In this context digital platform like Moodle is common in use for most universities in Bulgaria. Its open source helps reducing the financial costs but sometime there are crushes. Using the full potential of the platform is hard because of few reasons. First, academics are not prepared. Second, some universities did not make the platform fully functional for their needs. Third, students access to the internet in not covered. Therefore, both all academic staff and business are faced to a new problem. Another problem is related to migration as a factor that influences in the existing practice of recruiting workers from other countries [8].

TRAINING FIRM CONCEPTION AND ITS IMPLEMENTATION IN REGIONAL DEVELOPMENT

A training firm simulate the working process of a real firm. All the aspects of real businesses are covered. The procedures are almost the same but not in the same amount of information. Also, the activities of the raining firm cover topics like daily business communication like calls, responding to mails, working with specific software and etc. In addition, students can learn how to work in a team, how to deal with customers and purchase orders. Depends on the activities and specific area students can learn how to use the theoretical knowledge into the practice. It can help to them for taking different decisions. It means that this will make them more responsible for the others. The training firm is like a real life, we should keep in mind to common business usage and the legal framework. The difference from the real business is that in the training firm are not used real money. All the transfers and payments are made by virtual bank but with real or close to real banking transfers. The goods and services used in training firm are virtual too but the simulation works on papers. That is why every training firm should keep all the papers in accordance to the state law and requirements. The tasks used in training firm are following:

- correspondence, using new softwares in accordance of the specific activities
- dealing and responding with incoming mail;
- filing;
- using the telephone, scanner, multifunctional machine;
- working on the PC or lap top.
- designing advertising media, like for instance catalogues
- preparing power point presentation
- dealing with customers, suppliers, business partners
- purchasing and selling
- importing and exporting
- dispatch and customs clearance
- issuing invoices for purchases
- money transfers with domestic and foreign business partners
- banking operations
- entering business cases into the books
- warehouse accounting and fixed assets accounting
- calculating wages, salaries and commissions
- cost accounting
- settling the accounts with the revenue office and the national health insurance
- hosting visitors and business partners
- other mercantile tasks

These essential skills help students to be prepared for real business activities. From the viewpoint of training the practice firm allows for true-to-business practice and professional and didactic reappraisal. This simulation of the economic reality supports the trainees' creativity, self-starting qualities, entrepreneurship, responsibility, teamwork, language skills - in a nutshell, those key qualifications that are also relevant for life-long learning. And it is beyond all doubt that life-long learning is what we will depend on in the future.

The training firm is the best way to understand that this work is for you or not. This simulation to the real business helps in a few directions. First, if you take different positions in the company, you will understand which best fits to you. Second, the

simulation to the real business is the best way for the students to understand if they like their future job or not. Third, it will give opportunity for testing new approaches and models. In the following table are summed up some differences between training business and real business.

Table. 1 Training firm VS Real Business

Training firm VS Real Business		
Criteria type	**Training company**	**Real business**
Дейност Activities	entrepreneurial decisions are made as in reality, but goods and services are a simulation	the full range of possible activities, goods or services
cash flow	there is no real cash flow	real cash flow
Entrepreneurial risk	there is no entrepreneurial risk	entrepreneurial risk
External contacts	primarily with other UTFs - often influenced by the teacher	economic space
Full scope of tasks and activities	expanding the tasks and responsibilities as a learning process	The implementation of tasks, activities is a necessity
Structure	job rotation as a central element of learning	job rotation as an element of staff development in modern and successful enterprises
Choice of branch and product	Teacher - student - training companies - market	entrepreneur, CEO or board of the directors are choosing the branch and niches
Work time	3-5 hours a week	"Normal" working hours depending on the business and law allowance
Successors and success criteria	amount of learning opportunities, i.e. the dynamics of own UTF incoming mail and number of activities, testing of theoritical approaches	profit, lasting market position maintaining enterprise and workplaces, etc.

The main achievement and advantage for the author is to adapt these activities in the curriculum for the regional development. Other authors think that Life and practice undoubtedly have demonstrated the need for permanent improvement of teachers' training and further mastering (including geography ones), without which it is impossible to achieve the expected [9]Aspects for adaptation can be presented in the fields like:

- Regional business development.
- Regional management.
- Expertise in the field of regional development policies.
- Entrepreneurship and others.

Preparing the university curriculum in a way to respond the needs of the business and the state is always hard. The main reason is locked in between the balance in theory and practice, on one hand. On the other hand, students must have complex knowledge and can not be shaped perfect for one specific activity. That is why university can give the beginning of the carrier start with basic and specific knowledge but not full and detailed. In contrast training firm can do it. Using this teaching approach can help to be developed these specific skills which will be used in the daily work. For example, preparing students for regional business development manager position they must know:

How to approach new markets and develop it. In their responsibilities are Collaborate with key stakeholders in our business ecosystem to work on several projects and initiatives that will improve our sales efficiency; Continuously identify new opportunities and bring fresh ideas for improvement; Meet and exceed all assigned recognition targets

and objectives. Smart technologies will be the future of the market. They will help constantly monitoring the most important infrastructure - roads, bridges, tunnels, railways, metro, airports, seaports, communication systems, water supply, power supply, even important buildings - for optimal resource allocation and safety[10]

Achieving market goals and report results. They must report on monthly and quarterly recognition and activation activities. Keep updated trackers of work progress regarding recognition, activation, scores, partnerships and other related services, ensuring these are completed and submitted in a timely manner; Report and track on other market players and activity; recognition, test centre locations etc.; Keep informed about developments within higher education and within the language testing industry.; Monitor, review, update, and analyze the different stakeholder tracker(s) and ensure all related external comms (website – list of recognizing organizations) are up to date.; Develop calendar for data collection, feedback from clients to improve our liaison and better understand/manage expectations.

Other requirements: problem-solving skills; Able to work independently; strong organizational skills.; Thrive in an agile, changing environment; Enthusiastic, high degree of integrity, self-motivated, positive attitude, proactive approach to work and a confident approach to closing business.; Excellent interpersonal and communication skills.; Able to travel overnight and frequently.

Implementing the training firm approach is always beneficial for students. They will know and understand the specific feature of the business and expertise. They will be very close to the real situation and will know how to deal with the daily professional and nonprofessional problems. Training firms can help students to be prepared for that business which pay more, satisfy the staff's needs, develop knowledge and etc. The strong demand for better training and improving of the pedagogical staff in the field of social and educational management[12] play key role for the educatoinal future. Other point of view int the future is related to smart cities. It means that new knowledge will be needed. According to urban planning goals, smart cities can be defined as "cities of knowledge", "digital cities", "cyber cities" or "eco-cities". Smart cities in economic and social terms are looking to the future. [13]

CONCLUSION

The pandemic situation brings education and business to their knees. Choosing different teaching and learning approaches depend on the specific situation. But in these conditions neither the people nor the universities were prepared. The main question is: What we have learned so far? First, the hybrid teaching and learning approaches are better than online. Second, nothing is better than face to face teaching and learning. Third, training firm approach is the only way for covering the specific practical knowledge in which must be included both academics and people from practice.

The questions for discussion so far can be summed up in: How we can fulfil the knowledge of the students after the pandemic situation? What will be the new challenges in the business and education? Should we forget some educational approaches? Last but not least Education will need to increase investment in lifelong learning to maintain productivity and an aging workforce in times of rapid technological change [14]. Moreover migration processes will affect to community-recognized socio-economic needs, legislative measures and financial incentives. [15]

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THE MAIN CHARACTERISTICS OF SPATIAL THINKING IN HIGH-SCHOOL GEOGRAPHY TEXTBOOK QUESTIONS AND TASKS IN THE REPUBLIC OF SRPSKA (B&H)

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ABSTRACT

Spatial thinking remains one of the basic cognitive competencies of modern education and STEM disciplines in particular, regardless of the fact how the great body of work defines it. Geography courses at all levels of education represent a fertile ground for encouraging spatial thinking, which has been insufficiently capitalized on for different reasons. In order to support spatial thinking in geography classes, the authors believe that it is crucial to undertake an initial analysis of its characteristics focusing on school textbooks. It is the textbooks, including tasks and questions set before students, which represent a “gauge” of advantageous students’ cognitive abilities and skills. The paper investigates the characteristics of spatial thinking in high-school geography textbook questions and tasks used in the Republic of Srpska (B&H).
The research was conducted on the basis of the methodology used by Trifunović (2020), which is basically an extended methodology developed by Jo (2007) and Jo & Bernardz (2009). Trifunović's methodology introduces 2 important new elements into the research of spatial thinking - conceptions of spatiality (topological conceptions based on Aristotle's teaching on topos and absolute conceptions of spatiality) and spatial metaphors. The research analyzed 1437 questions and tasks from the textbook.

Keywords: spatial thinking, geography textbook questions and tasks, spatial conception, spatial metaphors, interpretation.

INTRODUCTION

Ever since 1980s, there has been a “spatial turn” in the humanities and social sciences. Spatiality has come a long way from a sort of an inert scene of social events to one of the key factors of conducting and understanding social processes. On the other hand, the rapid processes of globalization and urbanization, the development of information society, and the general introduction of technology into the lives of people demand special cognitive abilities referring to spatial thinking [1], [2], [3].
The US National Research Council Report [4] underlines the fact that both scientists and educators should pay careful and systematic attention to spatial thinking in order to encourage both practical and theoretical spatial thinking among students. It is clear that geography, both as a science and a school subject, has a potential to inspire higher cognitive abilities and skills as it has been indicated by earlier studies [5], [6].
Gersmehl [6, 99] claims that one of the most pertinent findings of previous studies is the transfer taking place within spatial cognition. The relevance of studying spatial thinking and its application in teaching geography is pointed out by the Lucerne Declaration on

Geographical Education for Sustainable Development which pronounces the necessity to comprehend basic spatial concepts as key ideas which help students understand the world as a meaningful unit [7].

Consequently, it is crucial to provide a clear answer to a seemingly easy question regarding the definition of spatial thinking. A great body of work [8], [9], [10], [11], [12], [13], [14], [15], [16], [6], [17], [18], [19], [20] offers different definitions by different authors, both formally and substantially. From a formal and vocabulary point of view, there are different terms used to refer to spatial thinking, such as spatial literacy, spatial ability, spatial intelligence and geographical reasoning. Substantially, most definitions use three basic elements as follows: concepts of space, different tools for space representation, and operational combinations of these activities in the process of reasoning [4, 12]. Kastens and Ishikawa [16] suggest a broader definition by materializing the process of reasoning through categories of interpretation and prediction, also introducing spatial metaphors. It is evident that most attempts to define spatial thinking focus on listing relevant concepts. From the geographical point of view, it is understandable that each element within a system must be, in some way, a part of a whole. The previous definition is missing this principle. The definition also fails to elaborate on different meanings of specific concepts of spatiality. Concepts may obtain different meanings, as can be observed in cases of location or boundary concepts, which might be comprehended from geometrical, cultural or ontological aspects. Hence, conception of spatiality represents a basic structure or an organization matrix of spatial thinking, its demonstration and representation. We can think of conception as a spatial code, the function of which matches the so-called final interpreter [21].

A plausible definition of spatial thinking should also contain a connective structure which would “provide” concepts with specific meanings by materializing them. The authors believe that it is the conception of spatiality what the definition is lacking [19], [20]. Our definition of spatial thinking is as follows: Spatial thinking is a complex cognitive activity composed of five interconnected elements - conception of spatiality (1), concepts of spatiality (2) space representation (3) process interpretation (4) and the usage of spatial metaphors in non-spatial thinking (5) [20].

It is the school textbooks that clearly indicate a state of a science in a specific society. As sources of knowledge, these textbooks reflect the existing scientific truths presented in the text materials. On the other hand, their didactic and methodical elements reflect the didactic and methodical side of the teaching process. According to Vučenov [22], a textbook is both a source of knowledge and a medium of knowledge transfer.

In order to develop spatial cognitive skills within the teaching process, it is necessary to analyze to which extent the textbooks and their methodical and didactic aspects actually stimulate these skills. Earlier studies of textbooks focusing on characteristics of spatial thinking [23], [17], [24], [25], [20] represent initial steps which may serve as guidelines for designing future geography textbooks.

MATERIALS AND METHODS

We believe that parts of the textbooks referring to tasks and questions are places where structural components of spatial thinking are easiest to detect and where encouragement of spatial thinking among students is most pronounced.

The research consisted of extracting all questions and tasks from high school geography textbooks, and doing an analysis of their content with regard to certain elements of spatial thinking. This analysis was performed on the basis of the methodology used by Trifunović

[20], which is basically an extended methodology developed by Jo [23] and Jo & Bernardz [17]. Trifunović's methodology in the research of spatial thinking, in accordance with his definition of spatial thinking, introduces 2 important new elements - spatial metaphors and conceptions of spatiality. Along with the absolute conception of space, this methodology also entails Aristotle's topological conception [26], [27], [20] which author believe to be the essence of the systems approach in geography.

Following the mentioned methodology, questions and tasks are analyzed through the six categories:

1. The location of questions (in the text, as an appendix, end of a lesson) 2. The type of conception of spatiality (absolute or topological) 3. The type of spatial concept (non-spatial, primitive, simple, complex) 4. The type of interpretation demanded of students in tasks and questions (reproduction, interpretation of relations, projection of processes) 5. Do the questions and tasks demand specific graphical representations? 6. Are the students asked to use spatial metaphors in non-spatial thinking?

The next methodological step was to encode the element of spatial thinking in the questions which enabled the analysis. For instance, the textbook question Name some scientific disciplines in geography is coded as V-7, G-1, D-2, F-1, G-0, H-1, I-5. Once we decode the sequence, it means the following: V-7 – The question is on page 7 in the analyzed textbook; G-1 – The question is located in the text; D-2 – It is the absolute conception of spatiality; F-1 – The question used a non-spatial concept; G-0 – The students are not requested to use the spatial relation representation; H-1 – An answer to the question require the reproduction of facts; I-5 – The students are not requested to use spatial metaphors.

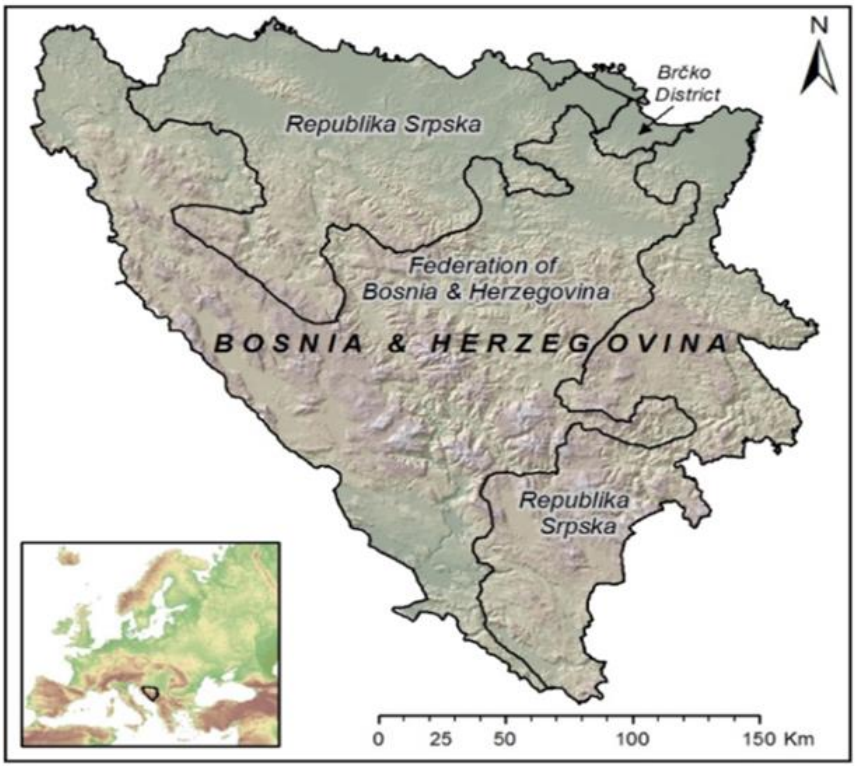

Figure 1. Geographical position of Republic of Srpska. Source: [28]

The research was conducted in the territory of Republika Srpska (B&H) (Figure 1.), where we analyzed the following five high-school geography textbooks: the 1 st grade

textbook for vocational high-school students, the 2 nd grade textbook for Grammar School students, the 3 rd grade textbook for Grammar School students, the 1 st grade textbook for economy-business-trade high-school students, and the 1 st grade (3-year high-school) and 2 nd grade (4-year high-school) textbook for students attending the vocational high-school of tourism and catering. For practical reasons, the textbooks are labeled as A, B, C, D, and E, respectively.\

RESULTS

The analytical technique used for the analysis of tasks and questions in the high-school textbooks comprised, as mentioned in the introduction, the following categories – conception of spatiality, concepts of spatiality, interpretation, graphical representation, the usage of metaphors, and the location of tasks and questions in the textbooks. All these categories represent a gauge helping us analyze aspects of spatial thinking and their interconnection, which is the primary objective of the study. There are 1437 tasks and questions analyzed in five textbooks.

CONCEPTIONS OF SPATIALITY

Results of the analysis of tasks and questions in high-school textbooks in the Republic of Srpska indicate that, within the category of conception of spatiality, there are 425 (29.6%) tasks and questions in the subcategory of topological conception of spatiality and 1012 (70.4%) tasks and questions in the subcategory of absolute conception of spatiality [20].

