

# Classification and valuation of functions, goods and services of Karavasta wetlands

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## **Abstract:**

*The development of coastal wetlands is very dynamic and influenced by many natural and human factors. The Albanian wetlands are very rich in biodiversity therefore they offer many functions, goods and services for the local people and tourists.*

*The management of the coastal wetlands is one of the main concerns of central and local governments in Albania. The raise of knowledge is essential for the identification and protection of the wetlands, including the adequate ecological valuation and representation of their functions, goods and services.*

*This paper presents the classification and valuation of functions, goods and services of Karavasta wetlands. In the first part of the article it is given the fullest possible range of this ecosystem functions that provide a large number of goods and services. The second part is focused on the analyze and valuation of human impact on the natural and artificial wetlands of Karavasta. There are more than seven types of natural and artificial wetlands in Karavasta: estuaries, shallow marine water, marshes, sand dunes, drainage and watering channels, agricultural land flooded permanently, fishing ponds etc. The natural wetlands are suffering the severe human impact and are being transformed in artificial ones. In this paper it is used a defined model to assess the impacts of human activities on coastal wetlands. The results show that human impact is still severe both in natural and artificial wetlands of Karavasta so effective and integrated management is needed to protect, restore and conserve them.*

**Keywords:** *Wetlands, classification of functions, goods and services, human impact.*

## **INTRODUCTION**

Nowadays, wetlands are considered very important ecosystems, which should be conserved, protected and created. In Albania as in many other countries the valuation of the wetlands importance has changed through the years. During the communist regime, many Albanian wetlands were considered as wasteland and hazardous for the human health. Many tropical diseases as malaria, dengue fever, were associated with these wetlands and this was the main reason why many of them were drained for agriculture. It is estimated that Albanian coastal wetlands have been 70,000 hectares and from which 15,000 hectares were drained for agriculture land. This initiative was not always successful, because some wetlands had very salty soil that could not be used for agriculture, even after they were drained (Durrësi wetlands).

After the decline of communist regime in 1990 the human impact on wetlands became more severe and uncontrolled. The overfishing in the lagoons (often not in a sustainable way) and the spread of the constructions in the protected areas had a bad impact on the Albanian's coastal wetlands. Actually, many environmental organizations, the local and central government are aware of the importance of the wetlands and the emergency for the application of laws and practices to use them through protection and restoration.

In this paper the ecosystem functions are defined as 'the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly' (De Groot, 1992). The increase

of the knowledge of the local government and community on the functions of this wetland will lead them toward the sustainable management of the goods and services offered by the wetland of Karavasta. It will also help the community to know the best ways for the protection of the natural and artificial wetlands.

## **MATERIALS AND METHODS**

### **1. Data collection and preparation**

The analyzes and classification of the functions, goods and services of the Karavasta wetlands was made based on the academic information (Albanian and foreigner), government reports, field verification, interviews with the community members and leaders etc. In the literature there is a wide range of ecosystem functions, goods and services, but for the better understanding of this classification it was most convenient to group them in four primary categories (according to De Groot et al., 2000) and to focus mostly on the main functions, goods and services offered by the Karavasta wetlands.

### **2. Data analyses**

Different maps of the area were analyzed to identify the land use changes and the spread of the human activities. Depending on the presence of the natural or human landscapes, spread and type of economic activities, interviews with local stakeholders etc. it was defined which landscapes had experienced more changes and have had higher human impact.

### **3. Preparation of tables and results**

Table of the main functions, goods and services of the Karavasta wetland was prepared after consulting the

literature and choosing the model to follow. The table was adapted for Karavasta from de Groot, Wilson and Boumans (2000).

## RESULTS AND DISCUSSIONS

In this paper it is attempted to provide a comprehensive valuation and classification of all possible functions, goods and services provided by the wetlands of Karavasta. This analyze will help the local community and government to enhance more balanced decision-making regarding the wise use of wetlands.

### 1. The classification of the functions, goods and services of the Karavasta

Karavasta wetland is a natural ecosystem very important and for its great values it is the first Albanian wetland signing the Ramsar Convention (Ramsar Site No: 781, Unic Code of the Agency 3AL001, year 1994). According to the many classifications given for the natural ecosystems in general and particularly for the wetlands it is accepted that these functions can be grouped in four categories: *Regulation functions, habitat functions, production functions and information functions* (De Groot, Wilson, Boumans 2002).

