TRANSFORMATION OF RELIEF AND WATER NETWORK IN THE KOLLOSI REGION (SOUTHERN CYPRUS) IN THE MIDDLE AGES – A HISTORICAL AND GEOGRAPHICAL ANALYSIS

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ABSTRACT

Spatial analysis utilized GIS tools, old maps and historical data, as well as paleogeographic data from a salt lake on the Akrotiri peninsula. Cyprus was home to one of the oldest civilizations in Europe, reaching its greatest glory between 1291 and 1374. After the fall of Acre (1291) to the Mamluks, rapid economic development occurred, and the island played a crucial role in Levantine trade. The Medieval economic boom was based on the cultivation and processing of sugarcane - a period known as the "Frankish Sugar Age". The cultivation of cane and the production of sugar by the Knights of St. John and the Venetians are associated with the Castle of Kollosi and the settlement at Episkopi. The castle held strategic importance in the administration of southern Cyprus. The Knights of St. John constructed an irrigation system for the sugarcane fields, as well as an aqueduct and pipelines to bring water from the Kouris River for use by the watermill and sugar refinery. However, the amount of available water was variable and determined by climatic changes (drought) at the beginning of the Little Ice Age and the lowering of groundwater levels associated with the sea level drop. However, the most significant and devastating impacts were caused by human factors – warfare with the Genoese and Mamluks, the suppression of the Templar Order, and the involvement of the Hospitaller Order on the island of Rhodes. This negatively impacted the economy of the study area and the entire Kingdom of Cyprus, as well as its geopolitical position in this part of the Mediterranean.

Keywords: Cyprus, Kolosi, Middle Ages, Geography, History

INTRODUCTION

Cyprus is located in the eastern Mediterranean and has been a strategic point and supra-regional trade centre since ancient times (Fig. 1). It was home to one of the oldest civilizations in Europe, reaching its greatest glory between 1291 and 1374. After the fall of Acre (1291) to the Mamluks, rapid economic development occurred, and the island played a crucial role in Levantine trade. The Medieval economic boom was based on the cultivation and processing of sugarcane. Thanks to the Arabs, the first sugarcane plantations were established in the Mediterranean region as early as the 7th century, in

Syria, Palestine, and later in Crete and Cyprus. However, sugarcane processing only began with the Latin conquest of the island in 1191 and the arrival of the Order of Saint John. Sugarcane then became the island's main crop, a period known as the "Frankish Sugar Age".

Its location at the obduction zone of two lithospheric plates (Anatolian and African) [1] results in significant tectonic activity, numerous earthquakes [2], and uplift movements, marked by elevated marine terraces in the coastal relief. However, the southern part of Cyprus near Limassol (Lemesos) is very weakly uplifted – 0.02 mm/year [3], and sea level fluctuations in the last 2500 years (Fig. 2) range from −1.15±0.13 m (OSL: 2150 ka) to +0.5 m (OSL: 770 ka = ca. turn of the 12th/13th century AD) and a further drop of -0.41±0.13 m (OSL: 480 ka = ca. end of the 15th century AD) [4]. The study area (Fig. 1) consists of chalks and marls of the Miocene Pakhna Formation [5] exposed on the hills surrounding the Pleistocene/Holocene Kouris alluvial fan [6], [7], as well as on the hills of the Akrotiri Peninsula around the Salt Lake located there [8] (Fig. 3).