Table 1. Conception of spatiality in different textbooks

	Textbook A		Textbooks B		Textbook C		Textbook D		Textbook E	
	n	%	n	%	n	%	n	%	n	%
Topological	64	26.4	74	25.3	113	42.5	111	31,4	63	22.2
Absolute	178	73.6	218	74.7	153	57.5	242	68.6	221	77.8
Total	242	100	292	100	266	100	353	100	284	100

There is also a significant disparity among conceptions of spatiality emerging during the analysis of different geographical materials, i.e. during different approaches to the analysis of geographical materials. There are two approaches in geographical studies, methodology design, and geography teaching organization at all levels − regional and thematic. The reason for these two approaches is purely didactic but it often results in simplification and schematization of the teaching content and methods. The thematic approach is commonly used for the introduction of geography as a science and it focuses on the structure and spatial distribution of a specific geographical component. The distribution is usually illustrated via maps displaying the Earth structure, layers, genesis, relief, etc. The purpose of this approach is to set foundation for the more complex regional approach, i.e. a synthetic approach to processing geographical content. Geography teaching is based on the pyramid model where the base covers the studying of natural geographical components, which will later on be used in the synthesis of social-geographical segments within a specific regional unit.

Given these two approaches, the analysis of textbooks indicates that the textbook A, which addresses 1st graders, represents a paradigm of the thematic approach, whereas the textbook B adopts the regional approach as it addresses the regional geographical units in line with the 3rd grade Grammar School curriculum.

Table 2. The distribution of conceptions of spatiality in line with approaches to the teaching content

	Textbooks			
	Thematic A		**Regional B**	
Conceptions	N	%	N	%
Topological	64	26.4	113	42.5
Absolute	178	73.6	153	57.5
Total	244	100	266	100

Table 2 clearly shows that the topological conception of spatiality prevails in the textbook B, meaning that the tasks and questions formulated within the regional approach encourage the interpretation of mutual connections among the elements of the environment. It is in this textbook that the topological conception covers 113 (42.5%) tasks and questions.

The absolute conception of spatiality is more pronounced in the 1st grade textbook with the total of 178 (73.6%) tasks and questions. These findings indicate that there is a correlation between the systems approach and the absolute conception, i.e. between the regional approach and the topological conception of spatiality.

CONCEPTS OF SPATIALITY

The concepts are distributed within the absolute conception as follows: there are 58.5% (592/1012) of non-spatial concepts, one third (331/1012) are primitive concepts, 3.7% are complex concepts, and 5.1% (52/1012) are simple concepts of spatiality in the analyzed tasks and questions (Table 3).

On the other hand, the topological conception of spatiality displays an opposite trend. Complex concepts are most pronounced and they are detected in 292 tasks out of 425 tasks which include topological conception in total. Tasks with non-spatial concepts are the fewest with only 12 instances (2.8%).

Table 3. The total ratio between the concepts and conceptions of spatiality

	Conceptions			
	Topological		**Absolute**	
Concepts	n	%	N	%
Non-spatial	12	2.8	592	58.5
Primitive	32	7.5	331	32.7
Simple	89	21	52	5.1
Complex	292	68.7	37	3.7
Total	425	100	1012	100

There are 7.5% (32/425) primitive concepts of spatiality and 21% (89/425) simple concepts in the total number of tasks including topological conception.

Table 4. The distribution of concepts of spatiality in line with the task location

	In the text		As an appendix		End of a lesson	
	n	%	n	%	n	%
Non-spatial	85	30.9	6	10.3	513	46.5
Primitive	98	35.6	17	29.3	248	22.5
Simple	25	9.1	8	13.8	108	9.8
Complex	67	24.4	27	46.6	235	21.2
Total	275	100%	58	100%	1104	100%

Most tasks and questions in the analyzed textbooks are located in the end of a lesson (1104) in cases of all four categories of the concepts of spatiality. Still, most tasks and questions located in the end of a lesson belong to non-spatial concepts (513/1104) (Table 4).
Primitive concepts of spatiality are detected in 248 tasks and questions located in the end of a lesson, whereas simple concepts of spatiality are found in each tenth task and question (108/1104).

TYPES OF INTERPRETATION

Results indicate that most tasks and questions demand that the students reproduce facts. There are 788 tasks in this category, i.e. 54.8% of total tasks and questions. We may infer that this is an unfavorable indicator because the students are encouraged to use only the lowest level of cognition – to memorize information and repeat them without any analytic and synthetic expansion of knowledge. The tasks that require the highest level of cognition (projection of processes) are the fewest (26/1437). Percentually, the high-school geography textbooks include only 1.8% of such tasks and questions.
Table 5 systematically lists the types of interpretation requested in each textbook. The textbook B mostly covers tasks and questions which require the memorization and reproduction of specific facts and data (percentually) and there are 58.9% of reproductive tasks in this textbook. Speaking of this category, the absolute values are most pronounced in the textbook D – 201 tasks out of the total number.
The textbook B also includes the fewest tasks and questions which are cognitively least challenging. It is only in this textbook that the percentage of such tasks is less than 50 percent – 48.5%.
Tasks and questions which primarily focus on the interpretation of processes are also most frequent in the textbook C (133/266). In this category, the percentage of such tasks and questions is 45.5% in the textbook A and 39.1% in the textbook D. In other two textbooks, such tasks share similar percentage - 43% in the textbook E and 41.1% in textbook B.

Table 5. The distribution of types of interpretation for each textbook

Types of interpretation	Textbooks									
	A		**B**		**C**		**D**		**E**	
	n	%	n	%	n	%	n	%	n	%
Reproduction of facts	126	52.1	172	58.9	129	48.5	201	56.9	160	56.4
Interpretation of processes	110	45.5	120	41.1	133	50	138	39.1	122	43
Projection of processes	6	2.4	0	0	4	1.5	14	4	2	0.6
Total	242	100	292	100	266	100	353	100	284	100

Speaking of tasks and questions which demand the projection of processes as a high level cognitive activity, it is the textbook D that includes most of these in both absolute and percentage values – 14 tasks and questions (4%). Secondly, there is the textbook A with six such tasks (2.4%). We should point out that the textbook B does not include any of such tasks and questions. The fewest tasks which demand the projection of processes are found in the textbook E (0.6%).

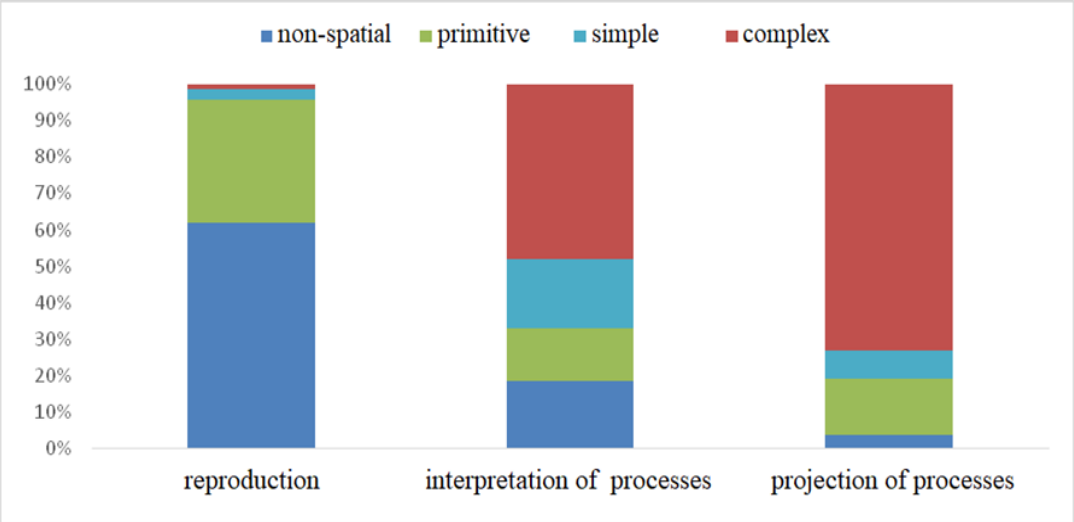

Figure 1. The required types of question interpretation in line with the concepts of spatiality in total

Figure 1 demonstrates the ratio between the required types of interpretation and the used concepts of spatiality. There is an evident connection linking higher concepts and cognitively more challenging functions. Among tasks and questions which require reproduction of specific facts, there are most non-spatial (61.9%) and primitive (34%) concepts. On the other hand, tasks and questions requiring the projection of different geographical processes are dominated by complex concepts of spatiality (73.1%), with only 3.8% of non-spatial concepts.

GRAPHICAL REPRESENTATION AND THE USAGE OF METAPHORS

Table 6 outlines tasks and questions which require graphical representation, either as a basic or an additional element, for each textbook indivially. A general feature of this category is a remarkably small number of such tasks – only 24 out of 1437. Given the fact that the ability to graphically represent spatial relations is one of key components of spatial thinking as many authors point out [29], [30], [6], [31] such approach essentially constricts the ability to encourage spatial thinking in high-school geography classes. The required graphical representations usually refer to plotting geographical locations or areas with some dominant agricultural crops in maps without any representations of relations among spatial phenomena, objects or processes.

Table 6. Number of tasks which require the graphical representation per textbook and total

	Textbook A	Textbook B	Textbook C	Textbook D	Textbook E	Total
Number	3	9	3	8	1	24
Percentage of graphical tasks	12.5	37.5	12.5	33.3	4.2	100
Percentage in total	1.2	3.1	1.1	2.3	0.4	1.7

Spatial metaphors, the role of which is to transfer spatial cognition within a field where it is not required, are rarely singled out in high-school geography textbooks in the Republic of Srpska. Spatial metaphors are detected in only 0.3% of analyzed tasks and questions [20].

DISCUSSION

Our findings prove the predominance of the quantitative spatial analysis paradigm in our geography textbooks. Students are generally asked to determine locations of geographical objects, either by finding or plotting them on a map, which we refer to as positional reference. On the other hand, this paradigm is evident in tasks including arithmetic operations for calculating different absolute and percentage indicators, which we refer to as quantitative reference.

Topological conception is present in less than one third of tasks and questions in the target textbooks. Given the fact that these textbooks are used in high-schools, this finding is unsatisfactory. Although we believe that the aforementioned paradigm and the tasks within it are valuable, it is still crucial to insist on tasks and questions focusing on the analysis of functional and hierarchical relations among spatial objects and phenomena. The reason for this is the pertinence of encouraging students' higher cognitive activities necessary for everyday life. Furthermore, the analysis of PISA tests unveils that the test tasks within the field of geoscience require (geo)topological perception of relations among specific phenomena.

Strictly speaking, concepts of spatiality encompass only the last three groups (primitive, simple, complex). It was for the purpose of analysis that non-spatial concepts were included despite the conceptual inconsistency. The validity of such decision lies in the fact that it is now possible to compare data with the "real" concepts of spatiality. It is the non-spatial concepts that prevail in the analyzed tasks and questions – 42% of all concepts. The obtained results suggest that it is necessary to reconceptualize the high-school textbooks by increasing the occurrence of "real" concepts of spatiality in tasks and questions and decreasing "non-spatial" concepts which refer to facts and reproduction.

According to our findings, reproduction covers almost 55% of all tasks and questions. Interpretation is required in 43.4% and evaluation and projection in only 1.8% of all tasks and questions.

Since the analyzed textbooks are used in high-schools, the reproduction should be minimized and more complex types of interpretation should be encouraged. Primarily, the tasks and questions should include graphical components and inspire so-called graphicasy [32], [33].

Last but not least, textbooks should inspire students to think metaphorically and develop an ability to apply their geographical thinking outside geography classes.

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SOCIOLOGICAL THEORY IN GEOGRAPHY: PHASE OF EMPIRICAL-ANALYTICAL SCIENCE

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ABSTRACT

For the initial phase of the development of modern geography, in addition to its philosophical foundations in the post-Hegelian period, social theory was also of great importance. Its ancestor in the first half of the XIX century. was A. Comte (1798 - 1857), and crucial importance was given to it by the most important representatives of "grand theories": classical theories, contemporary theories, and contemporary theories of everyday life. The historiographical-methodological aspect of the development of sociological theory is provided by sociologists ([42], [44]), while the influence of sociological theory on geography presented by numerous geographers ([6], [10], [16]). The subject of this paper refers to the first phase in the development of geographical science during modern times, during which it had the character of empirical - analytical science ([18], [51]). During this period, numerous directions developed within social geography, which are best represented by the concepts of natural determinism, regional tradition, cultural determination and quantitative revolution, and which are partially united by the concepts of geography as a spatial science ([7], [23] [29], [39]) or positivist geography ([3], [25]). During this period, the works of A. Humboldt and C. Ritter represented the starting point for the development of the first phase of scientific geography (anthropological), the subject of which was the relationship between man and nature [28]. This was best demonstrated through the concept of Lebensraum [41], as a synthesis between biogeography and anthropogeography. At the same time, some other concepts, such as the ideas of P. Kropotkin and E. Reclus, will take a century to revive (radical geographies). During the second phase (first decade of the XX century), the subject of studying geography moved towards the region and the laws of its formation, and on the premises of different concepts as possibilism, chorologism and exceptionalism ([21], [52], [56]). The strong penetration of new elements of social theory (cultural contents) into the geographical studies of the region confirms the landscape as a new subject of research, which is embedded in the development of cultural geography [46]. Finally, the application of the principles of logical positivism leads to a quantitative revolution in geography ([4], [36], [54]).

Keywords: geography of modernity, social theory, empirical-analytical science, positivism.

INTRODUCTION

Modern is a period in the development of modern scientific thought that has a different duration in the social sciences. Weber (1989) linked the emergence of modernism to "Occidental rationalism" (the West), whose economic prosperity (capitalism) was crucially contributed by the ethics of Protestantism. Before defining the doctrinal issues

of modernity, Habermas [17] classified scientific knowledge, ie. science and phase in their development on: empirical-analytical (technical interest), historical-hermeneutic (practical interest) and critical-dialectically oriented sciences (emancipatory interest). Then, he [18] defined the notion of modernity as a set of cumulative and mutually reinforcing processes, such as: capital creation and resource mobilization; development of productive forces and increase of labor productivity; affirmation of central political forces and shaping of national identities; expansion of political rights participation, urban life forms, formal school education; secularization of values and norms, etc. He also claims that:

> After Hegel's death, the paths of school and secular philosophy separated again. School philosophy must compete with private assistant professors, writers and private individuals such as Feuerbach, Ruge, Marx, Bauer, Kierkegaard - and one Nietzsche, who left the Basel professorship. Within the university, the task of theoretical self-understanding of modernity is ceded to state and social sciences, as well as ethnology. In addition, names such as Darwin and Freud, trends such as positivism, historicism and pragmatism confirm the fact that in the nineteenth century. physics, psychology, and the historical sciences liberate worldview motives, which for the first time, without the mediation of philosophy, influence the consciousness of time [18].

It is certain that for Habermas modernity [16] begins at the end of the 18th century, while its end is an open question. On the one hand, he suggests that postmodernism is already beginning with Nietzsche, that is, "that against discourse, which from the beginning resides in this philosophical discourse of modernity, it began with Kant and thus created the opposite of subjectivity as a principle of modernity" (Ibidem, 278). On the other hand, he suspects that the modern is an "unfinished project" that has not yet been fully realized. That is why he states that the radical critique of the mind has led to the abandonment of modernity, and that negative dialectics [17], deconstruction [18], and genealogy cannot be unambiguously included in philosophy or science, or in the theory of morals and law, or in literature and art." the epoch of modernity is connected with the non-dialectical rejection of the principle of subjectivity.

It is clear from this that the issues of theoretical development of geography must be viewed far beyond the narrow philosophical framework, primarily through the influence of social theory, and thus the question of the duration of modernity needs to be defined more precisely. The beginning of the development of modern geographical thought can be roughly determined as the middle of the 19th century, and the end of the second half of the 20th century. The appearance of the first scientific geographical societies (Royal geographical society, London 1830) or regular geographical classes at all universities in Germany [19] can be considered as indicative events. Taylor (1985) notes that C. Ritter in Berlin (1820) briefly established a course in geography, and that the first permanent

[16] He probably does not mean a specific event, but the processes that Hegel spoke about, which have expanded sufficiently over most of Europe and created the preconditions for the beginning of a new era.
[17] It refers to the "negative turn" that Adorno and Horkheimer made in the Dialectic of the Enlightenment.
[18] This term represents Derrida's departure from structuralism, by which he explores the sedimented structures that shape the philosophical discursiveness within which we think, and one of his most famous works is Grammar.
[19] After the victory over the French in 1871, Bismarck understood the importance of geography, so he introduced it by decree to all German universities.

courses were established in Wien (1851) and Giessen (1864). Peet (1998), in his desire to more precisely define this time frame, begins the modern connection with the year of death (1859) of the first scientific geographers (A. Humboldt and C. Ritter), and connects the end with the emergence of neoliberalism in the late 1970s. Also, in theoretical terms, he focuses on geographical directions that developed in the second half of the twentieth century, from existentialism, phenomenology, humanistic, radical, Marxist geography, etc. Most other modern geographers avoid more precise dating of this period, e.g., Johnston (1997), who is indispensable in assessing and periodizing the development of geographical science and who, according to Agnew (1989), identifies a series of "paradigms or philosophies and methods" in which the history of geographical ideas is successfully presented. He emphasizes the adoption of the scientific method in geography, the development of spatial analysis and spatial science, and various concepts within behavioral, humanistic and radical geography. He does not emphasize the conditional boundary between the period of modern and postmodern time, but it is discreetly read through the description of the cultural turn in geography in the late 1980s, which is characterized by the emergence of new directions (feminism; identity politics; the question of language and discourse; reinterpretation of the old).

