

The Adriatic Coast and Tourist Potentials in the Lagoon Ecosystems

Mirela Tase, Arjeta Hallunovi

Abstract

The Adriatic coast is characterized by the presence of a highly diversified lagoon system. That is considered to be a high tourism potential and a basis for a more sustainable development of the economy of the area in which they are found. Changes of sea level rise on the Adriatic coast lagoon prominently displayed on the change of biodiversity. Besides the natural factors in this lagoon as well as all other lagoons of the Adriatic coast it feels a lot during the last 60 years of pressure from human society itself. In the dynamics of the waters of the Patok lagoon play a major role in hydrological processes of climate (the arrival of water through tides, increasing during heavy autumn, winter flooding, evaporation process of the wind, etc.), which raise or lower the level water in the lagoon creating this process through channels connecting the Patoku sea.

The study aims to identify the values of this wetland complex located in the coastline and is identified as a region in a critical condition and vulnerable to climate change. Here, it can be successfully develop several types of tourism: the creative and ecological. The chaotic urbanization and the problems that derive from it, have arisen massive violation of environmental balance, associated with environmental, social and demographic problems. The paper, it is based on a multi-year work to show their biodiversity values, as well as the measures needed to be taken in order to build the tourism sector.

Key words: Lagoon System; Management; Climate Change; Natural Assets;

1. Introduction

This paper is based on research, analysis and prognosis performed in recent decades by experts in areas of geomorphology, geography and urban planning. They have been taking a firm stand for the preservation at all costs of these ecosystems, which has lost their habitats, due to the changes caused by human interventions and climate change. The Adriatic coast is part of accumulative coastal category. Its length of 270 km include quite a few lagoons, which are not only assets used by the local population, tourists, foreign and domestic, but they are also the subject of research for the specialists in the field. Out of all lagoons situated in our territory, 2/3 two third, are found along the Adriatic coast. These lagoons are incredibly fragile but on the other hand, they are rich of ecological, economic, educational, scientific values. In the last decades, most of the lagoon and coastal ecosystems have experienced anthropogenic pressure accompanied with massive migratory movements of population toward coastal areas (Reid and Andereck, 1989). This phenomenon has been experienced dramatically in our country after the collapse of the communist system. The hemorrhage of this movement has brought serious consequences for coastal areas that have been fallen prey to the actions of people lacking civic consciousness, thus destroying the natural equilibrium of these lagoon ecosystems. The Tourism in coastal lagoons can be transformed in a way that is fit to the geography and symbiosis between biophysical and social environment, including agro tourism-leading to a lagoon environmental protection and their further enrichment (Pirnar, 1993).

Changes in biodiversity of wetlands as a result of the natural and anthropogenic factors. Changes of sea level rise on the Adriatic coast lagoon prominently displayed on the change of biodiversity. A concrete case is Vilun lagoon where greater increases in sea level have in October, November and December where activity dominates the area. Viluni lagoon is considered a type of lagoon closed when the channel length is less than 1/5 the length of the cord that separates the lagoon from the sea. The Lagoon serves as buffer of changing water coming through high thrust ripple and rise of the sea level by lowering the pressure tides and mitigating the striking force and erosive off the coast. Despite the

expansion of the lagoon (mostly associated with the deposit) coastal processes aimed around single water circulation between the sea and the lagoon. (Depth of the channel has changed these last 60 years, where 2m in 1957 to 1.4 in 2000 and 1.2 last measurements in 2014. The narrowing of the channel connector are consequences in the development of life in the lagoon and expertise to this must be quite large investments and a higher cost to keep open the channel. It has made a difference in the amount of salinity which is comparable with earlier periods of time is thought to have been the salt (for this show waste disposal plant halophytes).