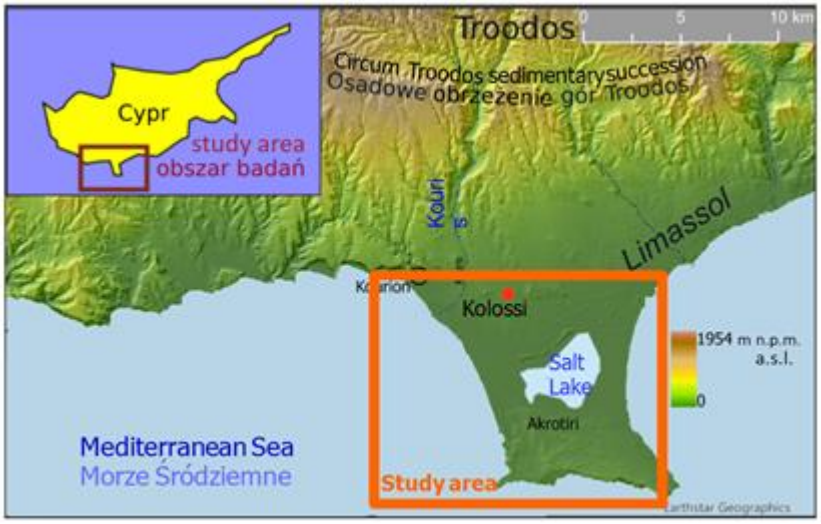

Figure 1. Location of study area ([7] changed). Hypsometric map made classical method and based on the Digital Elevation Model (DEM developed on the basis of the SRTM mission [12]) of southern Cyprus. The boundary of the sedimentary margin of the Troodos Mountains (Circum Troodos Sedimentary Succession) according to [9]

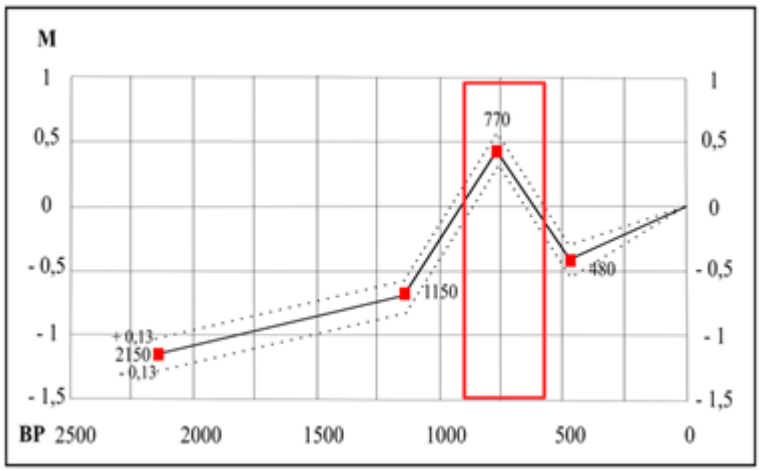

Figure 2. Sea level changes near study area. Period of study indicate by red box ([4], supplemented)

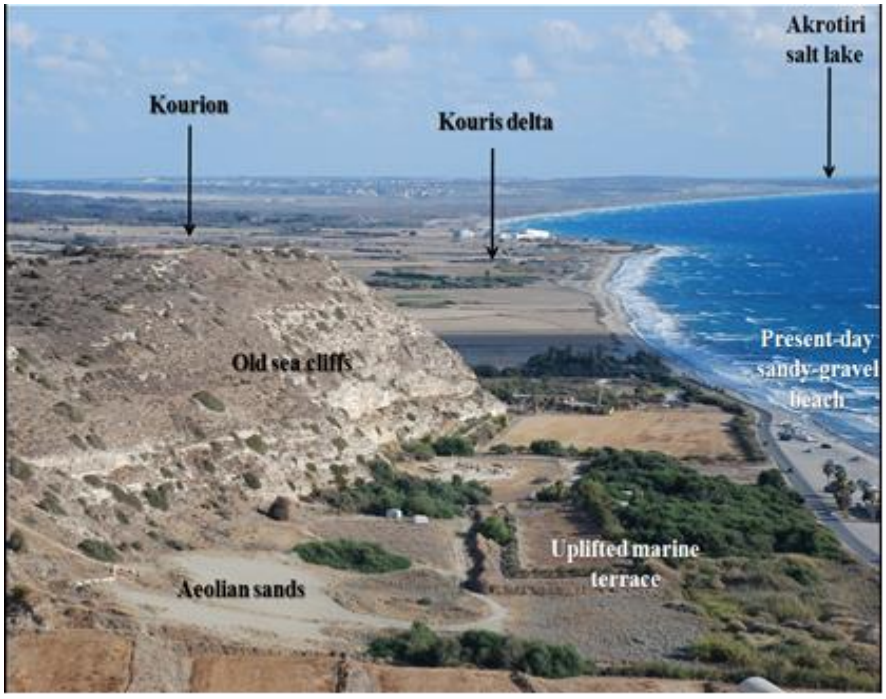

Figure 3. Relief of study area with outcrops of the Miocene Pakhna Formation near ancient Kourion, The Pleistocene/Holocene alluvium of Kouris river, the Pleistocene uplifted marine terrace and lagoon cut-off in the Subatlantic - Salty Lake on Akrotiri Peninsula (photo T. Kalicki)