> The late 1980s saw changes within human geography which were both reactions to preceding disciplinary development and responses to external approaches and no longer considered them viable, especially those associated with spatial science, although some continued to explore large data sets in the mold established by behavioral geographers: locational science was a small, relatively isolated sub-set of active geographers, and development in GIS did not make a substantial impressions on much of the discipline, indeed, many were very critical [23].

Other important historians of the theoretical and methodological development of modern geography maintain a similar approach. One emphasizes the result of a critique of the positivist approach or the development of geography as a spatial science, which crystallized in two directions in the late 1960s as radical and as humanistic approaches [7]. Another one embraced a far broader time frame and emphasized the plurality of geographical thought that carries the inevitability that we must live with positivist, Marxist, humanistic, Islamic, structuralist, Christian, folk geography, etc. [29]. The third introduces a clearer division within the modern development of geographical thought, based on Habermas' (1975) classification of scientific knowledge [50].

Table 1: Habermas's theory of cognitive interests

Form of science	Knowledge-constitutive interest	Social medium	Expression trough
Empirical-analytic	Technical	Work	Material production
Historical-hermeneutic	Practical	Language	Communication
Critical	Emancipatory	Power	Relations of domination and constraint

Source: Unwin, 1992: 30

Based on this, we can now narrow down our subject of research and focus on the development of scientific geography in the modern period with precise timing. For us, the beginning of this period begins with the organization of university geographical teaching in Europe, and ends with the appearance of capital philosophical-geographical achievements (Harvey, Explanation in geography; Lefebvre, La Production de l'Espace).

In this way, within this incomplete lifespan (spatial and empirical-analytical science) we get a precise temporal (1874 - 1969) and theoretical-methodological framework (anthropological, regional, cultural and quantitative geography) of this research. In this way, the extensive works of researchers from the period 1960 - 1980, which methodologically fit into behavioral geography, and humanistic and radical approaches, because they belong to the historical-hermeneutic science, are excluded.
The complexity of historical-geographical and scientific-methodological development of geographical thinking during the modern period requires a certain degree of generalization and visualization of concepts, processes and researchers in a given time frame. Therefore, we will accept the challenge to present this scientific cognitive process on the basis of reference literature in the form of a multilayer diagram in which the first level represents the type of science [17], the second refers to dominant paradigms [23], and the presentation of other layers, disciplines, methods, key thinkers) is the result of the author 's reflection on the subject of the paper. In order to clarify the following diagram, it is important to mention that most of the cited sources in the paper refer to Anglo-Saxon geography, for which regional geography begins with Hartshorne [21

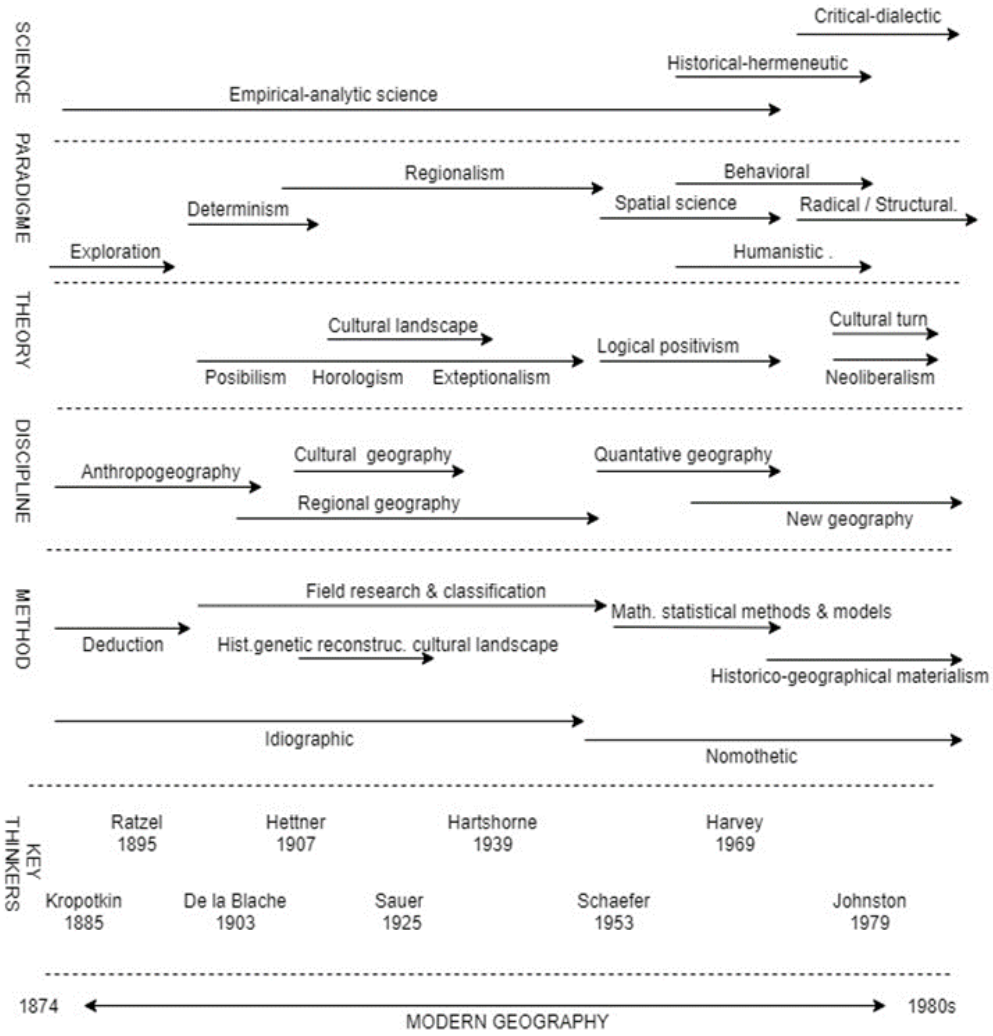

Diagram 1: Scientific and paradigmatic development of geographical thinking in the modern period

Nevertheless, the same author had previously translated Hettner's major work Characteristics of Regional Geography into English [20] , making Hettner not only the most important German geographer in the early stages of modern geography, but also a widely influential one [56]. Development of regional geography moved to the first decade of the 20th century in which the capital works of De la Blache (Tableau de la Geographie de la France, 1903) and Hettner (Grundzüge der länderkunde, 1907) were published. Considering the year of the beginning of regular geographical teaching at universities, anthropogeography [21] was included in this period, as an early modern geographical school, which was a good connection with the 20th century. and the dynamic development of scientific geography.

In this way, on the geographical side, we made an introduction to what the term geographical imagination is, and it was introduced into wider use by D. Harvey, who tried to relate to what sociologist W. Mills had previously identified as sociological imagination. According to Gregory (1994: 81 - 82), both authors sharply criticized the prevailing orthodoxy in geography and sociology, which emphasized ethical and political responsibility in clarifying the links between the terms place and space (Harvey, 1973), respectively biography and history (Mills, 1959). It is clear that social geography until then, for the most part, showed little interest in social processes, while sociology paid little attention to theorizing the spatiality of social life. Only now can we begin a historical-geographical description of the origin and development of social theory, the crown stone [22] in the construction of the four-sided pyramid (geography, philosophy, social theory and political economy) of social geography in the first modern period, which had the character of empirical-analytical science.

The emergence of Social theory

The name sociology, as well as its basic theoretical postulates, is considered to be the result of the scientific work of A. Comte, whose capital work included the Cours de philosophie positive (1830 - 1842) and Système de politique positive (1848 - 1854). He not only gave a name to sociology (1839), explained the transition of primitive societies into modern ones (theological, metaphysical and positivist phase), but also established a positivist direction that would strongly determine the character of social sciences and humanities and which, with certain amendments (logical positivism 1920s - 1930s), to be dominant until the middle of the 20th century (in social geography 1953 - 1969). Sociology is defined as the science of society, to which Comte's successors gave a deeper meaning, while social theory is a narrower term, which arises from the self-conscious speculation of social theorists about social reality and social relations.

It can be concluded that they, like other scientists, rely on the results of their predecessors, explaining social reality through databases, on the basis of which they base their own theories on a wide range of social problems [43]. Only those theories that stand the test of time, and at the same time have a wide scope of application, become generally accepted. That is why sociological theory is defined as "a set of interconnected ideas that

[20] He received the Cullum Award in 1930, the highest recognition of the American Geographical Society

[21] Ruppert et. al. state that the development of this direction went through four phases: geodeterministic (La Play and Ratzel), possibilistic (P. V. d. l. Blache), morphogenetic (Durkheim and Schluter) and functional (Park, Burgess, Bobek, Christaller).

[22] The name for the final stone in the circular roof structure, about whose examples and symbolic meaning, see: G. Mutabdzija, Geophilosophy of the premodern, Amazon (2021).

enable the systematization of knowledge about a society, the explanation of that society and the prediction of its future" [41]. As space, place, and landscape, as central subjects in the study of social geography, have become interesting for the humanities and social sciences, the broader implications of the contemporary permeation of social theory and geography are most evident in political ecology and cultural policy of nature [9]. These have become, probably, the most important issues which, by their nature, have significant implications for the main social theory, in which the notions of power, knowledge and space are recognized. This is somewhat confirmed by the characteristic geographical interpretation of the concept of social theory:

> I do not use it as a synonym for sociology or even social science. Instead, I propose to treat social theory as a series of overlapping, contending and contradictory discourses that seek, in various ways and for various purposes, to reflect explicitly and more or less systematically on the constitution of social life, to make social practices intelligible and to intervene in their conduct and consequences [16].

However, the modern interpretation of sociological theory abandons the idealized conditions in which it arises and suggests that it is similar to society, that is. to be influenced by a wide range of political factors. It can recognize the crucial role in emphasizing the importance of certain theories through relationships political forces in society, and: the importance of mentoring that current theorists have gone through, dominant political orientations in society, empirical verifiability of the hypotheses on which these theories are based, as well as the affiliation of their authors to dominant and influential social groups [41]. It is clear that this affiliation has a variable geographical definition, depending on the political-geographical and cultural matrix of individual countries or regions. Therefore, only a few theories reach a certain level of universal acceptability, as an expression of their scientific orthodoxy or canon.

Within these theories, we distinguish three types. The former is defined as grand - theories, which deal with social structures and significant social changes, and therefore represent the interpretation of large time segments of human history and / or large parts of society. This term can also be used to denote all theories that successfully describe the transition from one type of society to another (primitive - modern, feudal - capitalist, production - consumer). The second type are theories of everyday life, which focus on everyday problems of small scale, they are also called theories of everyday life, and therefore represent the opposite of grand - theories. The third type refers to theories that try to integrate the previous two types. Given the time of their creation, the subject of our interest are classical theories I (1870 - 1920) and modern theories of everyday life (1930 - 1970s).

The classical age of sociology encompasses the late nineteenth and early 20th centuries and refers to theories created by the first generation of sociologists, primarily Emil Durkheim, Carl Marx, and Max Weber. These founders of the most important grand theories are joined by Georg Simmel, Thorstein Veblen and George Mead.

Table 1: Overview of the most significant authors of grand theories in the classical period

Key thinkers	The theory is significant for explanation	Key concept
E. Durkheim	The transition from primitive to modern society	Social facts
C. Marx	The Proletariat and the Enrichment of the Capitalists	Exploitation
M. Weber	Rationalization of the West through social action	Bureaucracy
Simmel	The tragedy of culture and the theory of everyday life	Mystery and space
T. Veblen	Conflict between business and industry	Consumption and leisure
G. Mead	Sociology of Everyday Life	Definition of the situation

Given the subject of study and key concepts in their grand theories, the works of Durkheim and Weber are important for the empirical-analytical phase of geography, while the grand theories developed by the other four authors (Marx, Simmel, Veblen and Mead) relate to theories. Marxism, everyday life and consumption, which in the sphere of geographical interest (epistemological aspect) belong to the historical - hermeneutic phase of geographical science, so it will not be the subject of this paper.

Durkheim and Vidal: from social morphology to possibilism

Emil Durkheim (1858 - 1917) is considered a successor to Comte's work, which surpassed his teacher. This is reflected in the successful theoretical development of sociology, but also in the establishment of a specific way of thinking, which has left a significant mark on most contemporary sociology theorists. His capital contribution to sociology is reflected in the establishment of a theory, which through the terms: solidarity (concerns diversity based on the contribution of a large number of members of society), dynamic density (represents the number of people and frequency of their interaction) and collective consciousness (beliefs and feelings common to members of a group, tribe or society) explained the historical transformation of primitive mechanical societies (eg hunting - gathering economy was characterized by mechanical solidarity or absence of division of labor, in which everyone did everything) in modern organic societies (occur in societies with a developed division of labor and specialization of craft and other jobs). He had a great influence, not only on sociology (he is considered its founder), but also on anthropography, which focuses on three main types of problems: the description of ethnographic facts; inductive reconstruction of long-term cultural history; and the development of general propositions about culturally regulated human behavior [26]. This was transferred to the then dominant anthropogeographic school [28].

Also, his contribution to geography was achieved through a kind of rivalry with Paul Vidal de la Blache, who is considered the founder of social geography. Although Vidal was 13 years older, their scientific careers were almost identical, and they both died almost simultaneously. While Durkheim was born into a Jewish family in the east of France (Espinal, Vosges), Vidal came from a conservative Catholic family from the south, who was educated in Avignon. In that period, elite education was not reserved only for the best students, which they both certainly were, but a certain hereditary social status was also necessary. The Durkheimian were rabbis, while Vidal's father was a high school teacher and his grandfather a customs officer. This is best confirmed by the commentary on the historical circumstances in France at that time, according to which "a peasant could still expect his son to become a teacher, and he to get his son to become a teacher in high school, while only his son could become a university professor and member of the Institute" [52].

After primary education in local communities, Durkheim and Vidal were educated in Paris. While Vidal came to the Favard institution at the age of 13 and then to the Lyceum

of Charlemagne, at the age of 18 Durkheim enrolled at the Jauffret institution and then at the Luis-le Grande lyceum [1]. This was just a preparation for the prestigious Ecole Nationale Superieure (ENS) whose students become, Vidal after the second attempt at the age of 18, and Durkheim after the third attempt at the age of 21. After three years of study, they both successfully passed the aggregation exam, Vidal as the first in the history-geography group, and Durkheim as the seventh in the philosophy group. After this, they both worked in high schools, Vidal in Carcason, and Durkheim in several provincial schools (Puy, Sans and Saint Quentin), after which they continued their postgraduate studies. Vidal at the Ecole francaise d'Athenes, and Durkheim received an international scholarship to stay in Berlin, Leipzig and Marburg.

The careers of university professors of crayons began early, Vidal at the age of 26 as an assistant professor (maitre de conferences) in Bordeaux, and Durkheim at the age of 29 in Nantes. After this experience, Vidal spent twelve years at ENS, and then the same number at the Sorbonne, as head of the geography department. Durkheim spent fifteen years in Bordeaux before crossing the Sorbonne. Their followers are dubbed Durkheimian and Vidalians, their followers were called Durkheimian and Vidalians, and were constantly interacting on three different sets of research questions. The first relates to the growing interest in modern history (geography, sociology, and the social sciences), especially about how these different interests came together as institutionalized disciplines in France and Europe in the late 19th and early 20th centuries. The second set of questions emphasizes the existence of an extensive literature on the history of ideas and the history of geographical and sociological thought, while the third refers to the connections between Durkheimian and Vidalians, and seeks a conceptual foundation for social geography and revived humanistic geography [1].

Despite the similarities in individual careers, their political and scientific orientations were significantly different. Durkheim and his supporters (Durkheimian) were proponents of positivism, rationalism or realism, leftist views and socialism, who published papers on social morphology in the journal Annee sociologique (Mauss, Halbvachs, Simiand and Hubert). At the same time, Vidal and his like-minded people (Vidalians) pinned their hopes on neo-Kantianism or nominalism, liberal or moderately conservative beliefs, wrote for the Annales de Geographie, and shaped their views within possibilism [23] as a regional geographic direction. The interpretation of the basic contextual settings of this geographical school is most comprehensively presented in Vidal's fifth book The Physiogamy of France (Tableau de la géographie de la France, 1903), followed by regional monographs, which were doctoral theses under Vidal's mentorship: Demangeon (1905), Blanchard (1906), Vallauk (1907), Vacher (1908) and Zion (1909). These regional monographs soon became a model for studying regional geographic content at universities around the world. In addition to these narrowly geographical themes, Vidalians have contributed significantly, in theoretical terms, to the understanding of the concept of place and influenced on historians of the Annales School of History [5]. Although Tableau was an introduction to a much larger project [24], outside the narrow geographical framework, which focused on French natural history and long-term social and cultural development, it was challenged by the Durkheimian because it did not articulate laws but pointed to coincidences and ambiguities between nature and society. A kind of mirror in the relations between these two groups of French scientists,

[23] See: G. Mutabdzija, Regional geography of Europe

[24] Ernest Lavisse, Histoire de France, a 27-volume edition covering the period before the 1789 revolution.

he represented their critical attitude towards the works of the German geographer F. Ratzel [25], whose works Vidal read and commented on meticulously.