This is connected with the arrival of freshwater brought by Martenzes channel after the reclamation of the field due to the restriction Velipojë and arrival of sea water from the narrowing of the canal that connects the sea and water balance (precipitation). It is too high in recent decades, and especially these last two years, where temperatures in the summer season have spent average temperature values. Knowing the characteristics of salinity is helping us to know the features of the plant and the animal world and especially for the growth of organisms such as species of fish, etc. Besides the natural factors in this lagoon as well as all other lagoons of the Adriatic coast it feels a lot during the last 60 years of pressure from human society itself. The Viluni lagoon after 1958 has reduced its surface by 2100 ha to 638 ha as a result of drying of wetlands and deforestation bringing and the disappearance of a portion of the marshy vegetation and other organisms that grow in this chase. The Ecological importance of these habitats is not only in terms of natural communities and species they contain, but also in the environment, the role they play in controlling the quality of waste water by dumping industrial and urban discharges in these lagoons. A clear example is the Kune- Merxhani lagoon and it discharged today Vaini lagoon where urban waste of the city of Lezha. The Wetlands are seen not only as a source of food but they are also seen as filters of pollutants coming from inside the earth and wet surfaces near wetlands used as purification plants wastewater great economic importance. In the recent years due to scientific interest and practical father, these are called kidney nature (Viluni lagoon), for the protective effect cleaners but also because of the presence of very habitats that represent economic value.

It is known that by measuring the height of the waves on the Adriatic coast is around 3m and therefore the waves or waves their water comes into lagoons that serve as a buffer to mitigate the striking force of the waves

and channels connecting roads communicating with the sea should be kept under cleanup the natural state of their own, here helps us experience the Dutch, Danish (in Rihebring) where by creating breakwater, obstacles quarry and concrete blocks at both ends of the channel (especially in the northern part of the Viluni lagoon) to keep open the channel to be allowed in this way a turnover of wildlife intense and enrichment lagoon salt water species marine, an increase of the amount of oxygen in the lagoons etc.

In 1973-1975 were built many wells on the borders of the Kuines lagoon to reduce the salinity of the water, and 4 of them were opened near the Merxhani lagoon as a discharge quantity of 100l / s and five others in the lagoon Vain a discharge amount of 200 L/s. These affected and change the water quality of the lagoon. In the Kune-Vain lagoon the average temperature reaches 17°C. In these two decades and especially in the last 10-year-old has reached this temperature over 19,5°C (data from institution of Geophysics, Tirana, 2014), which has brought about the change of flora and fauna. Salinity has increased these last two years, reaching 36-39‰ in value and sea currents have a speed of 0,3m / s. The average level of evaporation in Vain is 763 mm/year, according to 2007 statistics. In the last decade, this level has reached about 790mm/year affecting habitation of this lagoon. This increase in average values of temperatures has brought increasing % of salinity, which changes the values from the central to eastern lagoon and indication of this variability is the difference of values of pH of the winter season with the winter (They are higher in summer).

The summer season for these lagoons is in the most critical in terms of their condition becomes more peaty and especially evident when these lagoons are discharged and urban waste. According to the biological research institute, "Monitoring of flora and peaty lagoons situation Adriatic coast" appears more problematic. A more critical case is Kënalla lagoon which is gradually transformed into a landfill wastewater, while in the case of Kulari lagoon the channel communication is completely closed, causing suffocation to complete, especially during summer when it is associated with decay and deposition of underwater vegetation dominated by *Zostera*, *noliti* algae and animal organisms. During this period due to the high level of evaporation, we have a significant drop in water level, the high level of eutrophication and the almost total absence of aquatic life. According to the Institute of Biological Research "Monitoring of flora" and peaty lagoons situation Adriatic coast "Vain lagoon, characterized by

mesotrofi-eutrofi value of chlorophyll content to 7 mg/m³ in particular areas.

In the coastal area where the complex Kune-Vain lagoon found vegetation from that water up to pines grown, but most are accompanying hydro-hygrophytes, but despite the diversity of the high amount of associations in many sectors are quite damaged. The situation looks better in Kune, after the gate of the reserves. In such premises and a large number of vertebrates which indicates the appropriate space that offers this area for nesting of many different kinds of birds. By (Miho 1998) despite the great diversity that occurs in this area flourishing virtually absent (case Merxhani) and this is related to the lack of communication of waters between the best of the sea, while at the Ceka encountered and the population in bloom, even poisonous (eg. reverse and peridinete Nitzchia populations).

