

ECOSYSTEM ACCOUNTING FOR WATER

DOI: <http://dx.doi.org/10.18509/GBP.2020.03>

UDC: 556.18:502]:330.5

Nikolay Katsarski

Sofia University „St. Kliment Ohridski“, Faculty of Geology and Geography,
Department "Regional Development", Sofia, **Bulgaria**

ABSTRACT

The water is main source of life on the Earth. As a part of ecosystem water can be viewed by different points. On one hand water is viewed like a natural resource which means that exist in a plain type \lakes, rivers and etc.\. On the other hand, water can be a material for the business and regional development \material for bottling – mineral, spring and tap, SPA procedures \. On the third hand water can be a thereat for the humanity. In ecosystem accounting exist both material and monetary accounts in which water is presented. The material accounts are known like extend and conditional a conditional accountant. Monetary accounts are related with the ecosystem services that can be done for the specific asset. Mixer between both material and monetary accounts could be cold ecosystem asset. Using of these accounts will give a chance for collecting different data which can be used for analysis.

Keywords: ecosystem accounts, water, ecosystem accounting

INTRODUCTION

We are living in a world where clear water is hard to find and keep it clear may be harder. We all take water resources like something that will never finish. We see the oceans and lakes they are full of water and we like their views. This resource is used not only as a natural resource but also as a material. Water is the main source of life on our planet. In most cases, we take it for granted, except when it suddenly stops. Water is a major source of life on our planet. People use it in several ways. First of all for household needs. It reaches people through built infrastructure of dams, rivers and more. through treatment plants and the water supply system (pipes, pumping stations). Building such infrastructure is a complex and expensive process. This requires the development of a system of accounts to record this information. It can be used to make future evaluations and analyses in the event of a replacement. In addition, chronological recording serves to determine the useful life of this infrastructure. Second, water is considered material. The material nature of water is associated with its use in the heavy industry (metallurgy, chemical, etc.), trade/juices, liquid diluent, etc. / and electricity production. The use of water as a material is subject to different regulatory requirements. Choosing which sector to redirect to is a priority of state policy, but a free-market economy should not be forgotten. The establishment of accounts in this area enables the consumption of water as a material. In addition, the analysis made determines the minimum amount of water needed for production needs. Third, water is considered as part of nature, biodiversity and the reproduction of natural resources. Maintaining ecosystems is of particular importance for biodiversity, forests, soil, air. Nowadays, the aggressive use of water resources does not allow the regeneration of ecosystems by themselves. The activities that can be undertaken are linked to the creation of appropriate conditions for reproduction. Such activities are

soil enrichment, afforestation, irrigation and more. In this regard, calculative accounts are created that enable the pricing of ecosystem services and hence the entire ecosystem. In the fourth place, water is considered a risk factor. The creation of artificial water basins poses many risks for the population and nature. The first group of risks is related to construction. These risks are related to the dam wall. The second group of risks is related to the human factor - mistakes, deliberate action or inaction. The third group of risks is related to natural factors and disasters. The creation of the accounts that organize the overall implementation activity is an operating expense account. This creates assets whose useful life depends on the inputs, the way they are maintained, and more. Unlike other assets, what is special here is that nature proves to be the most important factor. For this reason, reforestation, afforestation along dams can reduce risk factors. That is why this causes the dam ecosystem to be decomposed into different and constituent parts - forests, soils, dam, water, infrastructure. If it is considered as a single system and all activities for its construction and maintenance, and since they cannot exist separately from one another, then we have reason to consider it as an asset. This specific asset deserves attention and a new group of assets, generally, ecosystem assets may emerge.

THE NEED FOR ACCOUNTING FOR WATER

The need for ecosystem accounting for water is pretty obvious. In these days we are facing serious problems related to the scarcity of clean and drinking water, on the one hand. On the other hand, the continuous development of the industry is increasingly in need of water for processing parts in the metallurgy industry. Another important point is the water resources used in trade. All these needs necessitate a new rethinking of the use of this valuable resource. Proper classification and accounting are of particular importance in two respects in general. First, the material nature of water. The natural resource water is considered as a material for the production of electricity, thinner, metal cutting agent, cooler and more. The diversity of this valuable resource is subdivided into the surface level, ground level, and gaseous state. In this case, groundwater and surface water is important. Material accounts are therefore created to monitor the change in this resource. Next is the need for a monetary measurement of the construction of water retention facilities, the infrastructure responsible for water transmission, the consumption of water for its treatment or its use for industrial purposes, the drainage and re-treatment of water. The prerequisites for the need for adequate accounting for material waters are:

- Lack of detailed information on pollutants (natural and industrial);
- Lack of mapping of water deposits (above ground and underground);
- Insufficient information on the permeable layers along which rivers flow;
- Insufficient analysis of the water permeability of the soil around the water basins;
- Need for water/air/freshwater - fresh air analysis; chemicals contaminated with water-contaminated with air /;
- Insufficient information on ecosystem services implemented and their impact on water ecosystems;
- Need for improvement of water management;
- The prerequisites for the need for adequate accounting for monetary value water are:
- Need to calculate possible losses;
- Calculation of ecosystem services applied;
- Determining the cost of infrastructure and its useful life;
- Need for risk assessment in areas affected by water shortages for a specified period;

- Determination of the value of water treatment and its use for industrial, domestic or agricultural purposes;
- Valuation of ecosystem services related to water for ecosystem reproduction;
- Valuation of thyroid events in case of non-performance of ecosystem services for risk mitigation;

To achieve all this requires the creation of a set of tangible and monetary accounts. The need for material accounts can be sought in early warning of changes in the physical state of water resources. Creating material accounts by type of water creates conditions for a clear presentation of the change in the water over a certain period of time (for example, for one year). This information can be used for early warning of changes in water. Different sensors and sensors can be used here. In addition to changes in their physical volume, analyzes can also be made of changes in the chemical composition of water. Segmentation of clean waters, toxic waters and those with the potential to be toxic can thus be ensured. This could provide the necessary actions and measures that should be implemented to limit the damage from potential pollution. Understanding the material nature of water is essential to the potential for development in at least two directions - social and industrial. Overpopulation of one area to another also requires relatively high consumption of drinking water. Next to the industry's importance is the physical volume of the water as well as its geographical location. This is due to the production capacity, which should be implemented on the one hand. On the other hand, this is linked to the availability of adequate workforce as well as the construction of a comprehensive infrastructure. We can see other information like “regional policy, regional development and spatial planning are linked to a number of concepts, concepts, initiatives such as balanced sustainable development, green infrastructure development, a blue regional economy, the development of integrated management plans, and so on” [1] The monetary value of tangible accounts is related to the costs that would have to be incurred in order to build the infrastructure. The construction of a complete infrastructure covers: construction of a dam, dam wall, water supply system/pipes, sedimentation tanks, etc. /, treatment pumping stations, etc. In addition to building materials, human resources, equipment, and equipment are required. Determining man-hours and machine-hours together is important for calculating value.

What has been presented here gives us reason to conclude that the consideration of water under its various forms of manifestation is vital. This is based on two approaches. The first is related to the material nature of water. The second, its monetary value. Therefore, meeting this need is realized through the compilation of physical and monetary accounts.

ASPECTS OF WATER ACCOUNTS

The establishment, organization, and reporting of water accounts should be consistent with the methodology and methodology laid down in accounting science. The use of financial accounting enables us to modify our water accounts and put them into an appropriate framework for analysis and interpretation.

Ecosystem accounts presented in this way broadly represent the logic of future data collection and aggregation. In the first place, for accounting purposes, information about the ecosystem asset, the data that exists and the policies associated with those assets are relevant to accounting purposes. Second, these types of accounts should enable ecosystem assets to be properly accounted for and tracked for changes in time and space. Third, they allow tracking at the beginning and end of a specific time period. Fourth, accounts serve as the basis for the development of other ecosystem accounts. Ecosystem extent accounts

are the basis for the assessment of ecosystem services. The extent accounts present important information for desertification, urbanization, etc. The group additions to the extent include managed expansion, natural expansion, and upward reappraisals. Managed expansion is a tool for moving forward.

Table 1. The core ecosystem accounts [2]

1.	Ecosystem extent account – physical terms
2.	Ecosystem condition account – physical terms
3.	Ecosystem services supply and use account– physical terms
4.	Ecosystem services supply and use account – monetary terms
5.	Ecosystem monetary asset account – monetary terms

Using ecosystem services for a management tool for expansion is very important. It is important because of the basket services that can be put together. All the services that can drive expansion have a point. Also, they can be checked how they work both together and separately. The most important thing here is if these baskets of services can make a natural expansion or not. This expansion has different types. It can be related to forests, plants, soils, water and more. Managed expansion can be implemented in two ways. The first, through human activities. These are all the activities that people take to support expansion in one direction or another. The opportunities and combinations are different, on the one hand, afforestation, soil improvement, strengthening of walls and dikes, their extension. In other words, managed expansion is all the activities that humanity undertakes for the development and expansion of ecosystem assets, through specific, targeted and organized activities that increase their territorial coverage. Within the topic of accounts, water management is associated with the artificial construction of dams and ponds to serve a particular activity. These activities lead to an increase in the water supply, its management. On the other hand, is the reduction of water resources. In this regard, ecosystem services such as water supply for domestic and industrial needs, the use of water, as material for the production of various beverages, material for the production of electricity, etc. are considered. Water is considered as a risk factor - flooding, leakage of dams, unregulated discharge, outdated water supply system, etc. If we are to go deeper, it would be necessary to seek the loss of water resources in the environment. This environment is nature. Nature, such as trees, soils, chemical composition, watertight and watertight layers.