> While Ratzel moved from the life sciences into geography, Vidal was originally a historian and therefore less inclined to emphasize the physical constraints than the historical experience of those who populated and thus formed a region. Vidal's effort to build a respectable geographical discipline occurred in the political context of the defeat of France in 1871 and the loss of the Alsace region. His regional motive was embedded in a political battle concerning a better administrative practice in France. His historical inclination imbued his geography with a 'cultural turn' that conditioned a lot of work in this vein during the 20th century [48].

In addition to this political-geographical reason, the essence of Ratzel's critique referred to natural determinism, a widely present paradigmatic approach in the geography of that period, where Durkheim was initially helped by Ratzel's work in specifying the nature of social morphology and strengthening the view of sociology and human geography. On the other hand, Vidalians Ratzel's writings helped to diminish the influence of determinism in social geography, especially emphasizing the interaction between human activity and the physical environment, mediated through the relations of animate and inanimate nature. French possibilism would serve C. Sauer, along with the foundations of the German Landschaft School [26] and American anthropologists from the Berkley School (Kroeber and Lowie), to constitute cultural geography as a new discipline that would dominate the United States until the early 1950s. Her focus was also on the role of religion, which contributed to the transformation (superorganic construction) of the cultural landscape. It was the processes through which religion influences the landscape are not much studied, but the focus was on the spatial distribution of these landscapes [13]. The importance of religion, as a factor in reshaping the landscape, was also contributed by the ideas of Max Weber, which will temporarily strengthen ecological determinism. Cultural geography will lose its original significance in the early 1950s, as it will be characterized as "too descriptive, atheistic and apolitical" [36].

The Weber brothers: rationalization, social action, and the location of industry

In the history of modern science, there are rare examples of brothers who have achieved top scientific results in various scientific fields. Such an example is provided by the brothers Weber, Max (1864 - 1920) and Alfred (1868 - 1958). Both had a broad academic education, with Max studying law in Heidelberg and then history and law in Berlin. He earned a doctorate in the history of labor law, after which he began his academic career at the University of Freiburg and then in Heidelberg. The focus of his interest shifted from teaching to social issues, and the culmination of his scientific contribution was in the field of sociology, which he defined as a science that "wants to understand and interpret social action and thus explain what is causal in its course and its consequences." [43].

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[25] Anthropogeographie I -II (1881, 1891), Politische Geographie (1897), Völkerkunde (1885 -1888), and is best known for the concept of lebensraum (living space) through which he explained Germany's expansionist ambitions in terms of a Darwinian struggle for survival, a which the Nazis abused in a geostrategic sense.

[26] Created as a reaction to natural determinism developed by Ritter and Ratzel, the most important representatives were: Hettner, Schlüter, Passarge and Krebs.

This definition of Max derives from his rich theoretical work (theory of social action and theory of rationalization), which includes a diverse and complex conceptual apparatus. His work has left a big mark in the social sciences, and the starting point in the theory of social action is the distinction between the concepts of behavior and action. The first term refers mainly to unconscious actions that occur without conscious thinking and is closely related to the eponymous psychological concept (behaviorism), which significantly influenced the emergence of sociological theories of everyday life. The second term refers to conscious human actions, which Weber classifies into: affective, traditional, value - rational and goal - rational action. Because of this, the notion of action was the core of his interest and meant that a thought process took place between "stimulus and reaction to stimulus", so for him these were situations in which people attached meaning to their actions. According to him, understanding is a key methodological technique through which the researcher tries to understand the thought process of actors, its meanings and motives, as well as how they affect the action being studied.

Weber's second theory has a broader meaning and relates to the rationalization [27] he explained in his major work [53]. As can be seen from the title, he recognized the great influence of the ethics of different religions [28] in the development of capitalism. Among Calvinists, this influence is based on eschatology (predestination), which considers success in business as the main sign of choice (paradise). Therefore, this belief contributed to the formation of moral qualities in workers and entrepreneurs (thrift, diligence, punctuality, honesty, the pursuit of money), which significantly improved the spirit of capitalism, based on the motive to achieve success as an expression of moral norms, not greed. Related to this is the structure of government that has different legitimacy (tradition, charisma and legality) and which, depending on the degree of rationalization, develops in the direction of traditional, charismatic or rational - legal. Weber emphasizes the concept of the ideal type, as a unit of measurement for comparing examples of different social phenomena, and cites bureaucracy [29] as the most successful example. Related to this is his interpretation of the notion of territory, as the idea of a limited space under the control of a group or state, which is called Weber's phrase. He opposes the idea that the ruler has a monopoly on power (legitimate physical violence), because the borders of the territory are in no way fixed [10].

Younger brother Alfred had a different career. He began his studies of archeology and art history in Bonn, continued his studies of law in Tübingen, and defended his doctoral dissertation in the field of economics in Berlin. There he also began an academic career within which his scientific contributions moved in a wide arc of social sciences over three periods. At the beginning of his career, he worked in Berlin and at the German University in Prague, and his scientific focus was in the domain of economics and the struggle for the division of the Czechia on ethnic grounds. After moving to Heidelberg, he completed his major work on the theory of the lowest cost of an industrial site [54], thus making a fundamental contribution to the development of economic geography. His theory

[27] Weber distinguishes four types: practical, theoretical, value, and formal

[28] It explains the positive influence of Protestantism and the negative influence of Catholicism, Confucianism and Hinduism.

[29] Officials have eight characteristics: freedom of decision; setting, not dealing; powers and duties; professionalism; commitment; professionalism; there is no heredity of position; written forms of communication.

attempts to explain and predict the location pattern of the industry on a macro scale, based on minimal transportation and labor costs. The starting point of his theory is the location triangle with vertices that represent the main factors of production (market, sources of raw materials and production process). The problem is finding the optimal location of the factories where the two inputs (raw materials and workers) and output (market) meet. Weber showed that this location can be identified as a point where all transport costs are kept to a minimum (graphical representation of this point).

> As a general rule, the optimal location will lie within the triangle or on one of its edges, but Weber also argued that in instances where some idiosyncratic locational advantage (e.g., a source of power or a pool of cheap labor) could be obtained, a site outside the triangle might sometimes be preferable to the transport-cost minimizing point [14].

His theory requires an analysis of agglomeration factors (leading to enterprise concentration), deagglomeration (leading to enterprise diversification) and regional factors (limiting companies to a certain geographical area), thus achieving Weber's point of optimal transport. Following this success, a new phase immediately begins through working together with brother Max to establish a new discipline, industrial sociology. After a decade of researching the position of industrial workers, he breaks up with Max, in which some historians see the influence of Else von Richthofen [30]. After Max's death, Alfred shifted the focus of his scientific work to the sociology of culture and published significant works [31] in this field.

> Weren't they both shaped by the historical school of German economics? Didn't they often cooperate in the Association for Social Policy? Did they not demand early the parliamentary organization of the German Empire? Weren't they solid liberals, albeit with distinctly national characteristics? Didn't both lead the path from economics to the sociology of culture? But if they agreed so in many respects, why did their works not reinforce each other? [46]

Despite the seemingly similar life paths and scientific contributions of the Weber brothers, their relevance in sociology is different. Alfred was one of the most prominent representatives of cultural sociology, and today he has almost completely disappeared from sociological discussions. He became primarily the subject of historians, who rightly saw him as an exceptional figure in recent German history, and of economic geographers, as evidenced by the fact that the Institute of Economics in Heidelberg bears his name. And what about Max's work today? Compared to Alfred, the situation is completely different with Max. His work is the subject of national and international sociological debate, especially with the emergence of neoliberal economics, when its topicality begins. It did not begin only in Germany "but became a trend in discussions of the methodological and theoretical foundations of historical sociology" [46].

Park and Ullman: From Chicago to Seattle

Unlike previous grand theories, which focus on large sections of history, modern theories of everyday life are a kind of opposite and relate to everyday life. They were created in

[30] Max's student who married economist Jaffa and then was in a relationship with both brothers

[31] Ideen zur Staats - und Kultursoziologie (1927), Kulturgeschichte als Kultursoziologie (1935), Farewell to European History or the Conquest of Nihilism (1947), Einführung in die Soziologie (1955).

the 1920s and are the result of the work of sociologists who are connected to the creation of the famous Chicago school of sociology. The first generation of this school, under the strong influence of G. H. Mead [31], developed the theory of symbolic interactionism, and the most important representatives were: R. E. Park, E. Burgess, W. I. Thomas, R. D. McKenzie and others. The second generation of this school developed after 1945, combining symbolic interactionism with field research methods (today it is called ethnography), and the most important representatives were: H. Garfinkel, E. Goffman, G. C. Homans, J. S. Coleman and others.

Table 2: Overview of the most significant authors of contemporary theories of everyday life

Key thinkers	The theory is significant for explanation	Key concepts
R. E. Park	Urban Ethnology	Fieldwork and Observation
H. Garfinkel	Achieving Everyday Goals or Ethnomethodology	Explanatory Practices
E. Gofman	Social Life as Dramaturgy	Distance to Role
G. C. Homans	Theory of Exchange	Operant conditioning
J. S. Coleman	Theory of Rational Choice	Opportunity Cost

This theory of symbolic interactionism, with all its varieties, focuses on the interaction of the acting individual and the symbols that have a particular meaning. The main determinants of this theory can be presented as: the action of people on things that have meaning; these meanings always arise through interaction with other people; people internationalize meanings, but also modify them through an interpretive process; people consciously use symbols; social interaction makes people more humane; people possess consciousness and self, ie. they are able to shape their actions and interactions; given the life situations they find themselves in, people choose goals [42]. Similarly, as in the previous chapter, not all modern theories of everyday life had an impact on the development of geographical thinking during its empirical - analytical phase, and for us the most interesting is urban ethnology founded by Park and Burgess in the 1920s. This theory left a strong influence on the development of social geography and conditioned the emergence of urban geography, which will reach its dynamic development only with the emergence of quantitative geography in the mid-1950s.

Robert Ezra Park (1864 - 1944) is considered the founder of ecological theory, which he developed within the famous Chicago school of sociology, and which achieved the greatest results in the period between the two world wars. At the beginning of his career, Park was engaged in journalism, and following the life of the city, he improved his observation techniques and field work, which helped him expand his interests in the domain of what would later become urban ethnography. He enrolled at Harvard (1898) relatively late [32], but that did not stop him from making a brilliant academic career, which he began at a small university in Alabama (1905). In his 50th year, he came to the University of Chicago (1913-1934), where he achieved the greatest scientific results. Through his early three essays [33], he tried to formulate a theory of social movements [34],

[32] He conducted his doctoral studies in Germany, listened to lectures by Mr. Simmel, and defended his PhD dissertation with prof. V. Vindelband in Berlin in 1904.

[33] The City (1915), The Urban Community as a Spatial Pattern and a Moral Order (1926), and The City as a Social Laboratory (1929).

[34] It is a theory according to which immigration begins a "cycle of racial relations" between the majority and minority groups, and which goes through three phases: contact and competition; conflict and

which was in fact the programmatic basis of the work of the Chicago School. He later (1925) and his collaborators expanded the first essay into the book The City [35], which explained the development of the city as a model of concentric circles [36].

> This chart brings out clearly the main fact of expansion, namely, the tendency of each inner zone to extend its area by the invasion of the next outer zone. This aspect of expansion may be called succession, a process which has been studied in detail in plant ecology [38].

Park formed his views under the influence of George Simmel with an emphasis on the study of patterns in human behavior, to which he added elements of Herbert Spencer's social Darwinism [42]. Based on these theoretical assumptions, he built a model of society that could be compared to the ecological order, in which individuals cooperate, but also compete in the struggle for survival.

> Park focused on four major social processes: competition, conflict, accommodation, and assimilation. While the latter three processes were cultural and often conscious, Park modeled the competitive process directly from biological ecologists and argued that it was “interaction without contact.” He used plant communities reaching for a share of sunlight as analogous to the individuals striving for valued resources, often unaware of others who were similarly striving and limiting the availability of those resources [41].

The first group of researchers at the Chicago School dealt with comprehensive schemes of social change and social planning, and they were critical of the government 's superficial measures to alleviate the economic crisis [22]. The greatest contribution to this, in addition to the Park, was made by: W. I. Thomas (sharp critiques of social work), F. Znaniecki (introduce terms such as humanistic coefficient and culturalism) and E. V. Burgess (cognitive maps of unplanned patterns of city growth). It was this team that became most responsible for the rise of the Chicago School of Sociology, which will deal with the detailed processing of data on urban communities. The result of this group's work is the establishment of a field station of the Department of Sociology on the outskirts of Chicago, with the task of improving life in the poor neighborhood. As a result, the concepts of citizen participation, self-help, and the culture of poverty have emerged that will become key ideas in the war on poverty. Park's contribution to social theory is reflected in the recognition of "dominant processes of cooperation and competition within the socio-ecological environment" [41]. The first process is characterized by two basic forms (urbanization and institutions), where urbanization and advanced division of labor create interdependent economic dependence. On the other hand, institutions, from the family to the press, help to integrate actors into a common moral and symbolic order. As for social competition, Park felt that it focuses on the struggle for "domination", which can occur at different levels (an individual competes with others for employment, urban neighborhoods aspire to become centers of social power, etc.). According to the Park,

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adjustment; probable assimilation of a minority group. This theory was later rejected, because immigrants maintained the culture of their ancestors in the following generations as well.

[35] Park wrote 6 chapters, Burgess two, and McKenzie and Wirth each

[36] Commuter zone, Residential zone, Working class zone, Zone of transition, Factory zone, The Loop or Central Business District (CBD).

cooperative and competitive social processes often take place in repetitive patterns of "succession," and his best-known example is the study of population patterns in Chicago (immigrants regularly move from urban centers to the periphery to establish safer strongholds in their new country). His most prolific method of social research became social mapping, which was subsequently adopted by urban geographers with the aim of studying the spatial distribution and functional relationships between demographic and settlement factors. Despite these successful solutions and the connection between social theory and urban geography, the Chicago School has also been the subject of scientific criticism:

> Critiques of the Chicago School emerged shortly after as other urban scholars found the theory did not match up well to research in other landscapes. The Chicago School has also been criticized theoretically, most notably by scholars who did not believe the ecological analogy compared significantly with urban human social relations (see a discussion of Firey 1945, 1947; Sjoberg 1960 and Harvey 1973 in Valentine 2001). Although widely critiqued, the Chicago School opened up discussions and theorizations of “community” and promoted research into neighborhoods for subsequent geographers and other urban scholars [11].

Edward Louis Ullman (1912-1976) was a brilliant geographical mind, who achieved significant scientific results in various fields of geography (urban, traffic, regional planning), but also in the field of public administration (traffic, trade, planning), international organizations (OECD) and the military (responsible duties during WW II). He received his academic education at several American universities, and achieved full affirmation at the University of Washington and as a visiting professor [37] around the world [19]. Together with W. Garrison, he is credited with applying quantitative methods and that through a series of strategies and practices he educated an extremely talented and influential group of geographers [38] who stimulated others to adopt the concept of "new geography" [35]. In addition, it is interesting for us because of its contribution to the development of urban geography and its theoretical improvement. Very important is the work A Theory of Location for Cities (1941), which he published in a sociological journal due to the closeness of the subject of the paper. In it, he analyzed Christaller's theory of central places [39], which is better suited to agrarian than industrial regions, and argued that because of this:

> It is not static but changes to fit changes in underlying conditions, particularly transportation. The system also varies from place to place in the world in line with population density, type of agriculture, governmental organization, and many other factors. These underlying regional differences make possible comparisons between central-place systems in the United States [49].

After this, he continued elaboration and description different urban forms, thus improving the previous models ("concentric circles" and "sector forms"). His capital contribution to urban geography was the "multiple core model", which he developed together with C.

[37] Rome, Vienna, Moscow, London, Jerusalem
[38] B. Berry, R. Boice, W. Bunge, M. Dacei, A. Getis, D, Marble, R. Morrill, J. Nistuen, F. Pitts and V. Tobler
[39] Based on housing density and city size of southern Bavaria.

Harris [20]. Their model is based on the description of Chicago and starts from the assumption that people are using cars more and more, the city land is not monotonous and that there is no even distribution: resources, inhabitants and transportation costs. Due to that, secondary nodes are formed in other parts of the city (due to the reduction of daily trips), which act as growth points and over time take on the functions of secondary CBD (central business district). That is why he called this concept the model of multiple cores, which was criticized for its Darwinist (evolutionary) and ecological basis (too simplified patterns of urban land use). Their ideas influenced thinking about the structure of the modern city and, with the increasing importance of spatial analysis, aroused the second generation of urban theorists in the 1960s and 1970s [15]. The key principle in this Harris - Ullman model was transport costs, because it expressed the importance of distance in the decision - making process. Among other factors, which influenced production, this one was predominantly geographical and was adopted by Ullman's followers. Therefore, he considered that “the amount of movement between two places was related to three factors: complementarity, intervening opportunity, and transferability” [24].
This model could be linked to the process of spatial interaction, which represents a dynamic process of flow from one location to another. It is a general concept that can refer to the movement of people, such as suburban travel or intercontinental migrants, but it can also refer to the trade of goods such as raw materials or to the flows of intangible roles such as information [30]. Spatial differentiation emerged as a result of transport and trade, enabling specialization in certain economic activities and the concentration of different social groups. Also, the root of this model is in the term La géographie de la circulation [40], by French geographers from the beginning of the 20th century.

