



# **Economic valuation of the Karaburun-Sazan Marine and Coastal Protected Area**

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## Abstract

### Economic valuation of goods and services of ecosystems

The first Albanian Marine Protected Areas (MPA) to be created, Karaburun Peninsula – Sazani Island, has been proclaimed in April 2010 with the status of National Marine Park. This study carries out an economic valuation of the ecosystems of the MPA in order to support the implementation of the MPA management. This study also provides, in connection with the economic valuation of the ecosystems, an analysis of mechanism that could ensure the long-term financing of management activities.

To analyze and determine the contribution of habitats and species of the Karaburun area to the socio-economic activities of the Vlora Bay, an ecosystem services approach was used. The concept of ecosystem services allows the connection between the ecological functions of the ecosystems and the human activities relying on them. It is thus particularly relevant to analyse the socio-economic benefits generated by the implementation of the MPA.

The first part of the study determines the economic value of goods and services provided by the marine ecosystems of the MPA (coralligenous formations, *Posidonia meadows*, reefs and open water). The ecosystem services identified within the perimeter of the MPA are the following:

- **Provisioning services** :artisanal fisheries
- **Cultural services** : boat excursions: visible wildlife, aesthetic scenery, accessible beaches, sea diving, pescatourism (onboard tourism operated by fishers)
- **Regulating services**: sea water quality, carbon storage and climate mitigation, protection against natural hazards
- **Supporting services**: biodiversity, spawning grounds and nursery

The economic value of the KS MPA ecosystem services represents a total of **1,684 billion ALL per year**. **Regulating services represent the most important part of these services** (95% of the total value) while the provisioning services and the cultural services represent respectively 2,5% of the total value. The role of the *Posidonia meadows* is thus essential to the climate regulation thanks to its ecological function of carbon sequestration. The preservation of this ecosystem should constitute a priority for the management of the MPA. Important areas of *Posidonia meadows* are moreover located outside the perimeter of the MPA; the awareness-rising measures the MPA will lead outside this perimeter could contribute to the preservation of this outstanding ecosystem. The active participation of local stakeholder to the management of the MPA could also guarantee a better preservation of marine ecosystems inside and outside the perimeter of the MPA.

## Assessment of benefits of the MPA management plan implementation

**In order to value the potential economic benefits of the creation and optimal management of the Karaburun-Sazan MPA, two management scenarios by 2026 have been built.** These scenarios take into account pressures and threats on natural ecosystems identified in the Bay of Vlora and within the perimeter of the MPA (aquaculture, urban and tourism development, over-exploitation of natural resources, etc.). Both scenarios correspond to the implementation of management activities.

- The first one could be qualified as a business as usual scenario with the implementation of management actions as expected by the management plan. According to RAPA, there is no difference of priorities between the five main management objectives of the MPA but based on the practice administration, staff and financial capacities, the management staff is more focused on the biodiversity conservation and the management, administration and sustainability of the MPA. In this scenario only actions qualified as Priority 1 were considered, as specified in the management plan.
- The second scenario could be qualified as the optimal management scenario. Like the first scenario, the protection of biodiversity holds a key position in the actions implemented but at the same time. Since tourism activities (boating and diving) might grow very quickly in the area, their early control allows to limit damages on the environment and natural habitats of Karaburun-Sazan. In this optimal scenario, the four zones of the Karaburun –Sazan MPA are respected by the users: the core zone and the effective management zone are not allowed to any human activity. Impacts of human activities on the KS-MPA ecosystems will be the same as in the first scenario until 2020 and should be smaller then.

**If both scenarios allows the preservation of marine ecosystems and the production of ecosystem services for many beneficiaries (artisanal fishermen, tourists, tourism operators, etc.), the optimal management scenario brings more important benefits. The benefits of the implementation of the optimal scenario represent indeed 328 million ALL over 10 years, which represents more than 14 million ALL per year.** Carbon sequestration ensured by *Posidoniaoceanica meadows* is the most important contribution to these benefits. The preservation of this ecosystem is thus essential for this service but also for the provision of others services like artisanal fishing and cultural services. *Posidonia oceanica* ensures the regulation of the quality of sea water, which represents an important criterion for the attractiveness of the area. This ecosystem also plays a role in many marine species' lifecycles; its preservation brings benefits to fishing activities.

The direct-use values associated to cultural activities also represents 15% of the benefits of the implementation of the optimal management scenario. The protection of ecosystems and the preservation of biodiversity will also contribute to the attractiveness of the area in comparison with others destinations and will allow the development of sustainable tourism activities that will beneficiate to many stakeholders.