AIM AND METHODS OF STUDY

The aim of the historical-geographical analysis was to determine the role of the Knights of St. John and the Venetians in sugarcane and vine production, as well as the geomorphologic and hydrographic changes in the Kouris alluvial fan associated with this activity and the function served by the Medieval castle at Kolossi. Spatial analysis utilized GIS tools, old maps and historical data, as well as palaeogeographic data from a Salt Lake on the Akrotiri peninsula.

Palaeogeographic and historical data documenting environmental and climatic conditions at the beginning of the Little Ice Age and the volatile and unstable geopolitical situation during the 13th-16th centuries were analyzed.

The methods can be divided into geoinformatics, historical, geomorphologic, and climatologic. GIS data, particularly raster data (DEM), were used. Based on this data, a geoinformatics model of potential hypothetical castle locations and a runoff model were developed.

RESULTS

Historical and Environmental Data

From the 13th to the 15th century, rivalry between Genoa and Venice took place in Cyprus, which led to the division of the island into spheres of influence [10]. In 1210, on the initiative of the Frankish King, Hugh I of the Lusignan dynasty, the old castle at Kolossi, now in ruins, was built on the Kouris alluvial fan (Fig. 4). As shown by the geoinformatic model of potential (hypothetical) castle locations, the location was not determined by defensive factors (Fig. 5), but by its location on the limit of a flat, fertile, and arable area (Fig. 6).



Figure 4. Ruins of Old castle in Kolossi built in 1210



Figure 5. Geoinformatic model of potential (hypothetical) castle locations and the location of Kolossi Castle on a hillshade map (based on [11], [13])



Figure 6. Location of Kolossi Castle on the northern limit of the cultivated areas on the plain of the Pleistocene Kouris alluvial fan on a hillshade map (based on [12]). Basemap based on satellite images from the Copernicus mission [14]

In the 14th and 15th centuries, the largest agricultural sector in Cyprus was cereal cultivation, primarily barley and wheat, and to a lesser extent oats. The main export product was carob, the distribution of which was controlled by the Genoese through the port of Famagusta. Numerous farms (in the 14th century, the number of Cypriot villages was 493) cultivated beans, lentils, peas, flax, and linseed. On the slopes of the Troodos and Kyrenia Mountains, and in the study area on the slopes of the carbonate hills of the Pakhna Formation, favourable conditions existed for the growth of olive trees and vines. These provided olive oil, sesame oil, honey, and wax, and wine was produced [15]. However, by the end of the 13th century, sugarcane had been introduced to Cyprus, which led to a significant restructuring of the agricultural structure.

The cultivation of cane and the production of sugar by the Knights of St. John and the Venetians are associated with the Castle of Kollosi and the settlement at Episkopi. The castle held strategic importance in the administration of southern Cyprus. The plains of the Kouris alluvial fan in the study area were used for industrial-scale sugarcane cultivation by the Knights of the Order of St. John from 1291. They began cultivating and processing sugarcane in Kolossi, and the sugar and molasses produced were exported to Europe. After the fall of Acre and the Kingdom of Jerusalem (1291) [10], they benefited from the migration of skilled workers to work on plantations and in processing plants. Dry summers and the regime of the Kouris River necessitated irrigation of fields, and water was necessary for sugar and molasses production. This resulted in a transformation of the watercourse and canal system on the Kouris alluvial fan in the 14th century.

