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The Identification of Ecosystem Goods and Services Provided by Karavasta Lagoon

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Abstract

The coastal system as the Karavasta lagoon provides a range of goods and services. The Karavasta Lagoon (Ramsar site since 1996), is one of the most various mosaic of coastal habitats that extends in the central part of the Albanian Adriatic coast. The aim of the study was the identifications of goods and services in Karavasta lagoon. To identify, list and characterize the goods and services we have adopted the classification of ecosystem services proposed by Millennium Ecosystem Assessment [14] that outlined four categories of ecosystem services Provisioning, Regulating, Cultural, Supporting. According to the MEA, ecosystem services are seen as 'the benefits ecosystems provide''. To carry out our objectives we have used also a set of methodological tools for data collections including: (i) Previous studies and literature (ii) Questionnaire in villages, household around the lagoon and interview with tourist, visitor which use the lagoon. This methods help us to identify the Ecosystem Services and to collect information about the goods and services in the lagoon. The study found out that the goods and services of the lagoon are mainly utilized from the residents of the nearby villages such as Mize, Zharnec, Kryekuq, Bedat, Xeng and Divjaka. It was noted that provisioning services with direct use are: fishing (high level), medicinal plants, agriculture, mineral, wildlife (medium level) and provisioning services with indirect use are: endemic plants (high level), water (medium level). Regulating services with direct use are: recreation, education, cultural, historical and traditional services (high level) and regulating services with indirect use are: flood and flow control (high level), hydrological regime, biological regulation (low level). Supporting services with direct use are: supporting a range of biological diversity (high level), water transport (low level) and supporting service with indirect use is: supporting a productive fishing environment (medium level).

Keywords: lagoon, goods, services, ecosystem, assessment.

1. Introduction

Nowadays, lagoons are considered very important ecosystems, which should be conserved, protected and valuated. In Albania as in many other countries the valuation of lagoons has changed through the years. Lagoons have provided humans goods and services as fisheries, recreation, transport, agriculture, medicinal plants etc. More specially, these uses and functions can be classed according to the goods and services obtained. Humans have been the beneficiary of coastal lagoons for centuries and the benefits derived from them are translated in value. Despite its importance, this value are not always obvious, frequently are misunderstood and taken for granted. Therefore, many coastal lagoon ecosystems are being used in unsustainable ways and are being severely threatened. In order to ensure that the appropriate value to the society were understood and to allow better management of these ecosystems, lagoons goods and services must be identified. In this paper to identify the ecosystem services we have used Millennium Ecosystem Assessment [14] which define ecosystem service as 'the benefits ecosystems provide'[14]. Based on this definition, [3] explicitly acknowledged the importance of ecosystem services for human well-being not only for a sustainable life, but also worth living -i.e. health, security, basic material for life [14]. The Millennium Ecosystem Assessment simplified the presentation of ecosystem services concepts and placed them within a broader socio-economic-political context. This helped the

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policy-makers to recognize the importance of ecosystems and ecosystem services for human development.

The main purpose of this study is to identify, list and characterize the present key goods and services of Karavasta lagoon. The study is based on the methodology of [10] Millennium Ecosystem Assessment which (i) categorize the goods and services in provisioning, regulating, cultural and supporting, (ii) divide them in direct and indirect use value and non use value, (iii) give to the key goods and services a degree of measurement and rank them in term of importance (high, medium, lower), based on the data gathered in the lagoon from a combination of both ecological and economic standpoint.