In the dynamics of the waters of the Patok lagoon play a major role in hydrological processes of climate (the arrival of water through tides, increasing during heavy autumn, winter flooding, evaporation process of the wind, etc.), which raise or lower the level water in the lagoon creating this process through channels connecting the Patoku sea. In terms of a lagoon, close to its water salinity affected by climatic phenomena of the area having large oscillations of salinity, there is decrease in precipitation during autumn, winter and increased salinity during evaporation in the summer growth. Today the lagoon is affected by the activity corrosive of sea waves as well as that of human society where their effects occur in the eastern part of the lagoon where to 90s there was a quite area referred to increase pheasant today it has turned into a area Private and human intervention has caused the disappearance of this type of bird and marshy vegetation.

2. Prognosis of the area under study in the context of climate change and measures for their protection

The Coastal land strip where are concentrated coastal lagoons and wet lands in the Drini-Mati-Ishëm is of particular importance. This area carries significant biodiversity value and is considered as a critical vulnerable region for its climate variability and its expected changes. Protecting ecosystems and biodiversity they contain, it can provide turn support and protection for individuals and communities. The Costs are to have healthy

ecosystems and more effective and efficient change management than other alternatives used by people. These habitats provide as good material (resources that can be used, for example, it is thought caught fishing around fish 8000kv year, ecological tourism), as well as services (features that benefit the community, coastal protection). These habitats and communities are vulnerable to long-term climate changes that will cause the rise in sea level and frequency of marine storms. From Predictions I thought that average sea level rise 0.13m-0.16m in 2050 and 2100 from 0.27 to 0.49 and the average temperature 2-3°C more normal values which will bring the potential danger of fragmentation flooding, loss of habitats and species, bringing the destruction of wetland ecosystem in this area of study. As a result of climate change is thought that the existing lagoons and wetlands (in the area of Lezha and Velipojë) to become salty waters and dry land existing in wetlands. Greatest consequences will be seen in this region; as a result of climate change is thought to be:

- a. *The loss of wetlands;*
- b. *Fishing;*
- c. *Recreational opportunities on the coast;*
- d. *Loss of agricultural land.*

These are the area's most vulnerable to flooding as are areas close to the coast. Every millimeter sea level rise on the coast is expected to result in a withdrawal of coastline about 1km. There is only little experience and capacity to interpret the information and taking the study seeks to develop a climate change adaptation strategy of valuable wetland areas and wetlands that lie in the study area. This study has demonstrated that natural ecosystems of our paper have the potential to protect economic activities, infrastructure and built environment but will not be able to do so under the pressure of change and degradation is happening already.

Lagoons on the Adriatic coast occupy about 130km². Karavasta lagoon together with the one of Narta, occupies only 60% of the area. The lagoons along the Adriatic coast are considered as ecosystems with numerous values but highly fragile. They are considered as "nature's kidneys" (Viluni lagoon) due to their protective and cleaning effect. The fact that the regeneration of ecosystems is not fast, cooperation is required by specialists to calculate the intensity and anthropogenic pressure so that it can manage the overload which leads to the violation of critical limits of these ecosystems. The ecological importance of these habitats is not only about

the natural communities and species they contain. They are important for the environment as well. They play a role in controlling the quality of waste water, as a result of industrial and urban discharges in these lagoons. A clear example is the Merxhani lagoon as well as that of Kuni-Vainit lagoons, where urban waste of the Lezha city are discharged. The value of wetlands is expressed in all habitats, turning them into living museum of nature, environments, required for the development of modern tourism. The main lagoons are: Viluni lagoon, Merxhani lagoon, Kune-Vain lagoons, Patogut lagoon, Karavasta lagoon, and Narta lagoon.

3. The tourism development in the lagoons

The tourism is now being recognized more and more as an important source of exchange with the rest of the world (Garner, 1974). However the construction of other facilities can affect directly in the environment (Smith and Krannich, 1998). If not done the right way, it will lead to the degradation and alternations in the coastline. Examples: cleaning vegetation on the properties of areas with erosion, wetlands filling, construction which cause increasing sewage and solid waste or inadequate construction barriers (Lankford and Howard, 1994). There may be huge losses in natural capital as a result of inadequate planning along with the destruction of the coast and changes in the aesthetic scenery for the tourists (Bramwell and Lane, 1993).