*Regulation functions* of the Karavasta wetlands or its capacity to regulate essential ecological processes and life support. Some of the most important regulation functions of this ecosystem are: gas and climate regulation, disturbance prevention, soil formation, nutrient regulation, waste treatment etc. Both the forest of Divjaka and the wetlands around it, through this regulation functions offer for the local community many kinds of goods and services. The forest of Divjaka has an important role to the biochemical cycle CO<sub>2</sub>/O<sub>2</sub> offering good air quality for the local population and the tourists who visit the place. There are also two large channels which drain the agriculture land directly to the sea, protecting it from the flood. The peripheral zone of the Karavasta lagoon is bordered by peat, which can be used to enrich poor agriculture lands of Divjaka municipality (Ciavola et al., 1995).

Karavasta wetland offers also two important *habitat functions*: The *refugium and nursery functions*, because it offers a suitable living space, breeding and nursery areas for different wild plants and animals, both for resident and migratory ones. The Karavasta wetland is the most important one in Albania concerning the biodiversity. In Divjaka forest, the sandy littoral, Karavasta lagoon and other wetlands around live over 200 kinds of birds (watering and forest birds), 25 types of mammals and 29 types of amphibious (which are the 58% of the reptiles in Albania). The small islands in the northern part of the

lagoon of Karavasta are the nesting place of the *Pelecanus crispus* which numbers around 60-70 species (5% of the total world population of this species). The site is also rich in fish, molluscs and crustaceans etc.

*Production functions* of the Karavasta wetlands are very important for the local population and to support the profitable economical activities such as tourism, agriculture, livestock, trade etc. It offers different kind of foods, raw materials, medicinal and ornamental resources. The most important foods offered by this ecosystem is the fish (in the lagoons) and the wild animals and fowls living in the forest. In this function can be included also certain forms of small-scale subsistence farming and aquaculture. During the communist regime in the forest of Divjaka was build a small reserve for rearing the pheasants, which was very successful, but it doesn't exist anymore. Actually it has been constructed a small reserve of buffalos (in 2008 there were 41 buffalos). Their milk is of high quality and suitable for the production of mozzarella (kind of Italian cheese). The fish production of the Karavasta lagoon is high and provides fish for the local market and restaurants during the touristic season and also for some restaurants in the capital city. The vegetables are raised in the agriculture land profited by the drainage of the marshes and swamp areas near the Divjaka hills and around the lagoon of Karavasta. The quality of the vegetables and crops, especially carrot, broccoli, lettuce, potatoes, cabbage, wheat and corn is very good and furnishes not only the local market, but also some markets in the nearby cities and for export.

The wetlands of Karavasta are rich in ornamental resources that can be used to profit economically. The forest is mostly with pine trees. The wood from the old trees or from the trees which fall down during the winter storms can be used to create small sculptures or models of the most visited places in Divjaka (the church of Miza and the church of small Karavasta). Other ornamental resources in Karavasta are: *the sea shells* in different forms and colors; *the fur* of the wild animals, *wool* from the livestock could be used for knitting of scarves, gloves, rugs etc.

*Information functions* are very important for the natural ecosystem of Karavasta wetlands, because it contributes to the maintenance of human health by providing opportunities for reflection, spiritual enrichment, recreation etc. The curative effects of Mediterranean climate of the Albanian sea coasts are studied from many doctors. They emphasize its effect on human organism for the curing of: rheumatism (through sunbathing and covering of the body with the hot sand), anemia, skin diseases, stimulates the respiratory function, increase of the red corpuscles etc. Generally, the people go to Divjaka beach for the curing of rheumatism and problems with thyroids etc.

Karavasta wetlands offer different natural and cultural landscapes for the recreation, spiritual enrichment, education and science etc. This site is often visited by different groups of researchers from different disciplines, the school excursions, ecotourism, and for practice of sports in the sea, sand and forest (swimming, fishing, boating, Frisbee, beach volley, running, horse riding, hunting, bird watching, etc.

The typology used in the paper has been matched with the best available valuation methods for all types of wetlands functions, which was done accurately to avoid the double counting and enhance data comparability "as indicated in table 1" (Appendix).

The proposed classification and valuation of the functions, goods and services of Karavasta wetlands, helps for the better identification of information found in different literature and can serve for the future development, collaboration and research strategies in the study area.

## **2. The valuation of human impact on the natural and artificial wetlands of Karavasta**

The human impact on the natural and artificial wetlands of Karavasta has been valued through analyze of the actual state of the natural and artificial wetlands, comparing with the previous periods. Different maps have been observed to estimate the changes in land use and surface of the wetlands.