2. Material and Methods

2.1. Study site

During 2013 we have conducted research and gather data on the main goods and services in the Karavasta lagoon (40º56' N and 19º29' E) which is the largest lagoon in Albania with an area of 4,600 ha. It has a maximum of 15,4 km length and 4,1 km wide. The maximum depth is 1,3 m with an average depth of 0,7 m. The lagoon is a (Ramsar site since 1996) and is one of the most various mosaics of coastal habitats in Albania that extend between Shkumbini and Semani river, in the central part of the Albanian Adriatic coast [15]. Many different methods for categorization of ecosystem services have been defined [4]; [17]; [14]; [12]; [1]. For this study the over-arching classification of the benefits humans derive from the environment is drawn from the millennium assessment [14], a comprehensive assessment of the state of the global environment. The MEA definition follows [2] and it follows [6] in using the term "services" to encompass both the tangible and the intangible benefits humans obtain from ecosystems, which are sometimes separated into goods and services respectively [13]. To identify the goods and services of Karavasta lagoon we have adopted the classification of ecosystem services proposed by MEA [14]. The MEA outlined four categories of ecosystem services: **Provisioning** services are the products that are obtained from ecosystems. **Regulating** services are the benefits obtained from the regulation of ecosystem processes. **Cultural** services are nonphysical benefits that humans obtain from ecosystems through spiritual enrichment, cognitive development [3]. **Supporting** services are those which are necessary for the production of all other ecosystem services [7]. They differ from other services as their impacts on humans are indirect, or occur over a long time period [16].

2.2. Through previous report and literature.

To gather data about goods and services we have consulted previous literature, key publication [15], report about the Ecosystem Services in Karavasta lagoon. This study direct our work in those areas where there was a lack of previous studies.

2.3. Questionnaire in villages and household around the lagoon. Interview with tourist and visitor which use the lagoon.

Questionnaire was developed and focused on finding out the uses of goods and services. It was developed using guidelines from [8],[9], [10], [11].

We conducted about 50 interviews. Face to face interviews were conducted and lasted between 10-30 minutes based on the respondents' use of the lagoon. One person per household was interviewed. The household were chosen based on the villages around the lagoon, as Zharnec, Mize, Kryekuq, Mucias, Bedat, Karavasta. Also was conducted interviews with local and foreign tourist which use the good and services.

The data collected about the goods and services were dumped in a database and from their processing were benefit results. A list of the uses was derived and analyzed below

3. Results and Discussion

The data collected from previous literatures, questionnaires with research institutions with key persons and interview with tourists and visitors identified a preliminary list of ecosystem goods and services provided by Karavasta lagoon (Table 1). In this list set a general framework for the characterization of the goods and services in the lagoon and rank them by order in terms of importance (e.g. high, medium, low marked with ♦) from a combination of both an ecological and economic standpoint. This step was accomplished using various data sources cited above. To assess these goods and services we have divided in Direct-use values; values from direct human use of natural resources these can be extractive use values from outputs such as timber or fisheries, and non-extractive use values from activities such as tourism and recreation; Indirect use-values values from regulatory processes that indirectly provide support and protection to human activities,

such as flood protection [4]. The assessment of ecosystem goods and services was based on four categories of [14].

Table 1. Ecosystem Goods and Services provided from Karavasta lagoon.

Category	Goods and Services in Karavasta lagoon	Direct use	Indirect use
Provisioning			
	Fisheries	♦♦♦	
	Medicinal plants	♦♦	
	Agriculture	♦♦	
	Mineral	♦♦	
	Wildlife	♦♦	
	Endemic plants		♦♦♦
	Water		♦♦
Regulating			
	Flood and Flow control		♦♦♦
	Hydrological regime Biological regulation		♦
	Biological regulation		♦
Cultural			
	Recreation	♦♦♦	
	Cultural, historical and traditional	♦♦	
	Education	♦♦	
Supporting			
	Supports a range of biological diversity	♦♦♦	
	Supports a productive fishing environment		♦♦
	Water Transport	♦	

Key High ♦♦♦ Medium ♦♦ Low ♦

It is seen from (Table 1) that *provisioning services with direct use* are: fishing (high level), medicinal plants, agriculture, mineral, wildlife (medium level) and *provisioning services with indirect use* are: endemic plants (high level), water (medium level). *Regulating services with direct use* are: recreation, education, cultural, historical and traditional services (high level) and *regulating services with indirect use* are: flood and flow control (high level), hydrological regime, biological regulation (low level). *Supporting services with direct use* are: supporting a range of biological diversity (high level), water transport (low level) and *supporting service with indirect use* is: supporting a productive fishing environment (medium level). In the section below are defined detailed the main goods and services provided by Karavasta lagoon. According to the definition [5] makes a distinction between the value of goods and services in which goods are those which are based directly by humans (such as fish), and services are those which indirectly support human welfare.