Next, is natural expansion is related to the reproduction of the ecosystem itself. Extension of nature without direct or indirect human intervention. This requires a special attitude and analysis especially when there is indirect human intervention. A comparative analysis would answer the question - to what extent can nature reproduce itself? In addition, an analysis of the reproduction time can be made in either case. Within the theme, water with its constancy finds the easiest way to form a bed. Typical of water as a natural resource is that it is difficult to control. This is evidenced by the many floods that occur worldwide. What can be observed within this ecosystem account is the increase or decrease of water within a given area under the influence of the natural environment.

The reassessment of a decrease or increase in the physical volume of water resources is important for all sectors of our lives. Quality and quantity assessment determine the purpose of this resource. Changes in current and prior periods make it possible to analyze and re-evaluate the situation.

Ecosystem condition accounts are another type of ecosystem account in physical terms. This type of ecosystem account contains the following information. The first

improvement in the condition. These accounts reflect the improvement resulting from the restoration of nature. This can be considered a normal state without human intervention. The information collected here covers river flow, water quality, biodiversity and more. The role of the human being in relation to the improvement of the condition is related to the activities that are material in nature. These are activities related to the construction of dams, river beds, sewage treatment plants and other infrastructure that leads to the improvement of the water status.

Water reduction is another element that these accounts record. The change in condition here is related to the decrease of the harvest due to lack, shortage of water and its quality. In addition, human activity can also lead to a change in the negative state of water. These are activities in the chemical, metallurgical, mining and other industries. The study of this part of the water resources makes it possible to determine the available water resource for drinking purposes and the share of the polluted one. Ordinary human activity can be catastrophic. Not only are the constructions built by humans, but their use for electricity production has its risks. Water biodiversity is endangered by turbines through which water flows, thereby disrupting natural runoff. Lack of water runoff control can lead to a reduction of water resources for social and household needs, making water quality inappropriate. This inevitably leads to a crisis for the population, hospitals, kindergartens, etc. Catastrophic losses can also be observed under the influence of natural forces. An example of such losses is the heavy rainfall that leads to the water coming out and leaving the river beds. This uncontrolled water can lead to a number of adverse events, such as floods in settlements, agricultural land, interruption of electricity, destruction of road infrastructure and more.

The entries in the condition accounts give an idea of the improvement or deterioration of the material status of the waters. Analytical reporting is about nature and human activities. An analysis of these accounts will lead to the ability to determine to what extent nature can regenerate and what potential risks exist. In addition, determine the role of man in improving water resources, on the one hand. On the other hand, to analyze the negative impact of human activities, as well as the risk factors resulting from their implementation. Other types of accounts are ecosystem services supply and use account - physical and monetary terms. The ecosystem service supply account has both physical and monetary terms. These account record information for the physical flow of water. The analytical information in the physical term provides information for different water recourses and their usage. Water flows have an important connection between ecosystem assets and economic and human activity. The main point here is the ecosystem assets and their potential and services that can be provided. The supply of ecosystem services includes provisioning, connection, and cultural services. The provision of water is related to water and water-like material. Provisioning of water is very important for users - homes, and industry. Damage to nature and biodiversity would be significant if the water is not provisioned in an anhydrous period. Therefore, water management activities are another source of information to be analyzed. The regulation of runoff and water supply is an essential point in analyzing the risk of waterlessness, targeting, and priority use. Water regulatory activities have a direct impact on biodiversity, vegetation, and air. Creating opportunities to calculate the effect of regulatory activities leads to the valuation of water as a resource. However, filtering is another aspect that is directly linked to regulatory activities. Here, a distinction must be made between natural filtration and the treatment plants created. All this could not be realized without a built-in water supply system, which also includes treatment plants. From an economic point of view, the construction of the

entire regulatory infrastructure, as well as this provisioning service, is of material and material nature that can be reliably estimated (inputs, man-hours, machine hours and other activities). Therefore, we can talk about an ecosystem asset created as a result of human activity. The use of this infrastructure leads to its depreciation. Allocating a reserve over the useful life of these assets may provide for their replacement, repair, and restructuring, or further construction. The continuous increase in population in major cities requires increasing water consumption. Adequate determination of the value of water as a resource is a complex process that may include the following more important points:

- Calculating the value of water provision assets;
- Calculation of the value of the water transfer;
- Analysis of harmful events in cases of overflow, flood, spillage, etc .;
- Valuing water regulation services;
- Valuation of domestic and industrial water, taking into account previous points;

The use of water resources for different purposes also implies a different approach. Water, domestic, industrial, agricultural, natural/protected / parks cannot be evaluated in the same way. When using water, the focus is on how it is spent and what it is used for. Drinking water is unacceptable for industrial use. Another point is the reuse of water after its purification. The possibility of reusing water creates conditions for its long-term saving. It can also reduce its value to industry or agriculture. Therefore, the author considers it necessary to build ecosystem assets that have a specific purpose. In the era of 4.0 industry we connected every single minute with Internet. All of these assets can be connected with online sensors “although intelligent cities save resources, energy and time, they also have a big drawback - personal data protection will be problematic due to camera monitoring, sensors and GPS that will always know our location” [3] and the location of the these assets.

ECOSYSTEM MONETARY ASSET ACCOUNTS

Ecosystem asset accounts are at the heart of ecosystem accounting. Opening ecosystem asset accounts is a complex process that involves not only the material nature of the asset but also its value measurement. Building an ecosystem asset is twofold. On the one hand, it can be built by nature. On the other hand, this asset is built by people. The main problem with both assets is related to:

- Determination of ownership;
- What is an ecosystem asset or assets;
- Determining their value;
- Valuation of a natural asset;
- The relationship and interaction between natural assets and human-made assets;

The framework of such an outline requires a thorough analysis and interpretation. In relation to water as a natural resource. The author considers that ecosystem assets are: dams with dams along with their environment, pumping stations, water supply systems, treatment plants and more. Each asset can serve as a starting point for multiple indicators - monetary and physical. This will be addressed in the author's future research.

Looking for the links between motor and physical accounts, she can be most strongly seen in tourism and historical heritage by presenting beautiful views, such as water mirrors, etc. “The explosion in global cities as centers of world tourism is closely linked to the operation of many factors of historical and geographic, demographic, geopolitical, economic, social and cultural character. These cities largely concentrated within himself much of the world cultural heritage.”[4] In that case the link

is locked in the monetary aspects of the beautiful views of the lakes, oceans, rivers and etc.

CONCLUSION

To sum up, the ecosystem accounting for water we must make the difference between the ecosystem accounts for physical and monetary terms. We need to analyze the link between these accounts in order to understand how the system works and how much it will cost. Ecosystem accounting for water provides vital information for humanity. This information is important to both households and industry. Households need water to meet their needs, such as drinking water, washing water, biodiversity/fisheries, plants /, natural views, etc. The industry needs information about the volume of water that can be used for industrial purposes. Pricing for both types of groups is vital. Therefore, analyzing ecosystem accounts provides important information on the overall infrastructure and status of water, the distribution of water resources in a given territory, and the valuation of water as a resource and material.

REFERENCES

[1] Ivanov M. INTEGRATING SPATIAL PLANNING SYSTEMS IN THE FORMING OF REGIONAL POLICY IN CERTAIN COUNTRIES OF THE EUROPEAN UNION. Available DOI: [10.18509/GBP.2019.63](https://doi.org/10.18509/GBP.2019.63) Conference: 5th INTERNATIONAL SCIENTIFIC CONFERENCE GEOBALCANICA 2019

<https://www.researchgate.net/publication/335580557> INTEGRATING SPATIAL PLANNING SYSTEMS IN THE FORMING OF REGIONAL POLICY IN CERTAIN COUNTRIES OF THE EUROPEAN UNION

[2] System of Environmental-Economic Accounting 2012—Experimental Ecosystem Accounting United Nations New York, 2014 p.21

[3] Naydenov Kl. *SMART CITIES - THE FUTURE OF URBAN PLANNING*. DOI: [10.5593/sgemsocial2018/5.2/S19.025](https://doi.org/10.5593/sgemsocial2018/5.2/S19.025) Conference: 5th SGEM International Multidisciplinary Scientific Conferences on SOCIAL SCIENCES and ARTS SGEM 2018

<https://www.researchgate.net/publication/329929803> SMART CITIES - THE FUTURE OF URBAN PLANNING

[4] Traykov T, Naydenov Kl., *Cities – centers for tourism development*. Conference: Twelfth international Scientific Conference “Knowledge without borders”. p.1765-1768

<https://www.researchgate.net/publication/330412576> Cities -centers for tourism development