### **Potential for MPA long-term financing**

The KS MPA can be viewed as a business operation providing “customers”, understood here as users, with a number of “products” taking the form of ecosystem services. Depending on the evaluation method, the economic value of these “products” can either be a first indication of the amount MPA users would be willing to pay to benefit from an ecosystem services back up by the existing MPA, or an assessment of financial flows depending on goods and services provided by well-managed ecosystems. Based on the results of the ecosystem services valuation and the identification of goods provided to local stakeholders, 7 user-pays mechanisms have been identified as channels through which financial flows can be transferred from the ecosystem services’ beneficiaries to the MPA management :

- Production fishing license/permits
- Taxe on pescatourism
- Taxe on boat excursions
- Concession fee
- Taxe on diving
- Diving fees
- Payment for ecosystem services (carbon sequestration)

In line with a projection of potential revenues offered by those mechanisms over 10 years, the KS MPA business plan developed in 2015 was updated to highlight the financing gap that will have to be filled in by non-user-pay mechanisms (e.g. government’s budget allocations, private capital donations, corporate long-term contributions, debt-for-nature swaps, trust funds, etc.). Taking minimum revenue assumed for each user-pay mechanism, it is estimated that identified user-pay mechanisms, if they are all implemented, would provide MPA managers with an income covering 30% of estimated optimal management costs

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# 1. Context of the study

## 1.1. The Karaburun-Sazan MPA

As part of its obligations under the Convention of Biological Diversity (CBD), Albania has developed a National Biodiversity Strategy and Action Plan (NBSAP). Adopted in 1999, the NBSAP proposed 8 areas along the Albanian coast as potential areas to be claimed as Marine Protected Areas (MPA) (NEA, 1999). The first Albanian MPA to be created, Karaburuni Peninsula – Sazan Island, located at the border between Adriatic and Ionian Sea, has been proclaimed in April 2010, with the status of National Marine Park (*Decision No.289 dated 28.4.2010 proclaiming Natural Park the natural maritime ecosystem at the Sazan Island and the Karaburun peninsula.* 2010).

Today, the Karaburun-Sazan MPA has an active management plan and the management team from National Agency for Protected Areas (AKZM) has started to implement activities scheduled in the plan. However, as most MPA in their early stages of implementation and development, the MPA experiences:

- Insufficient human, economic and technical resources to fully implement the management plan activities;
- A lack of recognition of the MPA status among local stakeholders;
- A lack of support from local decision-makers.

The MPA is hence in a situation where it should demonstrate the benefits brought by its conservation, while still suffering from a lack of implementation. This situation may be a dead-end, unless actions are taken to convince stakeholders and decision-makers about the advantages of the MPA. In Albania's national plan for developing a network of marine and coastal protected areas, the CBD strategic goal "Enhance the benefits to all from biodiversity and ecosystem services (ES)" is identified "as one of the main target to be achieved as a priority". This target was one of the reasons why the government of Albania and the Minister of Environment initiated and developed the project for improvement of coverage and effectiveness of management of MCPAs in Albania with a focus on the Karaburun-Sazan MPA establishment. The economic valuation of ecosystems is hence part of the development process of the MPA.

## 1.2. Objectives and contents of the study

This study carries out an economic valuation of critical marine ecosystem services. The results of the evaluation could feed the MPA implementation and management process in a view to provide the MPA with arguments for its adoption and strengthening by local decision-makers and local stakeholders.

This study provides also an advocacy tool and explores further avenues for financing through innovative mechanisms such as payments for ecosystem service.

Besides, the identification of the main ecosystem services within the Vlora Bay should facilitate the implementation of specific management actions. It will also allow selecting the most relevant financial tools for the MPA and improving its management effectiveness.

This study ensures continuity with the first outputs of the management of the Karaburun Sazan Marine Protected area:

- Management plan for Karaburun-Sazan MCPA developed in 2014
- Business plan for Karaburun-Sazan MCPA developed in 2015

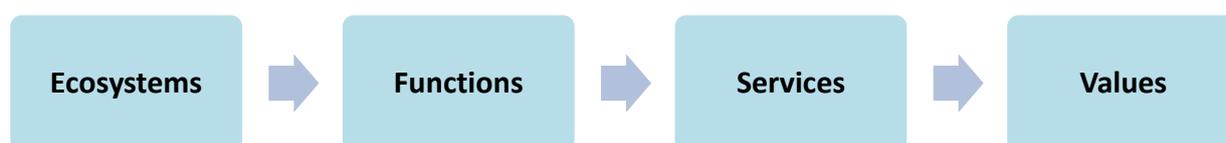
This study will help to ensure the effective implementation of these two strategies in a complex context (territorial reforms, budgetary constraint, etc.) and the existing gap between the legal status of those protected areas and the application of measures required for their conservation. It can also be a tool to extend the area of influence of the MPA by showcasing the services delivered by some specific ecosystems (like *Posidonia oceanica* meadows) and encourage the protection of productive ecosystems that do not belong to the MPA perimeter.

## 2. Phase 1: Economic valuation of benefits of the Karaburun-Sazan MPA

### 2.1. Evaluation framework

#### 2.1.1. Approach and methodology

To estimate the economic value of ecosystems and biodiversity hence lead to the assumption that these ecosystems supply goods and services. It also means that these goods and services supplied by ecosystems and biodiversity can be linked with economic assets (Godard, 2005). The concept of ecosystem services hence allows the connection between the ecological functions of the ecosystems and the human activities relying on them (Figure 1).