Ecosystem Goods and Services in Karavasta lagoon.

Fisheries: this good forms the basis of the country's economy and bring profit for the resident population of the surrounding ecosystem. This activity is exercised particularly in the Karavasta lagoon, coast, Godulla, river beds and irrigation reservoirs. The Karavasta blocks in an area of 4300 ha with a fish production average of 300 tons per years, and the most common fish catch are: Ater, Bass, Eel, Mullet, Koce, Cuttlefish, ect. The lagoon is known for a very rare species the American crab. Fishing performed by local teams or individuals, with and without a license, using all forms of fishing, but also from private companies. The use of the lagoon for fishing is divide in seasons In the end of May rays are open to the propagation of fish, from June to the end of January

the fish harvested in the beam using free hunt with nets. In February there is a low production.

Agriculture: About 4500 hectares of land is cultivated around the Lagoon. Divjaka area residents and villages around the lagoon of Karavasta are known for the cultivation tradition of agriculture products, vegetables, cereal, forage plants, in the construction of greenhouses, etc. The area is known for olive oil production and growth of mushrooms.

Wildlife: Apart from fisheries, other wildlife species are hunted. Around the lagoon live about 25 species of mammals and about 210 species of birds winter. Hunting of poultry, wild ducks are illegal activity done from local and foreign tourist. Also around the lagoon the people of the area have set up farms for growing horses.

Medicinal plants: The forest around the Lagoon contains large types of herbs, basil, rosemary, crock pine, pine needles, myrtle, laurel ect.

Mineral: During 90 the lagoon was used for the extraction of oil, salt and sand which come also from the sea, nowadays this goods are used marginally from local communities. Also the proximity with Adriatic sea made the coast rich of hydrocarbons.

Endemic plants: The area around the lagoon have a large number of endemic plants like: Asteri (Aster albanicus subsp paparistoi) ,Salep (albanica Orchis Orchis and hybrid forms paparistoi x), (x O.coriophora Karavasta is known for: Hidrokotilit trite (Hydrocotyle vulgaris), which was thought to be extinct in Albania until 1995.

Water: Some water extractions are made from the lagoon to irrigate agricultural area. Also water is used to extinguish the fire in Divjaka forest.

Supports a range of biological diversity: the lagoon consists of many environments, freshwater and salt wetlands, the salty and open marshlands with a dense vegetation, Godulla connected with Adriatic sea, saline lands and around the lagoon the hygrophyte forests, Mediterranean pine trees and forest lands. Also the Lagoon is the place where Pelican (Pelikanus crispus) makes nest, also about 5% of the bird population worldwide lives in Karavasta.

Water Transport: Although the lagoon is not used for transport on a large scale, local users still use the lagoon's water channels to access the sea on the coast, or for recreation.

Recreation: The lagoon provides several recreational opportunities including fishing, hunting, picnicking, boating, bird watching (the nests of Pelicanus crispus, specially during may and June), walking, making picture. The majority of the users are those who live within and around the lagoon, and they have indicated by survey that it brings joy to them. The number of foreign tourists is increasing recently thanks to some promotions done from local and foreign project.

Cultural, historical and traditional: There is a strong cultural link to the lagoon as evidenced by the many ceremonies organized from the promotion of agriculture products like watermelon, melon, which the area is known traditions within it.

Education: The Lagoon is used for excursion from the primary, elementary and high school which are useful to educate the generation to love and conservate the nature.