CONCLUSION

In the middle of the 19th century begins the process of establishing new social relations (feudalism - capitalism), which in the domain of theoretical understanding of the new age (modern) is recognized through the strengthening of social sciences (sociology, psychology, geography) and weakening the influence of philosophy on these processes. This is confirmed by social theory, which during the empirical-analytical phase of geography had a decisive influence on the formation of its theoretical-methodological framework. This was shown through a comparative presentation of the main achievements of leading sociologists and geographers within the then leading national schools (French, German, American), which is visible in its domain: paradigmatic orientation (exploration, determinism, regionalism, spatial science); theoretical framework (possibilism, chorologism, exceptionalism, logic positivism) and disciplinary differences (anthropogeography, regional, cultural and quantitative geography). Undoubtedly, social theory, through grand theories and theories of modern life, managed to impose itself on geography as a new theoretical framework, which replaced the hitherto dominant philosophical discourse.

[40] The term was also used by Robert Capot-Rey (1897-1977), who studied the characteristics of the nomadic tribes of North Africa.

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FORMATION OF GEOGRAPHICAL LITERACY THROUGH SYSTEMS OF CONCEPTS

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ABSTRACT

The accelerated course of our country on the way to building a developed democratic society has set many and responsible tasks for the preparation of the young generation. This drew the attention of state policy to the problems of education, to the development and adoption of a number of documents. They outline the educational strategy of the state towards the formation of a complex, competent, promising persona, capable of full realization in life. As the main goal of the high school, it obliges us to look for new approaches in determining the goals, educational content, organization, forms and methods of educational work. The course towards intensification of education must be aimed at achieving the goals in maximum compliance with the immediate and future needs of our democratic development; to decisive improvement of the educational content, by increasing its scientific-theoretical level, practical-applied orientation, educational value; to the organization and methods of training, which allow to develop the activity and initiative of the personality, to use the possibilities of the human intellect. Geography education is also emerging in new aspects. And if until recently it was thought that through this subject students are mainly acquainted with geographical objects, processes and phenomena, at this stage it is necessary to restructure the teaching of geography so that they do not just learn geographical knowledge, but to understand, to master the regularities of the geographical environment in the conditions in which a person lives, works, is formed as a person and which can to some extent purposefully change and manage. Geography education should contribute to the formation of such an image of the young generation, which will be a condition for its social realization.
Closely related to the above problems is the question of the formation of concepts in the geography education. As one of the main issues of modern didactics of geography, its current didactic-methodological characteristics are offered here. Emphasis is placed on the following main points: the place of concepts in the cognitive process; concepts as a logical form of thinking; psychological and pedagogical requirements for the formation of geographical concepts in the learning process; methodological aspects in the formation of concepts in the teaching of geography.

Keywords: geography didactics, geography education, geographical literacy, geographical concepts

INTRODUCTION

What is the place of concepts in the cognitive process?

Human knowledge is not just a passive perception and reflection of the world. It has an active and creative character, which is expressed in the ability of man to know the objective reality and purposefully change it according to social needs. On the other hand, in the process of cognition man himself changes, his cognitive abilities are improved.

This is the staging that is essential for the implementation of the learning process. What is the result of human cognitive activity? This is knowledge. As a form of assimilation of reality, it is the ability of man in his thoughts, goals, desires, activities to reproduce things, processes, to operate with their images, concepts. Geographical knowledge is also the result of the complex and long process of human knowledge.

A very important aspect of human knowledge that is essential for the learning process in geography is that it is a constant movement, a transition from ignorance to knowledge, from more elementary to more in-depth knowledge. This process has many aspects that are interconnected and have different roles in cognitive activity. One of these aspects concerns the problem of the sensory and the rational in cognition. It is the knowledge from a modern point of view that is an important condition for improving the formation of concepts in the teaching process of geography.

The sensory and the rational in knowledge are interrelated, “the essence of things is known through the knowledge of the phenomenon or the rational knowledge is realized with the help of the sensory, and the sensory in knowledge cannot be realized without thinking and language, ie. without the rational” [4]. This formulation has long given reason for a number of authors to consider the sensory and the rational not as successively alternating degrees of knowledge, but as two moments that "permeate it in all its stages of development." [6], [8], [10]. „The unity of the sensory and the rational in cognition means not following one after the other, but necessarily the participation of both in cognition“ [10],[1]. This interpretation confirms that scientific abstractions are a subjective reflection of objective reality, but living contemplation presupposes activity, not „... a passive reaction of the human sense organs to the influence of the surrounding world, simply „looking“ [5]. The staging is of great importance for understanding the basic requirements for the formation of basic concepts in the teaching process of geography, e.g. those about the role and place of visualization, the activity of students in the learning process, etc.

In the process of cognition, different levels can be distinguished, which as peculiar degrees of knowledge differ from each other in their completeness, depth, versatility of coverage of the object; on the ways of reaching the basic content of knowledge; in the form of its expression. In this case we are talking about empirical and theoretical knowledge, issues of great importance in the formation of concepts. In many cases in the teaching of geography, when through observations of natural and economic-geographical objects, processes and phenomena their description is reached, their external features, connections, states are revealed and their essence, genesis, change and development. Then the students' knowledge remains on an empirical level. This may be the result of educational content that does not correspond to the age characteristics of the students, as well as the result of imperfections in the methodology of teaching geography.

The course of the cognitive process and the formation of concepts are closely related to basic categories, such as concrete and abstract in knowledge. They reflect the changes in the cognitive image, both in terms of the versatility of the scope of objects and the depth of penetration into their essence, reflect the patterns of change in the content of knowledge throughout its development [10], [14]. In the case of the sensory in cognition, the image has a sensory-specific character, the knowledge about geographical objects, processes and phenomena is multifaceted, but covers only their directly perceived external aspects and properties (size, shape, color, distribution, etc.) the concrete is only a starting point of knowledge and in the formation of concepts in the learning process in geography. This is

expressed in the need for appropriate illustration, from direct observations of the studied objects and phenomena.

Abstract knowledge, in which the essential aspects and properties are separated, is more one-sided, but at the same time - deeper knowledge, because it reveals the essential, the regular, the universal in things. Abstraction simplifies, roughens, schematizes things and reality, so in the process of cognition thought ascends from the abstract to the new concrete - the "concrete in thinking", which appears as a summary and result. It is the ultimate goal of knowledge, the ultimate goal in the formation of concepts [4]. For it, the knowledge of reality is deep and meaningful, because it reflects the various essential aspects, connections, relations of things, because it reveals the connections of the singular with the universal and gives grounds to be considered as "unity of diversity". The concrete in thinking in the formation of concepts should lead students to a true knowledge of geographical objects, processes and phenomena, which should include the unity of the essence and its diversity. Eg. the formation of the concept of climate begins with the specific knowledge of the climate of the native place and passes through abstractions and generalizations in order to arrive at the disclosure of the content and formulation of the definition of the general concept. On this basis, we ascend to the new concrete in thinking as a unity of general knowledge about the nature of climate and its diversity around the globe, continents, countries and regions, depending on the peculiar manifestation of climatic factors.

The formation of concepts in the teaching process of geography is also related to understanding the unity of the historical and logical method in knowledge. The historical presupposes the study of the origin and development of natural-geographical and economic-geographical objects, processes and phenomena, which explains many of their modern peculiarities. However, this can be done in close connection with the logical method, which reproduces in theoretical form the content of the historical process in a system of judgments, concepts and inferences.

The concept - a logical form of thinking

Logical thinking is generalized and mediated knowledge, it is abstract thinking, ie. thinking with concepts. "The concept is a reflection of the general, and essential features of the class of objects" [2]. The class, in turn, is a set of individuals who have common features (properties, relationships). "An individual is understood as an object, a phenomenon, an animal, a person ..., in a word, everything that has an independent existence (ibid., 90). Classes are not created by people, they exist objectively, and people form concepts about them. Eg. The Danube is an individual that can belong to the less general class of "rivers in Europe", but can also belong to a wider class - "rivers".

The most characteristic feature of the concepts is that they reflect the essence of things, and these are the internal objective connections, which as a "genetic basis" define all other particular features of the whole. Eg. the nature of the climatic zone is determined by the internal causal relationship between its location at a certain latitude and the resulting approximately uniform climate. This connection is common to all climatic zones and determines their features. The essence of many things can be revealed by examining the process of their origin (genesis) and development. "To have a concept of an object means to have a common way of constructing it, to have knowledge of its origin ..., to know the ways of working with it, which have caused the need for its emergence in people's work" [6]. These formulations point to certain requirements both in terms of curricula and textbooks, and in terms of teaching methodology in the formation of concepts.

The peculiarity of the concept as a logical form of thinking is that it gives knowledge of the general. The common is a country, an essence, a moment of the singular, ie. it is given in the singular. On the other hand, we know the singular through the common, because the singular consists of common sides, moments, its essence is common [3], [17]. This statement is of great importance for the methodology of concept formation. Thus e.g. the single term "island of Greenland" on the one hand contains the common feature of all islands [18], and on the other hand - on the basis of universal knowledge for all islands can reveal the specific, special in formation, area, surface, climate and etc. on this island, which makes it unique.

The concepts should be considered in their amendment and development. An objective source for this is, on the one hand, the development of our knowledge of objective reality, which determines a deeper knowledge of the essence of things, its concretization, and on the other - the change of reality itself, which the concepts reflect. In the second case, new concepts emerge, which enriches human knowledge, science. Therefore, we can talk about the flexibility of concepts, about their transition from one to another (e.g. thermal zone - climate zone - natural geographical zone). At the same time, the flexibility of concepts must be combined with their relative stability, certainty, which allows the distinction of concepts and the disclosure of their peculiar nature. As a result of the continuous development of geography as a science, changes occur in its conceptual apparatus. These changes are reflected both in the new, more modern formulations of some concepts (subject of geography) and in the formation of relatively new branches of science and the related emergence of new systems of concepts.

In summary, the problem of change and development of concepts is reflected in the teaching of geography in the following aspects:

- 1. he knowledge about the essence of some geographical objects, processes and phenomena, about the content of their concepts according to the age peculiarities of the students is deepened and changed, which finds expression in the spiral arrangement of the material studied in the curriculum and the way of revealing this content in textbooks (e.g. the concept of "time" is studied at different levels in fifth and eighth grade).
- 2. The knowledge about the diverse manifestation of the essence of a given concept is enriched, its volume is increased by studying many single objects, where the knowledge rises to a new quality (eg the students' knowledge about the diverse manifestation of the climate in different continents, countries is enriched and areas throughout the training course).
- 3. Qualitative changes in the system of geographical concepts are also the result of quantitative changes in it with the inclusion of new concepts to be studied (eg "relief profile" in the sixth grade).

As is well known, there are relationships and interrelations between things and phenomena in reality, and the concepts reflect this reality. Therefore, there are also relations and connections between the concepts. The relationship between concepts as a reflection of the relationship between things determines the formation of systems of concepts in scientific knowledge in general and in particular - in individual sciences. This facilitates the process of cognition and at the same time allows for its further development. The relationship between geographical concepts is a reflection of the relationship between the three main agents: man (society) - production - nature (natural environment). The construction and study of systems of concepts in the teaching of geography have important methodological significance. In this way a logical and psychological basis for

the successful course of the cognitive activity in the learning process, in the individual lesson, a greater depth, scientificity and systematization of knowledge is achieved, a worldview is formed. This is a basic position in our methodology [4], aimed at forming the geographical culture of students [3], [17], [21].

Of particular importance for the formation of concepts in the teaching process of geography are studies of the content and scope of concepts. The problem is as follows:

- 1. In some cases the content of the concept is scientifically revealed and does not change further in the course of study, but the volume of the concept changes. This is the case with the term 'map'.
- 2. The way of revealing the content of the concept is changed from more elementary to more profound, scientific, e.g. in the concept of "natural geographic zone" in seventh and tenth grade.

What are the psychological and pedagogical requirements for the formation of geographical concepts in the learning process?

The formation of geographical concepts is a long and complex process. It begins from an early age with the formation of the so-called life concepts that are formed as a result of the daily life experience of children. In life concepts, knowledge is limited, elementary in content. Scientists use words, terms, with which they fix the concepts, but in fact the generalizations created by them remain at the level of empirical knowledge. Thus e.g. in the process of their life experience children learn a certain range of geographical terms. They talk about mountains, the weather during the day and more, having regard to many of the insignificant features of these concepts („mountains“ are high parts of the earth where there are forests, rivers“; „weather is whether it is hot or cold“). True knowledge of the nature of objects, processes and phenomena of the real world is obtained through scientific concepts that reveal the inner essential and common features of things [4].

Interesting for the teaching process in geography is the relationship between life and scientific concepts. In the pedagogical literature this problem is still not sufficiently developed. It is generally accepted, however, that in many cases the development of life concepts prepares the mastery of the system of scientific concepts, and in other cases empirical knowledge prevents students from rising to the level of theoretical thinking [7]. This also applies to teaching geography [19], [20].

The formation of geographical concepts finds its most purposeful and harmonious manifestation in high school, where it is a purposeful cognitive process, which is carried out through the joint activities of teacher and students.

The successful formation of the concepts largely depends on what the student perceives, and this depends on three factors:

- 1. From the object itself (what aspects in it are more pronounced)
- 2. From the personal experience of the students (which features are most familiar)
- 3. From the teaching methodology (what features the teacher emphasizes, or the students take notes of) [15].

For a long time, many authors have emphasized the need for a special selection of objects for observation, which must reveal both the essential common in things and the diverse manifestation of the common. This gave grounds to widely recommend the perception of a large number of objects, of "rich factual material" [13], [16]. The current statement in contemporary literature is that the observation and comparison of many objects is not necessary to illustrate a feature as essential. It is only necessary for the sign to be significant for them and then they will separate it even from one object, subject [6], [15], [20].

The personal experience of the students, expressed in perceptions, ideas, concepts, activity, plays a big role in the formation of the concepts. The important thing here is to emphasize, however, that the old knowledge must be used from a new point of view, for a new classification of objects, for a new solution of problems. "Life experience should be used in education, but only in the way of its essential reorganization into a qualitatively new form of scientific knowledge for the student, which does not correspond and cannot correspond to the simple life experience" [6]. In this sense, ideas and desires play the role of "handy material" in the formation of the new concept.
The formation of concepts in the learning process presupposes a deep mental activity, which is based on the logical operations of analysis, synthesis, comparison, classification and especially abstraction and generalization.

What are the methodological aspects of the formation of concepts in teaching geography?
The study of the methodological literature shows that the elaborations on the problem of the concepts are directed in three directions - the system and the content of the concepts in the teaching of geography, the classification and the formation of the geographical concepts [3], [17], [19], [20].
The scientific level of education finds the most concrete expression in the coherent and interconnected system of general concepts. In this sense, the basics of geographical sciences should be introduced in school through generalization of scientific material, increasing scientificity by strengthening the part of basic knowledge (including concepts) while reducing the more mobile shell (factual knowledge), strengthening typological approaches [12].
In general, all authors are unanimous in the opinion that the concepts along with the laws are a major structural component of geographical knowledge, that teaching geography should be based on systems of concepts, the main features of which are defined unambiguously and scientifically depending on opportunities for students [9], [11], [12], [3], [17].
Based on the studied literature and research on the problem of concepts, the following conclusions can be made:
1. At the heart of the curriculum in geography are systems of concepts and related patterns. They reveal the foundations of science and have a kind of content-logical structures, characterized by the following:

- Each system of geographical concepts consists of separate concepts or subsystems of concepts at different levels.

There are structural and horizontal connections and relations between the concepts and the subsystems, which determine the content-logical structure of the system, its integrity. There are horizontal connections between concepts and subsystems with the same degree of generality, from one level (e.g. industry - agriculture - transport), and vertical (subordination) connections - between concepts with different degree of generalization, at different level (e.g. industry - heavy (group A), light and food (group B). Horizontal links between geographical concepts or subsystems of concepts can be one-way (climate factors - climate elements), two-way (internal earth forces - external earth forces), multidirectional (eg between the components of the geographical envelope. to be expressed in: genetic unity (furrow - ravine - river valley), cause - consequence (atmospheric pressure - wind), partial coincidence (natural area - natural geographical zone), contradiction (market - command-administrative economy). Vertical connections and relationships express subordination and subordination. The subordinate concept is a

part, a side of the main one (national economy - branch structure), and the subordinates express species differences (branches of the economy - industry, agriculture, etc.).

- The systems of geographical concepts are at different levels - interdisciplinary, intrasubject, within a separate course, title, topic, lesson, paragraph. Each of them is strictly determined by laws, laws and principles of epistemology, logic, psychology, didactics, science, geography, methodology.
- Higher level systems have more complex content-logical structures. Each system of a lower level is a concretization of the higher one.
- The general subject system of concepts in the learning process changes, develops in a spiral. This is reflected in all lower level systems, in the individual concepts.

2. Classification of geographical concepts can be done from two aspects: system-logical (depending on the concepts can be general and single) and system-content (according to the peculiarities of science, geographical concepts can be grouped into subsystems - cartographic, natural-geographical, economically).

3. The formation of geographical concepts is a long and complex process, closely related to the system-structural features of the educational content and the application of the respective methodology. Basically, this process in the formation of general concepts includes the following activities: understanding and mastering the content of concepts and related ideas; formation of skills for application of the concepts in a known and in an unknown situation; building and making sense of systems of concepts (Fig. 1).