The tourism activity could have a negative impact on ecosystems as well (Tekin, 1994). For example, it can cause pollution, boats and anchors can destroy delicate under water habitats such as sea mattresses (Scheyvens, 2002). The touristic degraded areas can give a negative image of the area which could jeopardize current and future investments (Manning, 1999). It is important to relate tourism to nature conservation by setting environmental standards, but also by making sure that large areas are secured (Buhalis, 1999). The protected areas (like natural reserves, national parks, scenic landscapes) are important points that can attract people and are a source of income to local communities as well as to the country itself. This way, the tourism is focused on protected areas and could help to diversify the economic underpinnings of the agricultural economy (Miho, 1999). The protected areas are an indication that the aesthetic and ecological criteria for sustainable tourism should be taken into account (Trojani, 1999).

This helps to promote scientific exchanges among different cultures and people (Bachleitner and Zins, 1999).

We have to avoid mistakes made in France, Italy and Spain, which allowed mass tourism that caused serious damage to their coast (Tribe, 1999). Viluni lagoon presents scientific and practical interest. It is considered as the "kidneys of nature" because of the cleaning and protecting effect (Donohoe and Needham, 2006). It is a great biological wealth due to water and vegetation, characteristics that allow the development of an indigenous fauna but also characteristic that migrates in specific seasons of the year. For this reason, it was declared in 1958 as a hunting reserve with an area of 2100 ha for a period of more than 20 years. This is because at this time the number of wetlands and their area (including the Viluni lagoon and numerous ponds and swampy who kept a diverse fauna of many). The wetlands draining and deforestation reduced its surface and today it reaches 638 hectares including Viluni lagoon and its surrounding areas. As marshy vegetation (stubble, etc.) and its surrounding woodlands create very comfortable conditions for food and shelter to creatures with important values as robins hunting, cormorant, and turkeys, the water, doves, wild pigeons, quail and slippers in the waters of the lagoon, there are qualitative fish like sea bass, eels, mullet etc. Viluni lagoon and its surrounding wetlands are an important subject for scientific tourism although uncontrolled hunting of fauna has declined sharply types (Goelder and Ritchie, 2006). Limiting the width of the canal connected to the sea affects the amount of plankton. The lagoon coastal area should be protected. Viluni lagoon and resourceful zones should be administered (in agreement with the IUCN classification). Renci fishing and recreational activity can take place in this area (Gouide, 1994). To preserve the biodiversity of the area, we recommend limited access to the eastern and southern part of the canal, separating the areas for cultivation of fish eggs and ecological studies including their continuous monitoring (Gunn, 1988). In Viluni lagoon we can create a small service center for tourists which would facilitate their staying and enjoy scenery while walking in Velipojë. The ecotourism as a form of tourism development which takes into account the environment can take place not only in the Viluni lagoon but also in the Merxhani and Kune Vain lagoons. They are known for little depth with salinity of rotating and in the suburbs with halophytes vegetation. The exception is Kenalla lake depth up to 9 m and freshwater (about 5 mg / liter). These lagoons closed because their

communication with the sea was scarce (Merxhani gorge on the northern edge of the forest of Kune is virtually closed) but could have been even an estuary formerly the Drini delta. The diverse vegetation and animal world of wetlands, irrespective of industrial and urban pollution, constitute important ecological values (Farrell and Twining-Ward, 2005).

In 1980, an increase of anthropogenic activity took place, which has been reflected in the geographical landscape of the territory (Hall, 2000). During these years, the flooding of the delta of the River Drin and an increase in wet surface stood out more (Hunter, 1997). It was expressed especially in the Kune-Vain lagoons which intertwined for generations closely and developed a rich vegetation (Kune northern part was separated from the lagoon through a wide street).