Flood and flow control: The lagoon has the capacity to control flooding to the lands surrounding it. However, because the water supply channels are not maintained, and cleaned in the entrance and exit of water, this service is not effectively allowed to be carried out. Also is necessary a buffer zones around the area of water, the alluvium who come from fields, irrigation, erosion, lower the measurements of the lagoon bed to 1.5 m depth. In the summer there are fluctuations and vegetation exit. Another problem is caused from lack of wet canyons that connect the sea with the lagoon are shallow and there is low communication between them.

Supports a productive fishing environment: The main fisheries caught on a commercial basis occur on the sea in front of the lagoon, near the Adriatic sea and near the The lagoon supports this productive fishing area by acting as a nursery and shelter for juveniles.

3.1. The results of questionnaire about the goods and services provided by Karavasta lagoon

We have conducted about 50 interview in the lagoon included visitors, tourists, habitants of the municipality of Divjake and villages around the lagoon. The results below evidence in the Fig.1 the percentage of respondent about what kind of goods and services provided by Karavasta lagoon they use and in Fig.2 the percentage of respondents about the causes of threat or damage to the lagoon.

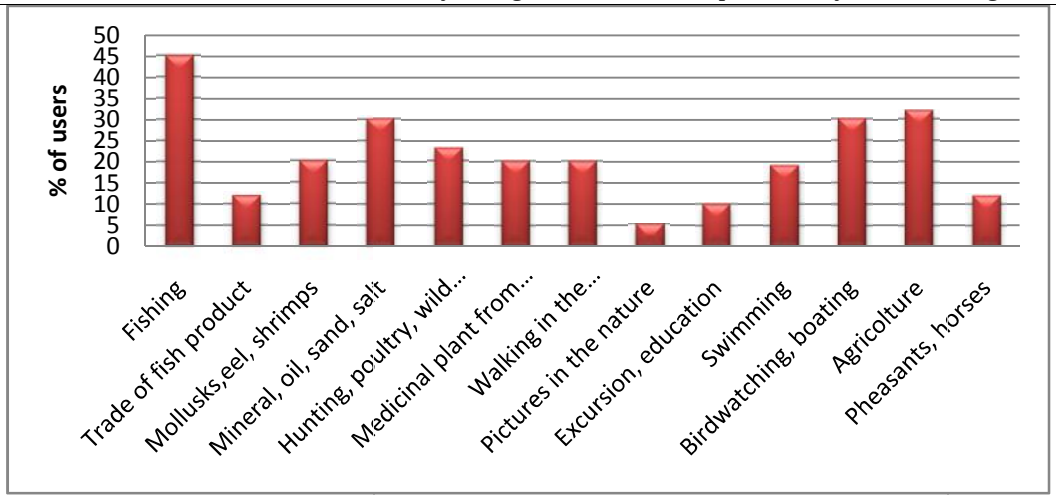

Figure 1. Percentage of respondent which use the ecosystem goods and services provided by Karavasta lagoon.

The majority of the lagoon's goods and services are used by the local people, as part of their routine life. But the Lagoon is used also from foreign tourist specially for hunting, and for the excellent food that this area offered. The Lagoon is used most for fishing, which sometimes is individual from the resident of the villages around or from private company. Another important goods which the respondent use are the Medicinal plants, rosmarine, crock pine, pine needles, basil, that they find in the forest around of the Lagoon. Agricultural product used from the local people around the villages of the lagoon reflect high value of use from the respondent. They cultivate a large number of product therefore the soil fertility and the good position with the lagoon. The extraction of mineral as oil, sand and salt respect a high values of use, but the respondent reflect that this goods are used different time ago, nowadays are used only from local people for personal needs. Tourism is evidenced from the respondent as an important value, the lagoon is used for a local tourism for walking in the forest, jogging, boating and bird watching of Dalmat Pelican which is a new activity used from foreign tourist. Unfortunately the lagoon have a spontaneous tourism organized from the local communities. Nowadays the lagoon is used also for education, and excursion of elementary and high school. Also local resident deal with the growth of pheasants, horses and buffalo.