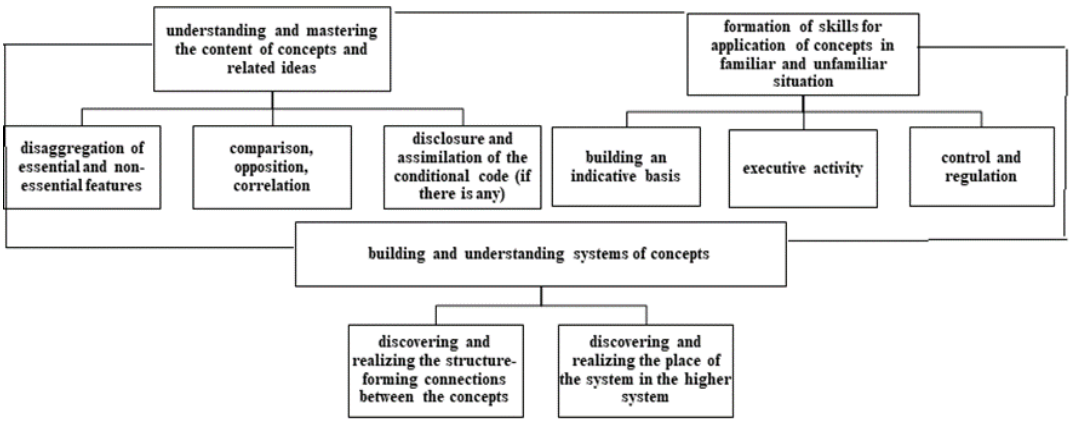

Figure 1. Formation of concepts in teaching geography [4]

The division of these three activities is conditional, as they are very closely interrelated and mutually conditioned. Understanding the content of concepts in some cases is done by performing one or another subject-practical activity, by revealing the place of concepts in a given system. The better the content of the concepts is understood, the faster the skills to operate with them are mastered, the better their place in relevant systems is understood. The understanding and application of some collective concepts presupposes the construction of systems of concepts and the related skills, etc. At the same time, these activities are very complex and have relative independence in the learning process, which requires their differentiation and more detailed consideration.

1. Conditions for successful implementation of activity - understanding and mastering the content of geographical concepts and relevant ideas are: knowledge and use of basic knowledge and skills of students, use of the map, intra-subject and inter-subject relations,

appropriate illustration, comparison, repetition of essential signs, exercises for recognizing them, etc.
2. Conditions for successful formation of the skills for application of the concepts are: to know with what skills the application of a given concept is connected; the formation of skills to be closely related to the content of the concepts and on the basis of basic skills; to provide all prerequisites for the management of the learning process - clear goals, indicative basis, practice of actions in different situations in control and regulation.
3. Conditions for successful construction and comprehension of systems of concepts are: complete, correct and permanently formed individual concepts, use of the graphic method (schemes, tables), wide activity for revealing various connections, relations, comparison, summarizing activity, etc.

CONCLUSION

From what has been said so far, it is clear that the problem of forming concepts in the teaching process of geography has a broad theoretical basis. This is a favorable prerequisite for its development in a practical-applied plan, for improving the practice of teaching geography in the spirit of modern requirements.
Given the fact that Bulgaria is part of the European educational area, it is completely reasonable to study the issue on a comparative basis with geographical education in European countries. This presupposes, firstly, the study of specific methodologies applied in these countries and which have proven their effectiveness, and secondly, the derivation of specific possibilities for their adaptation in the practice of teaching geography in Bulgaria.

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FORMATION OF SPATIAL THINKING IN GEOGRAPHY TRAINING

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ABSTRACT

The formation of students' spatial thinking is defined as an absolute value of geographical education. This is related on the one hand to the specifics of geographical science, and on the other – to the essence of spatial thinking. The contribution of geography education comes from geography as a science. It analyzes the numerous spatial relationships of the earth's surface to achieve a scientific understanding of the importance of space for human behavior – a kind of "geographical wisdom". This analysis underlies many human decisions. Concrete solutions and their spatial expression show that people perceive space differently and as a consequence receive different spatial information about the same objects or situations. This is determined by their needs and their ability to perceive the environment, to make adequate decisions, to implement them. The concept dominates in modern geographical education. According to it, the student fully acquires geographical knowledge only when it acquires meaning for him, when he becomes involved in what is being studied.

The type of intellectual activity that arises in the practical need for orientation in space is defined as spatial thinking. Given the specifics of geographical knowledge and the nature of the type of thinking that manifests itself in it, this report defines the place of spatial thinking in the context of the leading ideas in the strategy of geographical education in high school in Bulgaria.

Keywords: geographical education, spatial thinking, geography training, strategy of geographical education

INTRODUCTION

In the context of the learning content

According to the interpretation of the place of spatial thinking in geographical education in secondary school, which is made in this article, it is necessary to first consider the content aspect. The essential characteristics of the geographical content are the basis for formulating the goals of the geography education. The educational content, in the processing of which spatial thinking is formed and developed, is determined by the answers to the basic questions for geography: "Where, what is it there, and why is it exactly there, where it could be?" [3], [8]. These answers are related to the attributes of the geographical object - spatial location; spatial structure; spatial process [1].

Therefore, in the modern strategy of geographical education this approach to the study of the geographical object could be the basis for the selection and structuring of the educational content at macro and micro level and be reflected in the curricula and textbooks [7].

In the context of the goals of geographical education

The main goal of geographical education in high school "to form the foundations of geographical culture in students, as part of their general culture - for reasonable activity in the geographical space." [6], [2], [3] can be operationalized in a behavioral aspect in the context of spatial thinking. At the same time, the goals will be consistent with the content constructs, which are the content of both spatial thinking and geographical education. This needs to be specified in the curriculum. An example of operationalizing the goal is shown in the table:

Table 1. Example of operationalizing the goal

Skills	Relationships
To determine the absolute and relative location of an object; For analysis and interpretation of the spatial structure of the object; For analysis and explanation of the processes, as a result of which such a structure is formed, exactly in a certain place.	The young person participates in different social roles and in different spatial relationships; To understand one's own participation in natural and social situations; Evaluates and participates in resolving controversial issues in space; To conduct individual or team basic geographical research in order to obtain and apply information.

In the context of the learning process

The spatial nature of the geographical content, the essence of spatial thinking - a "tool" for mastering this content, the behavioral emphasis in the goals of geographical education give grounds for specifying some requirements for the process of teaching geography to develop qualities of spatial thinking. In accordance with the behavioral orientation of the goals, it is natural for the student to be a subject of learning. It manifests itself as such in the process of solving problems.

In current teaching practice, the teacher intuitively creates such tasks when it is necessary to compensate for their absence in the textbook. In this sense, the development of spatial thinking is not fully realized for either the teacher or the student. The purposeful development of spatial thinking can be achieved by carrying out a problematic type of training through a system of tasks designed in the textbook.

What are the features of such a system of tasks? The system is composed of tasks in which the content of spatial thinking is designed [9]. Two types of activities can be understood as the content of spatial thinking:

- To create images for the spatial attributes of the geographical object on the basis of different types of visualization (natural-material models, graphic and cartographic images);
- For operation in spatial images, ie. their inclusion in various connections and relationships in accordance with the condition of the task.

The system will have the property "integrity" if it contains tasks both for creating images and for operating with images of the three attributes of the geographical object [1].

The connections between the tasks, ie. the structure of the system is determined by:

- the sequence in which the types of visualization are used (from object, three-dimensional images, in which the point of orientation is fixed in the subject itself to graphic and cartographic, two-dimensional images, at an arbitrarily chosen point of orientation);
- the gradual development of the qualities of spatial thinking - independence in the analysis and interpretation of situations in space; speed and criticalness in decision making; ability to select an appropriate image.

Table 2. Exemplary research objectives for diagnosing the condition of the problem of spatial thinking in three aspects

№	Example goals
1	As a design in the teaching documentation of geography
2	As a competence, ability and readiness of the geography teacher to develop this type of thinking
3	As qualities of students' spatial thinking - a result of teaching geography

Table 3. Example methodology for studying the state of the problem of spatial thinking

№ object	Subject	Method	Tool	Presentation of the result
1.Training documentation - a book for the teacher	Theoretical formulations for goal-effective, content and procedural aspect of the problem for development of spatial thinking in teaching geography	analysis		
-textbook	Tasks and visual images in which technology for the development of spatial thinking is designed	content analysis	table	table
2. Teachers	Competence and ability to develop spatial thinkin	surveying	survey	graphic images
3. Students	The qualities of spatial thinking - a result of teaching geography	test	test paper	Profile 1 Profile 2

The system of tasks will have the feature of "structure" if the tasks involve the use of different types of visualization in a certain sequence and if in their conditions the development of the indicated qualities of spatial thinking is purposefully designed.

It is possible to design the tasks so that they are used in all moments of the macrostructure of the lesson - when announcing and motivating the topic, when developing the new curriculum, when consolidating, when controlling [4], [5]. This means that the approach and criteria for constructing the learning content at the level of learning material to coincide with those for formulating the tasks of the system. In this case, the task system will have the feature "functionality" [9].

In accordance with the presented theoretical statements about the place of spatial thinking in geographical education, specific research can be done to establish the state of the problem. Here we offer sample goals and methodology for such a study

Such a methodology can be fully used only in compliance with relevant criteria and indicators for spatial thinking. Such are presented in Table 4.

Table 4. Exemplary criteria and indicators for the development of spatial thinking

Criteria	Indicators
1. Ability to create images	1.1. Completeness of the image for ... 1.1.1 ... composition and structure of the site 1.1.2 ... location of an object 1.1.3 ... the processes as a result of which exactly this structure and exactly this place is formed 1.2. Width of image creation for ... 1.2.1 ... the composition and structure of an object 1.2.2 ... the processes as a result of which exactly this structure and exactly this place is formed
2. Ability to operate with images	2.1. Width of image operation 2.1.1. Changing the spatial location 2.1.1.1. Ability to select an object for orientation 2.1.1.2. Application of regularities 2.1.2. Change in the spatial structure 2.1.2.1. Application of knowledge of general concepts 2.1.2.2. Application of knowledge of regularities 2.1.3. Changing the spatial location 2.1.3.1. Ability to select an object for orientation 2.1.3.2. Application of knowledge of general concepts 2.1.3.3. Application of knowledge of regularities 2.1.3.4. Ability to present information about location and structure through different types of visualization

CONCLUSION

In the teaching of geography a specific type of thinking is developed - spatial thinking. The concretization of the target, content and procedural aspects of the development of this type of thinking in the context of the strategy of geographical education in the secondary school in Bulgaria gives an opportunity for: purposeful diagnosis of the state of this problem; constructive interpretation of research results; construction of technology for the development of this specific type of thinking for teaching geography, and subsequently - its design by the teacher and the student.

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INTEGRATIVE TRENDS IN GEOGRAPHY EDUCATION

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ABSTRACT

In recent decades, integration processes in science and social practice have remarkably attracted the attention of the scientific community and significantly influenced the style of thinking in various fields. These processes and trends are a fact that does not fuel controversy and denial. Unfortunately, however, the ways of their realization and the forms of their manifestation are not so indisputable. In this respect, there is still no unanimity and in the various areas of human activity this is the most difficult task to solve. Proponents of holistic, unifying, global, integrated learning, developed and tested more than once, saw in the integration processes of modernity new arguments in its favor. These objective processes served as a new stimulus for updating and deepening the theory of comprehensive (integrated) learning.

In what way do we interpret the influence of these processes in science on the selection and structuring of the curriculum for general education needs? What trends are observed now and to what extent are the forms they acquire appropriate? How is it interpreted in the modern pedagogical literature the so-called "program integration"? Is there a common opinion about the nature, meaning, functions and forms of integration trends in education? These are vital questions to which a constructive, principled and objective answer should be given in order to continuously raise the level of pedagogical science and teaching practice. It is unlikely that a single report could provide a comprehensive answer to all the above questions. In this sense, we limit ourselves here to their projection in the field of teaching geography. We refer to the ancillary state of the system of geographical education in Bulgaria, to the way it functions, to the didactic resources it handles.

Keywords: integrative trends in science, geography education, principles of education, interdisciplinary links

INTRODUCTION

not yet found its optimal development, although many attempts have been made in this regard. Such developments are extremely necessary in the context of private didactics, because on this basis a generalized option for the application of integrative learning in the modern school can be reached. In this regard, the author of the present study sets himself two main tasks: to classify the integrative links applicable in the teaching of geography; to outline possibilities for realization of methodological, interdisciplinary and intrasubject synthesis in the teaching of geography.

The very concept of "integration" has Latin origins and means uniting, connecting parts into one whole. In it, the essential aspects of the elements are united for the difference from the mechanical sum of things, which ultimately leads to a new qualitative definition of the system.

There is a significant terminological difference in the interpretation of integration in the literature. Some define it as integrative tendencies, which are "increasingly emerging as specific ways to improve the structuring of educational content for didactic purposes in order to help learners to better understand the phenomena of reality [1], [2], [3]. Others pay biggest attention to the structural and functional integrative tendencies, which he calls "quantitative and qualitative integration" [13].

Many publications in the pedagogical press consider the integrated approach in different aspects [10], [11]. It is often interpreted as a means of systematization in the goals, content and organization of the educational process, in order to synthesize and summarize the knowledge, beliefs and behavior of students as a developed person. In other words, the integral approach is a dialectical approach because it realizes the effect of wholeness through the dialectic of the whole and the parts. The world exists systematically and integrally and the knowledge about it must be built through the synthesis of sciences and in the synthesis of the subjects in the educational system. Therefore, knowledge of the world encompasses the processes of integration and differentiation, which is also the methodological basis of the integrated approach. Therefore, the integrated approach is a means to stimulate the cognitive activity of students and master the unity of the world, to synthesize knowledge and turn it into beliefs and behavior, for the functioning of education as a system of goals, content and organization of the pedagogical process. After taking into account the specifics of educational and scientific knowledge in the educational process, a number of authors indicate three levels of synthesis in the application of the integrated approach - methodological, interdisciplinary and intradisciplinary. Each of these levels is precisely defined by place, functions, content and forms in the overall learning process.

The highest form of integration is methodological synthesis. It realizes the ultimate effect of integration - systematic knowledge of the world, versatility in the development of the student's personality. On the basis of the methodological synthesis the private scientific knowledge of the students is integrated and generalized to the degree of scientific concepts and categories, to worldview knowledge and beliefs, to the formation of integral qualities. The students' views on the materiality of the world, on its regularities, on the interrelation between nature and human society, etc. deepen. The realization of the methodological synthesis is possible with a special purposeful organization of the educational process as a whole. All subjects take part in its implementation through the worldview elements included in their content. Through it, general scientific conclusions, concepts and philosophical categories are formed - a system of views on the world. The theoretical formulations of the integrated approach find a wide echo in the methodology of teaching geography, as well as in the practice of the subject [5], [8], [12].

In geography education, the integrated approach is defined as “a system of activities (procedures, operations) related to its goals, content, organization and methodology, aimed at systematization, synthesis and summaries at different levels in horizontal (single classroom) and vertical plan (education from 5th to 12th grade), which leads to mastering the unity of the world and to the formation of the qualities of the multifaceted personality” [5]. According to the author of the present study, there is a difference between integration and the integrated approach.

Integration is an objective process, and the integrated approach is a means, a way of action on the part of the subject, with which he stimulates the integration processes. The in-depth analysis of the terminological diversity - integration, integrative tendencies, integral approach, shows that in their essence there is something common, unifying. It finds

expression in the current setting for building the system of educational work in secondary school on the basis of integrative links, carried out at different levels. They find specific application in the teaching of all disciplines, in particular in the teaching of geography. Integrative links are the objectively existing form of interaction, of synthesis and generalization of knowledge, skills and worldview ideas, in which the latter are of a new quality [4], 12], [16]. They are a reflection of the objective links in the world around us, an intermediate link in the process of human interaction with the surrounding environment. This mediation is a result of the causal relationship between science and education, between the scientific and cognitive process.

The subject does not reflect science as a whole, but only its foundations in a reduced form [14], [15]. Scientific knowledge is a complete reflection of objective reality. In the process of interaction the subjects participate as a whole or through separate structural components related to their content. Therefore, it must be concluded that the use of integrative links in teaching geography aims not only at applying the acquired knowledge and skills from one subject to the acquisition of knowledge in another, but a functional synthesis of empirical knowledge that leads students to acquire knowledge, skills and the formation of worldview ideas on a new, higher level.