The Karavasta wetlands in year 1930 are spread in the whole area and every change is directed by the natural factors. The human impact on the wetlands in these years is almost inexistent. The most important wetlands in this period are the Karavasta, Godulla e Kularit, and many swamp and marshes. The other parts of the landscape are dominated by the Divjaka forest and small areas dry land.

The human impact on the natural wetlands of Karavasta started after the 1950's, when his activity began to dominate over the natural factors. In this period started the great work for the drainage of the wetlands and deforesting for agriculture land. The drainage of the field area between the Karavasta lagoon and the Divjaka hills (around 10000 hectares) began in 1964. From this process that lasted until 1981, 2300 hectares of natural wetlands were drained and 5200 hectares were improved (Hall 1993). Only the Karavasta lagoon and some wetlands around it

could be saved from this human intervention. The collectivization of the agriculture and the spread out of the settlements (the population was growing rapidly in this period) influenced the reduction or destroying of some other wetland areas.

After the year 1984, the human impact on the wetlands became more severe. In this year finished the total drain of the small Karavasta lagoon, but the land profited from this process was very salty and sandy and not suitable for the agriculture.

The uncontrolled human impact on the natural landscapes and wetlands didn't end with the decline of the communist regime. After 1990's the human impact on the natural landscapes is not as weak as it is thought.

In this period there are not anymore organized interventions in the landscape, but the human impact and interventions are still very severe. Human activities in the last 20 years have made big changes in the natural landscapes and have caused many social-economical and environmental problems. The decisions of the local government and community are directed mostly by the need to profit easily and rapidly without taking care of the consequences.

The human impact is very severe not only in the artificial wetlands, but also in the natural ones. We can classify these effects on the basis of the main economical activity:

*Agriculture, livestock, fishing, hunting etc.*

The farmers and fishermen are not informed and do not practice the sustainable principles in their activity. Their impact is mostly on the artificial wetlands, but also in some sectors of the natural one.

*Tourism* as it is practiced actually (mostly sunbathing) in Divjaka has more negative impact on the natural wetlands and is not very profitable economically.

*Construction* sector is developing by the increase of population and other economic activities, mostly agriculture, fishing and tourism. There is not a plan for the distribution of the buildings and settlements are spreading in every direction damaging the agriculture lands, the protected areas, the wetlands near the forest etc.

*Transport and trade* have negative effects in the forest and the sandy littoral. The cars mostly are parked in the natural and protected Forest of Divjaka or in the littoral sand.

**Tables**

Table 1. Main functions, goods and services of the Karavasta wetlands

<b>FUNCTIONS</b>	<b>GOODS AND SERVICES</b>
<b>I. Regulation function</b>	
1. Gas regulation	1.1 Good air quality 1.2 Favorable climate
2. Disturbance prevention	2.1 Flood prevention
3. Water regulation	3.1 Drainage and natural irrigation 3.2 Medium for transport
4. Soil formation	4.1 Maintenance of productivity
5. Pollination	5.1 Pollination of wild plants species
<b>II. Habitat function</b>	
6. Refugium	6.1 Farming and aquaculture
7. Nursery	7.2 Hunting, fishing, fruits
<b>III. Production function</b>	
8. Food	8.1 Fuel wood, organic matter
9. Raw materials	9.1 Health care
10. Ornamental resources	10.1 Resources for fashion, jewelry, decoration & souvenirs
<b>IV. Information function</b>	
11. Recreation	11.1 Natural areas for ecotourism
12. Cultural and artistic information	12.1 Use of nature in books, paintings, national symbols
13. Science and education	13.1 Use of nature for school excursions and research

Adapted from de Groot, Wilson and Boumans (2000)

**CONCLUSIONS**

The coastal wetlands of Karavasta have many functions and offer a wide range of goods and services, but the identification of some of them it is very difficult for the local community and therefore sometimes they do not profit economically from them. However, for all types of ecosystem functions it is possible, in principle, to arrive at a monetary estimation of human preferences for the availability and maintenance of the related ecosystem goods and services.

Human activity and pressure on the wetlands has been different during the communist regime (1945-1990) and after it (after 1990). In the first period the human pressure was more severe on the natural wetlands and brought the big lost of them through drainage of wide surfaces, while in the second period this pressure continues especially through the uncontrolled spread of construction and other economical activities.

The human activity on this wetland ecosystem should be directed toward the sustainable methods for the protection, restoration and creation of wetlands.

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