3.1. The Kune-Vain lagoon

The lagoon and the variety of environmental factors which act upon, represents one of the most interesting areas of our country and this part of the coast that we are focused on. The lagoon systems belong to the category of natural reserve managed (category 4) for the great natural values that it represents. Generally vegetation and environment proceed harmoniously in this complex environment and any modification corresponds to a modification of vegetation and vice versa. This compound has a very rich vegetation and diverse. This lagoon system is crossed by a number of swamps, ponds and the river Drin, which is considered of particular importance in the formation, performance, and their future. This ecosystem includes 14 km of coastline from the mouth of the Drina River to the mouth of Mat with VJ direction. A narrow strip of sand of vegetation separates the shallow waters of coast and Ceka -Vain lagoons. The coastal wetlands ecosystem have served as: *‘Natural Systems in stabilization of the coast’*

- They perform the function of buffer zones (inhibit the penetration of pollutants and infiltration of water through the rock salt basin.
- These lands are habitats for wildlife and an important fishing area.
- These lands provide opportunities for activities such as tourism and other leisure sports.

Figure 1. The Kune-Vain lagoon

Source: Magazine Environment today, December, 2017

But only the hunting reserve (published in 1992), is located mainly in the southern and western portion is an area about 1 ha with forest which is considered as a private area where pine condition is very good. In Merxhani area there is greater damage by logging, conducted on the west side where the *pinus* spp. The Vain forest has been damaged by logging from people, outdoor private residential construction and tourism that have been built in recent years.

One of tourist facilities built in this area is Hunt Hotel (Lezha island), before World War II. It was set up a hotel for hunters that was built by Count Ciano accounting and one of the tourist spots particularly found along the coast starting from the architecture and the way of organizing.

This hotel was built in 40 years, in the twentieth century, with stones and worn pine and was surrounded by greenery. It is one of the most frequented today by foreign tourists and domestic after 90 years (the fall of the communist regime). This reserve can also serve to organize outdoor activities such as hiking, fishing, boating etc.

3.2. Patog lagoon

It is located in the coastal zone of the Rodon gulf between the estuary of the Ishëm and Matt river. In joining the lines of sand, they have formed a cordon littoral 5 km long which has recently been interrupted by numerous canals and narrowed considerably from giving sea erosion lagoon open character (channels occupy more than 1/5 of the length of cord littoral). The Littoral cordon was closed after changing the Patoku river estuary, Ishëm and Droje rivers were built after the establishment of hydropower on the Mat river has undergone intensive corrosion with a length of 8 km. In 1957 the binder had a maximum width of about 500m and in 1987, it reached 175 m. Nowadays width of this cordon is significantly reduced and reaches values from 30-100 m. Such as intense erosion caused the destruction of all of the beach cabins and buildings that today are under the water.

In the east of the Patog lagoon, there is a distinguished area which is quite referred to former pheasant growth and today it is privatized. Motorway separates the swamp with Patog lagoon and Kuqe - field which are constitutes of a protected natural reserve (approximately 1200ha). In the south of the Patog lagoon lies the gorge of Ishëm river. It was interrupted by the sea with a sandy coastal strip but nowadays Ishmi River is back again. Despite an area covered with salt marshes, less salty lagoons and sandy beaches, the mouth of the new Ishëm river (almost in the corner of the Rodon peninsula) is also interrupted by a sandy strip.

According to the opinion of *Prof. Vasil Trojani*:

- a. The return of former Ishmi river bed JP would reduce coastal erosion.
- b. The reserve would be saved from the flood Kuqe- field.
- c. It will enable the development of other types of tourism hunting, fishing, etc..

Figure 2. Patog lagoon

Source: Mirela Tase, December 2014

3.3. Narta lagoon

About the features the Narta lagoon ecosystem inherits, it is a special wetlands. What is striking us in the analysis of topographic maps of a century is that wetland environment has been shrinking. Population of the Zverec Island has caused a lot of destruction of some habitats that were unique and served for scientific studies (Tase, 2014). The Mediterranean pine forest and characteristic monastery suffered after 90 years from hunting reserve, which are bringing great damage to flora and fauna, land and water as well as the loss of a rare bird station coming there.