The issue of the types of integrative links has a certain practical and applied significance for the teaching of geography. Based on the analysis of their nature and the peculiarities of the training in the subject, the following classification can be accepted:

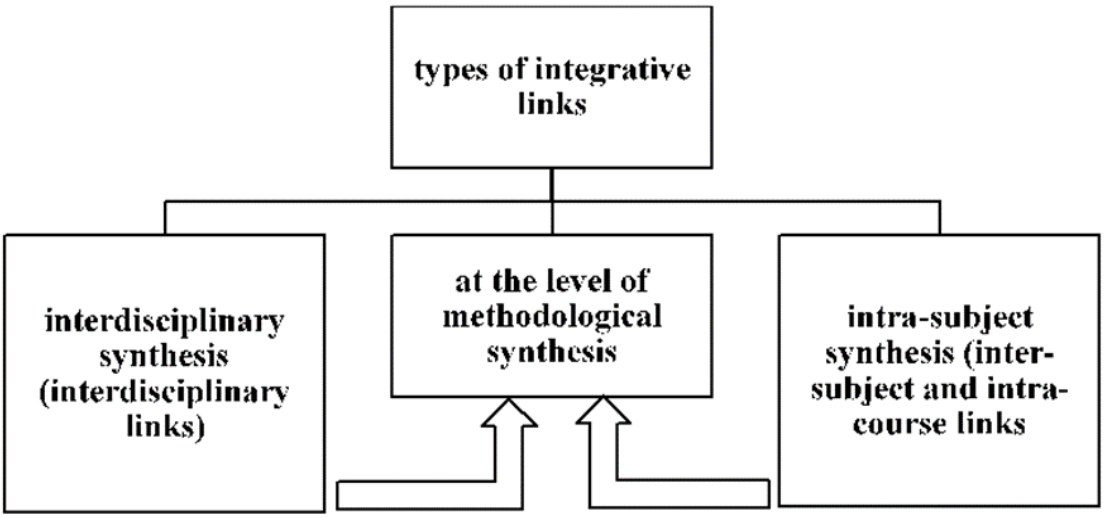

Figure 1. Classification of integrative links in geography education

In the practice of teaching geography, the interdisciplinary and intrasubject synthesis are successfully realized, ie. interdisciplinary, intrasubject and intracourse relations. Of interest are the views of Zverev and Maximova on the classification of interdisciplinary relations. It is proposed to group them in three directions: content-information; operationally effective; organizationally and methodologically, the latter being subordinated to the first two (Fig. 2). Their name shows that the interdisciplinary links of the third type enrich the methods, techniques and forms of organization of education.

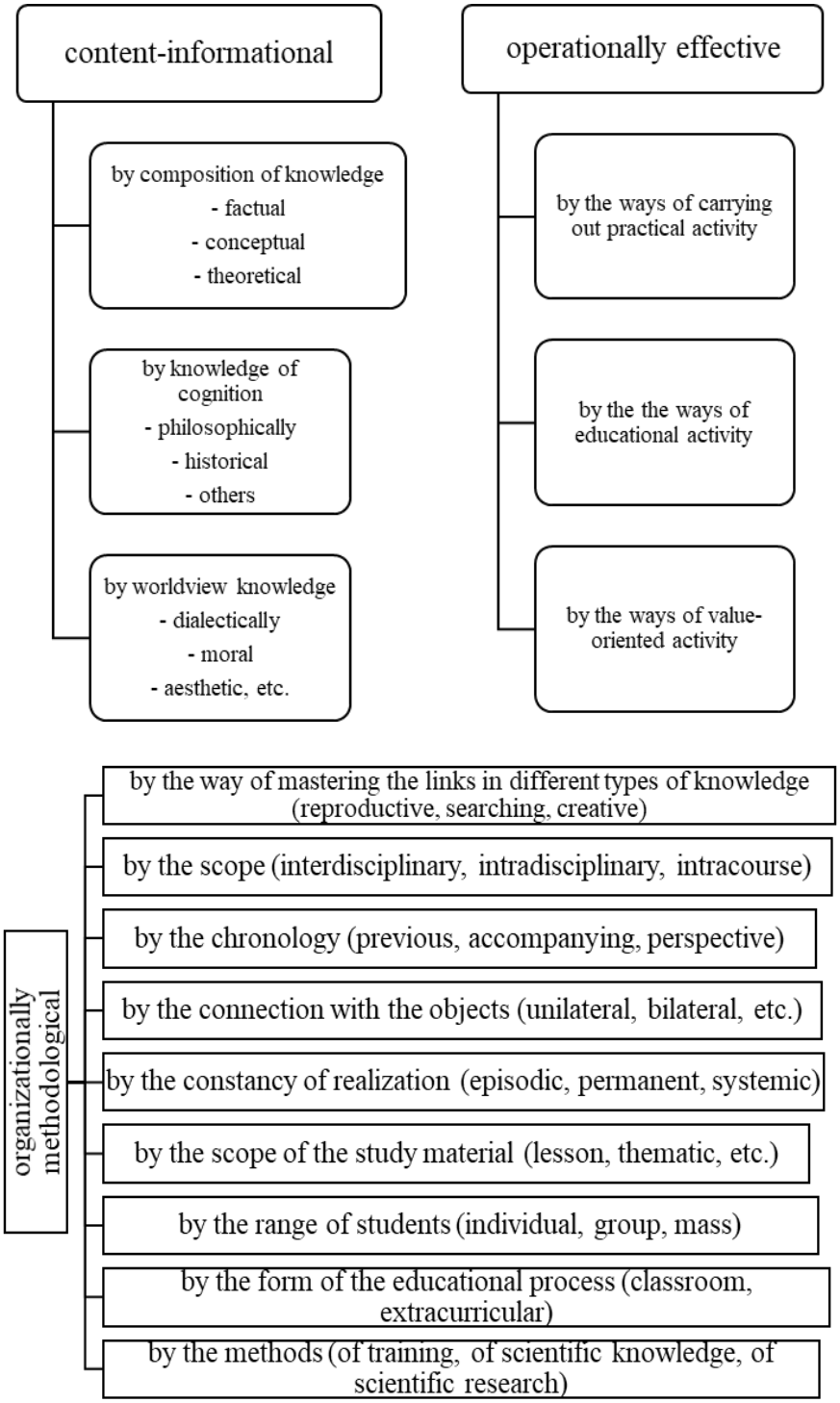

Figure 2. Classification of interdisciplinary links applicable in teaching geography [6]

The need to apply integrative links in the teaching of geography is based on deep methodological and scientific foundations. The integrative links in the teaching of geography are also imposed by the modern tendencies in the development of sciences and by the social practice. In this direction, the place of geography as a science with great integration potential can be seen. Proof of this is the very subject of her study - the natural and socio-economic territorial systems, their structure, dynamics and interaction in dialectical unity. Geography considers the geographical environment as a complex

material system. It explores the territorial aspects of the interaction between human society and the natural environment on a local, regional and global scale. The borderline position of geography as a fundamental natural and social science determines its possibilities for interaction with both the social and natural sciences.

This reinforces the practical and applied importance of geography, ‘’... its complexity is one of its most significant advantages over many other sciences in the integration of knowledge and the ability to solve interdisciplinary problems, not only purely geographical, but also those of other areas of knowledge’’ [9]. It can successfully participate in solving the ecological, raw material, demographic and food problem, in the rational territorial organization of production, etc. [7], [17]. Geography as a science reflects the diversity of its object (nature and society), but it is not able with its own means and methods to reveal the material unity of the world and the objective social reality. This is done through integrative processes with other sciences.

When it comes to using integrative links in the educational process, we should not confuse this form with integrated learning. These are two different concepts. This is about the implementation of integrative links in the following cases:

- when determining the goals and objectives of the educational process;
- in the educational content;
- in the organization and methodology of training

The issue related to defining the goals and tasks in the teaching of geography, in accordance with the modern formulations for the application of integrative links, acquires new dimensions. It is necessary, above all, to differentiate the main goal of the educational process between the different school levels. Secondly, each subject must make sense of and justify its contribution to the formation of integral knowledge, skills and beliefs in students.

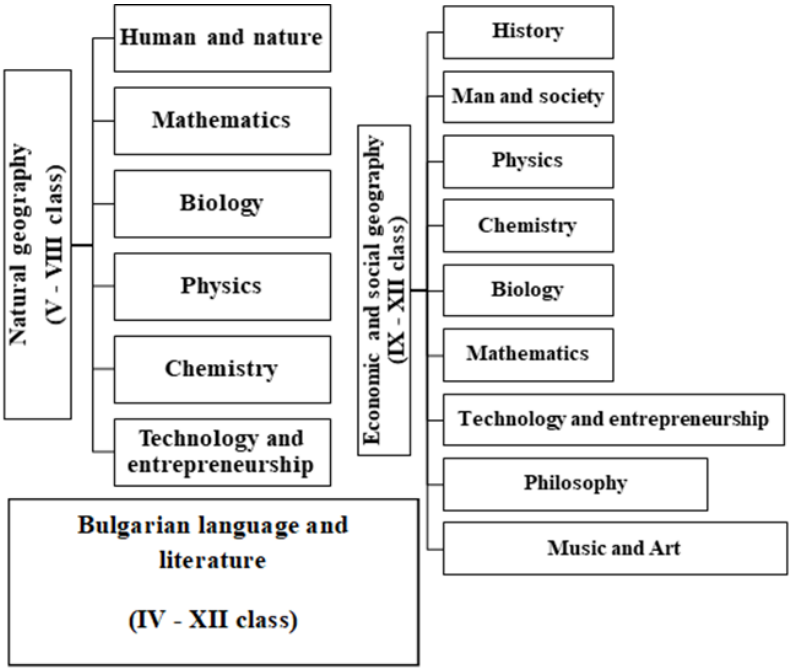

Figure 3. Interdisciplinary links in geography education

It can be seen from the figure that when studying the courses in natural geography it is expedient and possible to make a connection with the education in man and nature,

mathematics, biology, physics, chemistry, technology and entrepreneurship, etc. At the heart of many natural geographical processes and phenomena are physical, chemical and biological laws and patterns. In this case, the interdisciplinary synthesis leads to general scientific conclusions and generalizations about the unity and diversity of animate and inanimate nature, to preserve the harmony between nature and human society, the ecological balance in nature and others.

In the courses in economic and social geography, the closest interdisciplinary links are made with history, philosophy and the world and personality, less often with physics, chemistry and biology. The acquisition of scientific knowledge about the socio-economic territorial systems of different rank (global, regional, regional) is directly related to taking into account the role of socio-historical, natural and demographic factors.

Given the logic of the geographical sciences, the intellectual and age characteristics of the students, the intra-subject and intra-course links and synthesis are correctly applied with regard to the structuring of the educational content (Fig. 4).

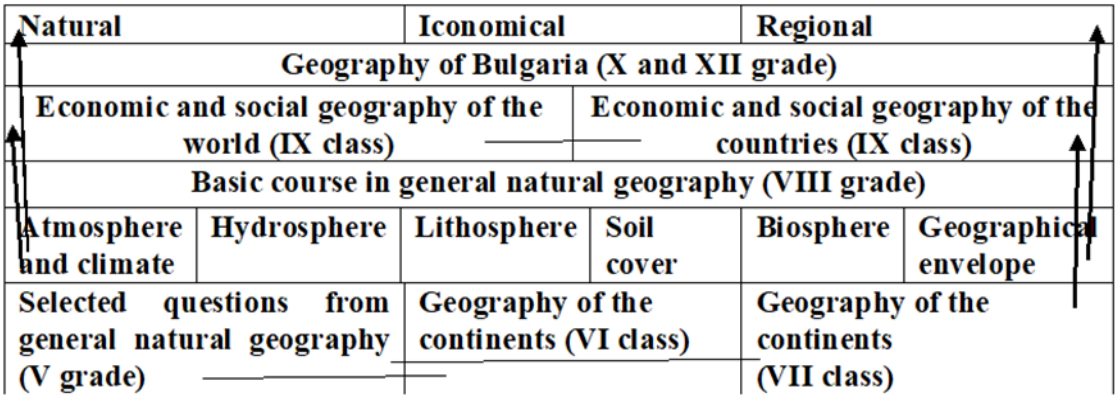

Figure 4. Intra-subject and intra-course links
→ intra-subject links
▬ intra-course connections

From the analysis of the figure it can be seen that in the teaching of geography a complex system of intra-subject and intra-course connections is realized, which are the basis of the content-logical structure of the subject. Without their consistent implementation in the learning process, the successful acquisition of scientific geographical knowledge is inconceivable. This is due to the complex nature of geography, combining natural science and socio-economic knowledge.

The following summary conclusions can be drawn:

- In the model of the curriculum in geography there are two blocks - V - VIII class with study mainly of natural geography and IX - XII class with predominant study of economic and social geography. This is determined by the logic of science and the learning process, as well as by the intellectual and age characteristics of the students. It can be seen that there are strong interdisciplinary links between the courses in natural and socio-economic geography. This is because the study of complex dynamic socio-economic systems of different ranks is possible only with a good knowledge of the natural-territorial systems that are the subject of natural geography. The integrative links between the two blocks are an adequate reflection of the objectively existing unity in the structure nature - man - production.
- There are pronounced intra-subject and intra-course links between V and VIII grade. In the general natural courses the geographical envelope is studied component by

component and complex. Getting acquainted with the individual components is a necessary prerequisite for the development of natural-territorial complexes at different levels. The intra-course links and their continuation allow, on the basis of the system of general natural-geographical concepts and regularities on a planetary scale, to acquire knowledge about the continents, to form skills for their complex characterization. The intra-course synthesis in VIII grade should lead the students to private scientific conclusions and generalizations about the mutual connection and conditionality between the separate geospheres, allows to reveal the basic geographical regularities on theoretical level and their manifestation in the different geocomplexes, condition - maintaining the harmonious balance between them.

- Intra-subject and intra-course links and interactions in the courses in economic and social geography are realized on the basis of the deductive approach. In the first part of IX grade a system of general concepts of economic and political geography is built: national economy, world economy, international division of labor, integration between the countries, branches of material production and non-productive sphere, economic region and others. The private scientific conclusions and generalizations are connected with the leading ideas and regularities of the social development. This is a necessary theoretical basis for studying the regional shares - economic geography of the countries and economic geography of Bulgaria. Their study rediscovers and proves the general patterns in the development of the countries, while revealing the common and special in them.

The realization of integrative links at the level of modern requirements is connected first of all with the improvement of the methodology and the organization of the educational process in geography. First of all, there is a requirement for a new approach to planning the learning process. Undoubtedly, this issue has always been in the attention of teachers, but now it is necessary to specifically plan all kinds of integrative links in courses. This means to know in advance very well the interdisciplinary key problems in the directions and courses, the educational content in the related disciplines and the possibilities for establishing interdisciplinary links, as well as those for making interdisciplinary and intracourse links.

The problem of the realization of integrative links is closely related to the qualitative characteristics of the educational documentation in general and in particular that of geography. It can definitely be said that the new textbooks in geography, both through the main text and through the non-textual components, create preconditions for the realization of interdisciplinary, intrasubject and intracourse links. In this regard, the methodological guidelines in the teacher's book are also helpful to the teacher.

The realization of integrative links at the level of modern requirements is related to a new approach in the organization and conduct of the educational process in geography. It does not deny the existing subject system, but only perfects it. The systematic realization of integrative links leads to new forms of education, the result of cooperation between teachers in different disciplines, e.g. integral lesson, integral seminar, complex discussion, complex excursion, etc. The integral lesson does not deny the main types of lessons, but develops them [12], [14], [15].

The various forms of education, which create an opportunity to apply knowledge and skills from different subjects, to private scientific conclusions and generalizations, allow to formulate and make sense of general scientific conclusions about nature, society, production, to form integral qualities in students.

If various methods and techniques with integrative orientation are systematically applied, not only in the teaching of geography, but also in other subjects, the students naturally prepare for the performance of tests on an integral basis. In this way, the knowledge in several subjects, the skills of the students to transfer knowledge and the way of mental activity from one subject to acquire knowledge or reveal regularities in another are checked and evaluated. Eg. The topic "Problems of the interaction between nature and society" allows to test the knowledge of geography, biology and chemistry.
The realization of integrative links in the teaching of geography needs to be done on the basis of problem-based learning in order to develop the cognitive activity of students and their creative thinking. This implies reproductive activity on an integral basis (reproduction of knowledge from other subjects by the teacher or students, discussion of private problems and solving individual cognitive tasks), derivation of interdisciplinary learning problems and independent search for ways to solve them (by applying knowledge and the ways of mental activity in a familiar and creative learning situation).

CONCLUSION

In conclusion, the following conclusion can be made: The application of integrative links in the educational process in geography has a huge educational, upbringing and developmental impact. The problem of standing as a whole - general didactic and methodological, is very complex, so its study and research continues. The presented theoretical formulations are an addition to the creative research aimed at shedding light on the issues related to the integrative links in the teaching of geography.
Although the above affects the implementation of integrative links in the teaching of geography in Bulgaria, continuity can be sought at the European level. This is necessary given the fact that the country is part of the European educational space. In this regard, the research interest should be focused first - on the study of issues in didactics and methodology of teaching geography in European countries, second - on the delineation of commonalities and differences between European countries and Bulgaria, and third - on the derivation of specific opportunities for stimulating the integrative connections in the teaching of geography in Bulgaria.

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OPPORTUNITIES FOR IMPLEMENTATION OF INTERDISCIPLINARITY IN GEOGRAPHY EDUCATION

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ABSTRACT

Contemporary didactics of geography perceives interdisciplinarity as a basic regulatory principle of subject teaching. In principle, it is not new, but today it is perceived as particularly relevant, given its role in making interdisciplinary links in the learning process. Interdisciplinarity is associated with the integration of geographical and non-geographical issues in geography education. At the present stage, this is especially important, because the solution of more complex learning tasks requires to approach them not only through the eyes of a learning discipline. Regarding the curriculum in geography and economics, considered in the system of geographical education in our country, the question seems even more relevant. New curricula in geography and economics abound in such complex learning tasks that directly affect reality.