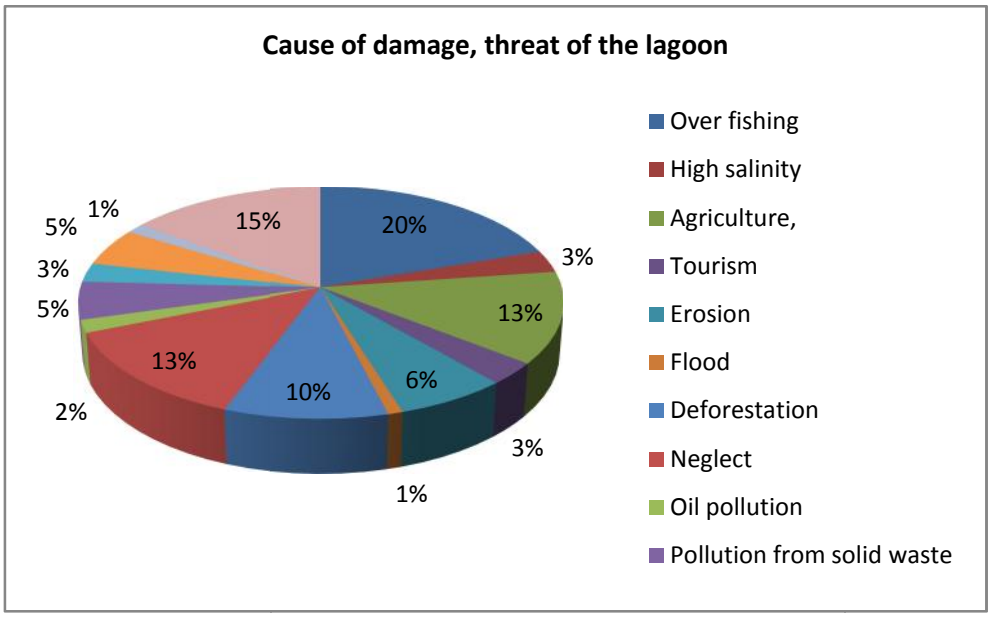

Figure 1. Percentage of respondents about the causes of threat or damage to the Karavasta Lagoon

The majority of the lagoon's goods and services are used by the local people, as part of their routine life. But the Lagoon is used also from foreign tourist specially for hunting, and for the excellent food that this area offered. The Lagoon is used most for fishing, which sometimes is individual from the resident of the villages around or from private company. Another important goods which the respondent use are the Medicinal plants, rosmarine, crock pine, pine needles, basil, that they find in the forest around of the Lagoon. Agricultural product used from the local people around the villages of the lagoon reflect high value of use from the respondent. They cultivate a large number of product therefore the soil fertility and the good position with the lagoon. The extraction of mineral as oil, sand and salt respect a high values of use, but the respondent reflect that this goods.

4. Conclusions

The main Goods of Karavasta Lagoon are; Fisheries with a production average of 300 tons per years; Agriculture, with about 4500 hectares of land and know for the cultivation tradition of agriculture products, vegetables, cereal, forage plants, olive oil production and growth of mushrooms; Wildlife: with 25 species of mammals and about 210 species of birds winter; Medicinal plants: like basil, rosemary, crock pine, pine needles, myrtle, laurel ect; Endemic plants: with a large number of endemic species. The main Services of the Karavasta Lagoon are: supports a range of biological diversity, water transport, recreation, cultural, historical and traditional, education, flood and flow control, supports a productive fishing environment. The goods and services of the Lagoon are mainly utilized from the residents of the nearby villages such as Mize, Zharnec, Kryekuq, Bedat, Xeng and Divjaka. Tourists engage in this activity mostly during the summer and then occasionally. According to locals, the main goods and services offered by the Lagoon are provided by fishing, agriculture and the Divjaka beach. The Lagoon supports a diversified range of biodiversity is populated by endemic and sub endemic species. Locals that live in the area around the lagoon think that it is in good condition but they also think that fishing should not be left in the hands of private companies. The local and central government should take steps to clean the canals that are degrading the Lagoon conditions through the years.

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