In 1305, the Knights Hospitaller became involved in the civil war in Cyprus between King Henry II and his brother Almaric, supported by the Knights Templar [15]. Simultaneously, in 1309-1310, they moved the order's headquarters (Convent, hospital) to Rhodes, where they established a sovereign state [16]. However, the Knights Hospitaller who remained in Cyprus regained their possessions after 1312 and took over those previously belonging to the Knights Templar (the order was dissolved in 1308). These were divided into three Commanderies, the most important of which, the Grande Commandery, was based in Kolossi [17]. In 1347–1348, the Black Death, a plague pandemic probably brought by sea from Syria, swept through Cyprus, killing between one and two-thirds of the island's population, and in 1347–1352 decimating the European population [18]. The demographic crisis enabled the aggression of, among others, the Turks against the fortress of Kyrenia in northern Cyprus. However, in the south of the island, after the pandemic, in the 14th century, the Hospitallers expanded the system of canals for irrigating sugarcane plantations, as well as pipelines and aqueducts (1365–1374), which brought water from the Kouris River to the entire sugar refinery complex built in the 14th century near the castle at Kolossi [19] (Fig. 7). The largest canal connecting the Kouris riverbed and the Salt Lake in Akrotiri was probably built during this period. This canal served the purpose of irrigating sugarcane plantations and simultaneously draining water used during cane processing at the Kolossi sugar mill to the western part of the Salt Lake in Akrotiri. The canal is marked on some historical maps, e.g., those from 1562, 1612, and 1682 [8].



Figure 7. The sugar mill complex (14 th century) and aqueduct (1365-1374) at Kolossi (photo T. Kalicki)

From the 1370s, the Cypriot possessions of the Knights of St. John began to feel the effects of the crisis that affected the Kingdom of Cyprus and was caused first by the war with the Genoese (1373-1374), who were finally expelled from Famagusta in 1468, then by the Mamluk invasions (1425-1426) [17]. Attacks by the Genoese in 1373, then by the Mamluks in 1402, 1413, 1425, 1426, and a series of earthquakes led to the ruin of the castle in Kolossi (Fig. 4). However, in 1454 it was rebuilt by the Grand Commander Luis de Magnac (Fig. 8).



Figure 8. New castle at Kolossi built in 1454 (photo T. Kalicki)

In 1401, the Hospitallers competed with the Venetians, who owned Episkopi in the second half of the 14th century [17], for access to the Kouris River and unlimited use of water resources needed for sugarcane cultivation and sugar production [10]. This may have been the result of climatic changes at the beginning of the Little Ice Age. A significant drying was observed in Lake Nar (Anatolia, ca. 250 km N of Cyprus) from ca. 1400 and continued throughout the 15th century [20]. Also, the lowering of sea level by almost 1 m/300 years (Fig. 2) caused increasingly lowering of groundwater level, and consequently, drying of habitats and the need for increasingly intensive irrigation of crops. The limited amount of freshwater used for irrigation and in the Kolossi sugar mill, which was discharged into the NW part of the Salt Lake on the Akrotiri Peninsula, did not sweeten of water the entire lake. Therefore, in cores from the E part of the lake (see [8]), there are no series of freshwater inflows in the uppermost part of the profiles.
Wars with the Genoese and Mamluks caused losses and a decline in income for the Hospitallers, and in 1488, their property in Kolossi became the property of the Venetians. According to Venetian data, in 1490, Cyprus had a population of approximately 106,000 and 800 villages. Sugar production and export from the island ceased completely between 1489 and 1571 after the Venetians took control. In the 17th century, the cultivated fields were occupied by cotton, for which demand was growing in Europe.

CONCLUSION

The transformations presented here demonstrate the complex interdependence of geopolitical and environmental factors shaping ownership changes, cropping patterns, and hydrographic patterns, using the example of a small agricultural region administered from the castle at Kolossi. Sugarcane plantations, dependent on an extensive anthropogenic irrigation system, played a crucial role here. However, the amount of available water was variable and determined by climatic changes (drought) at the beginning of the Little Ice Age and the lowering of groundwater levels associated with the sea level drop. However, the most significant and devastating impacts were caused by human factors – warfare with the Genoese and Mamluks, the suppression of the Templar Order, and the involvement of the Hospitaller Order on the island of Rhodes. This negatively impacted the economy of the study area and the entire Kingdom of Cyprus, as well as its geopolitical position in this part of the Mediterranean. Also crucial were the Venetians and Genoese's search for new trade routes to directly acquire and sell new goods.

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