The integration of the subjects, as well as the joint work of the respective teachers, are of different intensity. Therefore, it is not surprising that there is an abundance of definitions and modifiers often used as synonyms for integration in education - cross-curricular learning, interdisciplinary learning, blended learning, integrative learning, multidisciplinary learning and more.

The present study is a modest attempt to interpret the interdisciplinarity between geography and history in the learning process. Of course, we would not claim completeness in one report. In this sense, we will highlight some issues that deserve further research, first: what are the possibilities for interdisciplinarity, and second: what are the possible problems associated with it.

Keywords: principles of teaching, interdisciplinarity, geography education, history education

INTRODUCTION

What is meant by interdisciplinarity?

The issue of interdisciplinarity is especially relevant in modern didactics. Evidence of this are the numerous interpretations on the issue and the realization that linking different subjects will lead to better results and higher quality of education in high school. [1], [8], [9]

In general, interdisciplinarity can be defined as the "coordinated interaction of two or more disciplines" and, more particularly, the interaction of their "teaching methodology", which seeks to give a global rather than a concrete vision of problems or topics related to different disciplines. " [3]

In order to define interdisciplinarity, it is necessary to first make a distinction from others, widely used in the literature, often as equivalent concepts (Table 1).

Table 1. Distinguishing interdisciplinarity, [7]

Multidisciplinarity	Interdisciplinarity	Transdisciplinarity
Comparison of different disciplines, sometimes without a visible connection between them.	Interaction between two or more disciplines: this interaction can range from simple communication of ideas to mutual integration of management concepts, knowledge theory, methodology, procedures, data and organization of research and teaching.	Application of axiomatics common to a set of disciplines.

The distinction in the table can be supplemented by other concepts:

- Interdisciplinarity is "cooperation between different disciplines or between different sectors of the same science to achieve real interactions, reciprocity of exchange, for mutual enrichment." [2]
- Interdisciplinarity "arises when different disciplines interact with a specific research objective and in a specific field of application". [7]
- In the context of school education, “in the specific didactic scenario, it is largely a matter of momentary manifestations of limited interdisciplinarity and the creation of relationships, usually oriented towards the achievement of specific goals” (ibid.).
- Interdisciplinarity is what is lacking in the discipline to embrace reality. It establishes bridges, emphasizes interactions, differences, analogies, suggests dialogue, listening, open vision. [5]
- In instrumental terms, “means... convergence of specific skills; in terms of learning content – learning, knowing and understanding reality...“ [6]

It is clear from the definitions that the issue under consideration is not indisputable. However, it can be concluded that the common aspect between the disciplines stands out, aimed at explaining certain phenomena and approaching them from another point of view. This conclusion can be supplemented by Piaget's view that using an interdisciplinary approach we could look at an aspect in a more global way.

The complexity of the interdisciplinary connections is clearly visible. It is not enough for the disciplines to be simply comparable. They must be closely related to each other.

Where is the interdisciplinarity between geography and history?

The closeness between history and geography is indisputable. Its educational significance can be realized through clearly coordinated and integrated educational methodologies. This closeness is complex due to the fact that a person is both an inhabitant of time and an inhabitant of space:

„Hardly anyone will dispute the need to include the spatial dimension in the study of historical facts, as well as the temporal dimension in the consideration of geographical regions, topics and problems.“ [4]

The knowledge, skills and competencies for dealing with geographical and historical problems, which are activated and acquired in the learning process, emphasize the strong capacity of multidisciplinary synthesis and the methods of the considered disciplines. It is clear that the curriculum of each of the two subjects is not enough to separate them from each other - both disciplines deal with migration, agriculture and globalization. What distinguishes them is the research methodology and the reflections that accompany it. In this sense, a method must be sought to avoid the predominance of geography over history and vice versa. This also supports Piaget's view that in interdisciplinary work the two disciplines enrich each other. [2], [4]

Proof of the closeness between geography and history is the emergence of "geohistory" and "historical geography". In order to avoid the strong dominance of one of the two disciplines, it is essential to distinguish ourselves from the two approaches mentioned above. In this regard, the training offers to address topics related to global issues from different perspectives, both in their temporal evolution and in their spatial perspective. In this way, students have the opportunity to develop their critical thinking, to compare and understand the complexity and interdependence of phenomena.

What is the methodological aspect of interdisciplinarity?

The interdisciplinary methodology is systematic. According to Joël De Rosnay, this allows knowledge to be organized in different ways and understood not only through analysis but also through synthesis. Therefore, systematic knowledge differs from analytical knowledge (Table 2).

Table 2. Analytical approach and systematic approach, [5]

Analytical approach	Systematic approach
Isolation of the elements of the analyzed system. It is based on the precision of the details from a local point of view. Modifying only one variable. The analyzed system is closed and can be divided into minimal units. The system is independent of the duration. The connections are simple and linear. The system is autonomous and incomplete.	You connect the interdependent elements of the analyzed system from a global point of view. Change groups of variables simultaneously. The analyzed system is open and can be divided into subsystems or modules in constant interaction. The analyzed system integrates the duration and is part of a temporal and historical process. Relationships are complex and have circular causality. The system is heteronomous, purposeful and action-oriented.
Leads to teaching in comparable disciplines (multidisciplinarity)	This leads to interdisciplinary training

Interdisciplinarity is the concretization of the desire to integrate and consider a problem from another point of view. In this way the associative vision of the disciplines develops. [5]

The systematic approach, due to its wide distribution in the humanities, provides a sufficiently flexible and open methodological horizon. His fields of study, due to their large number, emphasize the interdependent relationships between the system as a whole.

Interdisciplinary activity in the learning process!

As mentioned earlier, in order to carry out interdisciplinary activity in the learning process, in the first place it is necessary for the disciplines to be strongly connected. Specific lessons should be well structured to make it as easy as possible for students to find specific information and connections between subjects.

An exemplary interdisciplinary activity between geography and history can be carried out on the topic „Bulgaria on the world map“ (see Table 3). Another example of interdisciplinary activity at European level is the example of "Switzerland's political role" (see Table 4).

Table 3. Proposal for interdisciplinary activity in geography and history
Topic: Bulgaria on the world map Grade: 7 and/or 10 grade

Stages	Goals, students...	Subject
Introduction: State structure of Bulgaria	Determine the state structure of Bulgaria; The children are able to connect the previously discussed information (borders and geographical location of Bulgaria) with what they have just discovered (state system)	Geography
Has Bulgaria always been as we know it?	The children make a hypothesis about what was the development of Bulgaria in time; Children are able to analyze a historical source to test their hypothesis;	History
What is happening? Evolutionary aspects.	The children can present the borders when founding Bulgaria on a map (681); The children are able to emphasize the main changes that have taken place between the founding of the country and the current situation	History Geography
Conclusion: how does the country we live in work?	Children are able to detect these changes in time and illustrate them in space; The children know how the political system of Bulgaria works and are able to explain it; The children know when Bulgaria adopted this system	

Table 4. Proposal for interdisciplinary activity in geography and history
Topic: Switzerland's political role. Class: 9, 11, 12 grade

Stages	Goals, students...	Subject
Introduction: Switzerland's political role	Determine the political division of Switzerland; Children are able to relate the information discussed earlier (natural and linguistic part of Switzerland) to what they have just discovered (political part)	Geography
Has Switzerland always been as we know it	The children hypothesize what Switzerland has developed over time; Children are able to analyze a historical source to test their hypothesis;	History
What is happening? Evolutionary aspects.	Children can present the initial situation (Switzerland from 1291) on a map; Children are able to emphasize the main changes that have occurred between the initial situation and the current one;	History Geography
Conclusion: how does Switzerland operate as a country?	Children are able to find these changes in time and illustrate them in space; The children know how the system works on three levels in the country and are able to explain it; Children know when Switzerland adopted this system	

Where is the problem?

The problems that arise in the construction of interdisciplinary training in the disciplines of history and geography are directly related to the annual planning of educational activities. The comparison between the curricula in geography and economics and history and civilizations for high school in Bulgaria shows insufficient opportunities for comprehensive planning of interdisciplinary topics to be studied simultaneously by both disciplines and aimed at achieving the goals set in the curriculum. In history, for example, it is necessary to introduce an aspect that is placed several centuries later than what has been done so far. In some historical periods, it is necessary to go back in time to reconstruct key events, and the use of retrospection, according to some researchers, would make it difficult for some students. In order to avoid this problem, it is expedient to carry out interdisciplinary activity on specific topics of the curricula in both subjects and which

have common ground with both disciplines. This will allow students to connect and analyze information more easily by performing short activities and using the concepts under consideration in a historical or geographical context. They can be used in the other area to highlight the links between the two subjects and to allow students to observe how some aspects relevant to one situation may be valid in others and therefore to gain a broader vision of the subject matter. In this case, there is more freedom in choosing the classes with which the activities can be performed, as they are shorter. In this way, cooperation between teachers is facilitated.

CONCLUSION

Interdisciplinarity is associated with the integration of geographical and non-geographical issues in geography education. At the present stage, this is especially important, because the solution of more complex learning tasks requires to approach them not only through the eyes of a discipline. New curricula in geography and economics abound in such complex learning tasks that directly affect reality.The connection between geography and history is indisputable. Despite the difficulties in the overall annual thematic planning, it is appropriate to search for specific interdisciplinary topics in the curricula of the two disciplines, aimed at achieving the goals of teaching geography and history in parallel.

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ORIENTATION IN TIME AND SPACE – FROM KNOWLEDGE TO COMPETENCE

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ABSTRACT

The localization of geographical objects on the earth's surface is a key skill formed in the geography education. It is a basic geographical skill and the first step in the development of students' geographical literacy. In the context of the geography didactics and teaching methodology, the question of acquiring this skill has a specific significance. The notions in the society about geography and geographical science are well-known, connecting it above all with its localization character. This, in a sense, depersonalizes geography, making it a source of simple illustrative, classifying, static, and "slow" knowledge.
It is a fact that the localization of objects in space is the essential basis on which geographical knowledge develops. It is also a fact that it is the basis of all geographical methods of research, regardless of whether they are rationalistic or humanistic, whether they are oriented to spatial analysis or to the study of the development of processes and phenomena in space. Too often, the localization of objects and phenomena in space is considered a basic prerequisite for the formation of "true geographical knowledge", even defined as a key goal of teaching geography in high school. The problem is not so much in the dissemination of this opinion among society as in its perception by a number of geography teachers. This is related to the misconception and vision of geography, to the underestimation of its educational potential, to its reduction to an ordinary subject, whose trivial task is to indicate where and how large are the natural and anthropogenic objects on the earth's surface.
With this report, we are focusing on this very issue. We try to read the "misunderstandings" by outlining the main geodidactic possibilities for this.

Keywords: geographical knowledge, geographical skills, localization in space, geographical competence

INTRODUCTION

The localization of geographical objects on the earth's surface is a key skill formed in the process of learning geography. [11] It is a basic geographical skill and the first step in the development of students' geographical literacy. [1], [2] In the context of the didactics of geography and teaching methodology, the question of acquiring this skill has a specific significance. The notions in the society about geography and geographical science are well-known, connecting it above all with its localization character. This, in a sense, depersonalizes geography, making it a source of simple illustrative, classifying, static, and "slow" knowledge. In this line of thought, the knowledge of finding geographical objects is the essential basis of geographical knowledge, on which all other reflections based on spatial analysis or study of territorial processes are based. [9]

Today, the acquisition of this knowledge is considered a major goal in the teaching of geography in high school. This misconception is common among teachers whose teaching process does not offer innovative and alternative methods of teaching the discipline. For this reason, geography is all too often seen as an ordinary school subject, which aims only to teach where certain objects are located and what their physical characteristics are. According to A. Magnaghi, it is important to emphasize the educational potential of the discipline, the main purpose of which is to provide tools that are useful for knowing, presenting, caring for and managing a territory. [8]

DATA & METHODS

In connection with the above, the present study examines the educational potential of geography by exploring the possibilities for the transformation of geographical knowledge into competence. A similar approach has been used by contemporary Italian didactics of geography (2017). [11]

In recent years, the ongoing dialogue between the research of scientists in the field and teaching in high school has led to tangible progress from an epistemological point of view, which strengthens both. [5] De Vecchis also speaks of the appropriate requirement "to integrate classical tools for modern research", which do not aim to describe the world, but to instill "great basic ideas that no longer want to present only concepts". The author in his work aims to suggest teaching through a research approach. [4]

The relationship between research and school teaching increasingly encourages the orientation towards planning through skills or “a set of components that combine to form competence: not only what the student knows, but also what he can do with what he knows“ . [3] The main idea of this relationship is to improve the effectiveness of geography education in high school, as well as to realize and understand the complexity of human and natural processes that occur on our planet. [12]

According to scientists in the field, this dialogue is extremely fruitful and will lead to a significant improvement in the social role of geographical science. In our attempt to prove that the discipline in question is not only an encyclopedic reference book, there is a risk of ignoring the fact that it contains fundamental knowledge and prerequisites for a wider response. We must also be careful in teaching, because sometimes the fundamental importance of localization competence is lost sight of. This is essential, according to Giorda, who argues that “it should be formulated not as an ability in itself [...], but when applied in a real context, to provide explanations and interpret, for example, potential and limits in a given territory in relation to its geographical location." [7]

The transition from the concept of the question of locating objects, understood from the point of view of knowledge, to the one that understood from the point of view of competence is crucial, as it returns the need to know the facts without questioning the educational value of geographical science.

Central to this transition is the cessation of geoelements to be objects. They become places, each of which has its own specific meaning and potential. In this way, the localization of an object in a specific place and the understanding of its functionality in a given territory can be used as a link between man and nature. This, according to researchers, could motivate and increase students' interest in geography. It is necessary for children to give real value to the knowledge of localization, to put it in context and to problematize it in order to give it meaning. Here the role of the teacher is to stimulate this ability by encouraging the student to constantly enrich their knowledge on the issue. Competence in locating geographical features can be activated in ways that stimulate

research interest. They can be emotional, sensory or intellectual. Their number could be unlimited, due to the huge availability of working materials from various scientific sources, as well as the imagination of the teacher. His creativity should be aimed at clearly emphasizing the connection of an object with a place.

Here we could easily incorporate an interdisciplinary approach to learning, linking geography to history. The connection between the two sciences dates back to antiquity, and is especially relevant today. History, like geography, deals with the study of time and space. Valega's point of view on this issue is interesting in that he considers the visions of the concepts of "time" and "space" side by side, while noting that they oppose each other in the modern world. They offer, on the one hand, "the vision of modernity, according to which place exists independently of the subject and time is a property of place." And, on the other hand, "according to which place is in the subject and time lives in place." [10] In these statements we can see how the competence introduced by the school regulations presents great theoretical and practical tricks.

In this context, an in-depth didactic study could be proposed, aimed at creating a teaching unit that aims to use the potential of history as a useful discipline for geography. It is good to include teaching through skills that improve students' localization competence.

DISSCUSION

Modern research on teaching is increasingly proving that traditional frontal teaching is not effective in modern society. The problems come largely from the generational gap (teacher-student) and outdated teaching methods used by some teachers. The need to update them is inevitable. The main goal is to avoid the concept of teaching, which focuses only on the transfer of knowledge. It is necessary to look for new methods and approaches in education that present science in a clear and understandable language for children. New approaches should aim at acquiring or strengthening transversal and disciplinary skills. In this way the children will be motivated and the time in the classroom will be useful and fruitful.

Some of the suggestions made by teachers and researchers seeking to find effective and workable strategies for modernizing geography education include working with digital technologies. STEAM training is extremely relevant at the moment in the world and in Bulgaria. The Ministry of Education and Science supports and stimulates this relatively new method of teaching for the country, and in the coming years it is planned to equip STEAM space in every school in Bulgaria.

Geographic information systems (GIS) are also increasingly used in classrooms. Their skillful use could strengthen the links between different disciplines, such as history and geography. Thanks to interactive cartography, children can more easily acquire a landmark in space and comprehend the meaning and problems of a given territory.

The "inverted classroom" could also find a place in modern education. According to Ferri, this is "a system that, thanks to the use of educational technology, reverses the traditional teaching scheme and the resulting teacher-student relationship." [6] With this modernized approach to teaching, the classroom "is no longer the place to convey concepts, but is transformed into a space for work and discussion, where you learn to use knowledge through discussions with peers and the teacher." [6] The classroom should become "the place where one works according to the method of joint problem solving." [6]. During this time, the teacher should guide the class or group to discuss various issues, engaging in laboratory-type activities (including STEAM training) that "lies" on the practice of experiential learning. The focus in modern education should be on children. The teacher

must guide, support and encourage the children's activities. It should give ideas, as well as actively involve each student in educational practice.
Thanks to this approach, the ability to use the new knowledge acquired during the lesson independently is strengthened. (see Tab. 1)

Table 1. Stages of learning in the inverted classroom, [13]

Stage 1 At home	Remembering Understanding	Recognition and memorization of facts Understanding what the facts mean
Stage 2 At school	Application Analysis Evaluation Creating	Application of rules, concepts, ideas Breaking the information into pieces Clash to express the value of information and ideas Producing something beautiful and interesting

CONCLUSION

The modern world offers new and diverse opportunities, thanks to which the geographical science and teaching geography is developing. In this regard, the role of the teachers is key. They must work to form the knowledge, skills and competencies of students. The formed competence will allow the students not only to locate points in the geospace, but to attach importance to the place, to turn it into an emotional or intellectual experience.

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