This biological unity underwent an incredibly powerful humanism bringing the return of the environment in an anthropogenic environment (Kennish and Paerl, 2010). The environmental damage appears in the cutting of forests, hunting, massive change of regime communication of waters between the lagoons etc. All direct and indirect interventions led to a transformation of biodiversity in this lagoon.

Figure 3. Narta lagoon



Source: Mirela Tase, June 2017

This lagoon should be treated by the community and local authorities with responsibility for the biological interest that this environment offers. The Evaluation of the lagoon should have a quality and sustainable development which should be based on the development of agricultural economics, crafts, food industry, all these as offerings for tourism consumption (Xiao and Smith, 2007). Besides them an offer of particular value would be the regeneration of biodiversity, restoration of communities and the return of rare species or enabling the development of ecotourism in the lagoon. This lagoon in current conditions is appropriate to be used for traditional fishing because of aquaculture development in today's conditions is very costly. The landscape is surrounded by the presence of dunes which are covered with vegetation of the area, providing good opportunities for the development of a sustainable tourism.

At the end of this observation on the Adriatic coast, but not least in importance is Karavasta lagoon. This lagoon is considered the largest area that stretches along the Adriatic coast. The communication of this lagoon with the sea is via three channels. The Karavasta environment lagoon constitutes the most important wetland in the entire coast starting from different birds that are found here, like curly pelican that occupies 10% of

the colony located across the globe. High biodiversity, proximity to the pine forest located in Divjakë, creates excellent opportunities for the development of ecotourism, scientific tourism, fisheries etc. Being a lagoon of special importance, it is included in the Ramsar Convention in 1998.

4. Conclusions and Recommendations

Wetland ecosystems in recent decades, has drawn a lot of interest, either in terms of scientific interest but also for the economic value that brings to the community in which they are found. Today they are seen as a national asset not only for the variety of habitats that they have but, they are seen as a great opportunity for the ecotourism development as well.

The development of a mass tourism would be a fatality to these ecosystems and habitats found in them. It is important to consider carrying capacity. It is commonly used given the level of tourists. The weight criterion is carrying much capacity as well as ecological capacity, fragility, lifestyle of wild animals, different species of behavior in these environments lagoon.

These areas offer excellent opportunities for the development of an elite tourism, leaving room for the preservation of environment-man equilibrium. But after 90 years of massive urbanization these lagoon environmental is accompanied by the destruction of natural resources, environmental pollution etc

It is therefore necessary to develop and implement an integrated management plan as drinking water supply, control the number of tourists in this area etc. The ecological corridor and narrow coast, cannot afford "mass tourism" (beaches and ecological barriers) to a high degree. The Promotion of this area as an example of mixing environmental protection with ecotourism can be a model for other Mediterranean countries as well as an awakening sense of pride to the local community.

The other options may also be present in this area for the development of wet soils and lagoons that are associated with hunting and fishing. This can be concluded on a limited scale, and always within the context of administrative principles with a sound ecological system. The option is to used these areas for hunting and fishing can be adjusted on the basis of areas.

*The measures for the protection of Biodiversity and Environmental
These measures consist in:*

- To prepare a biodiversity strategy for the coast. This should be part of a major effort to be made in the study area that have potential significant biodiversity, reflecting the general policy directions.
- To Develop a scheme of protected coastal area that we studied. This should include a number of options for protected areas based on different environmental requirements.
- To Suggest some actions based on observations that can be recommended are as follows:

Natural Reserves should have only a limited access to educational and scientific purposes as the island of Franz Joseph hunting reserve, a complex of wetlands / barrier island on the northern side of the Drin river and complex barriers of the Patogu lagoon.

Wetlands restoration and protection. These areas should be supported to maintain appropriate levels of fishing, hunting, limited and other goods of wetlands, for example filtering, productivity etc. They need to have buffer zones that allow only non-polluting activities, particularly should be no obstacles to agricultural and industrial inputs. This includes Viluni lagoon between Shëngjini and Lezha, south of the Drin River, Patog lagoon and Narta Karavasta lagoons.

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