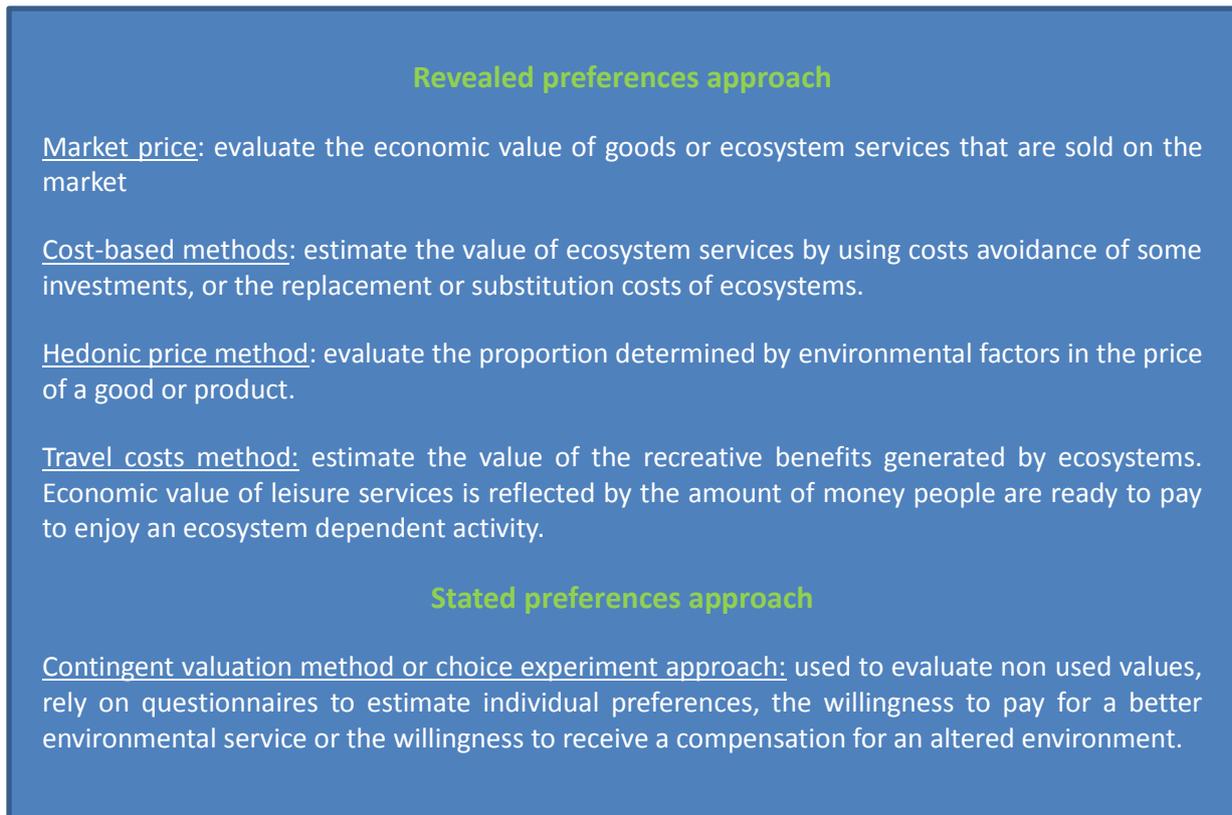


**Figure 1 : From the ecosystems to the economic values**

(Source: TEEB - The Economics of Ecosystems and Biodiversity, 2008)

This relationship between biodiversity and the ecological functions on the one hand, and the quality and the quantity of services provided on the other hand, allows us to assume that the value of ecosystem services is a fair estimation of the economic value of ecosystems and biodiversity for human societies. As a consequence, the conservation efforts of ecosystems and biodiversity can ensure the value of the services provided by these ecosystems.

In order to carry out the valuation of ecosystems services and goods, different steps must be followed. The description of the ecosystems and the services they can provide is the first one. GIS data and bibliographic information on the studied ecosystems help identifying the kind of goods and services they provide, and offer a first approach of the type of values associated to these services (direct, indirect, non-uses values). The second important step is to choose the suitable economic methods to value these ecosystems (market price, production function, etc.). Two main approaches are called to determine the values of the services provided by biodiversity and ecosystems: the revealed preferences approach infers the value of environmental goods and services from other market transactions, whereas the states preference approach asks individuals hypothetical questions about their willingness to pay for these environmental services or for their protection. A third approach, which is not a valuation method in itself, the benefits transfer approach, consists in using similar benefits from similar services evaluated in previous studies or reports (Figure 2). The method selected for each service assessment will be specified later in this report.



**Figure 2: Economic valuation methods for environmental goods and services**  
(Source: authors)

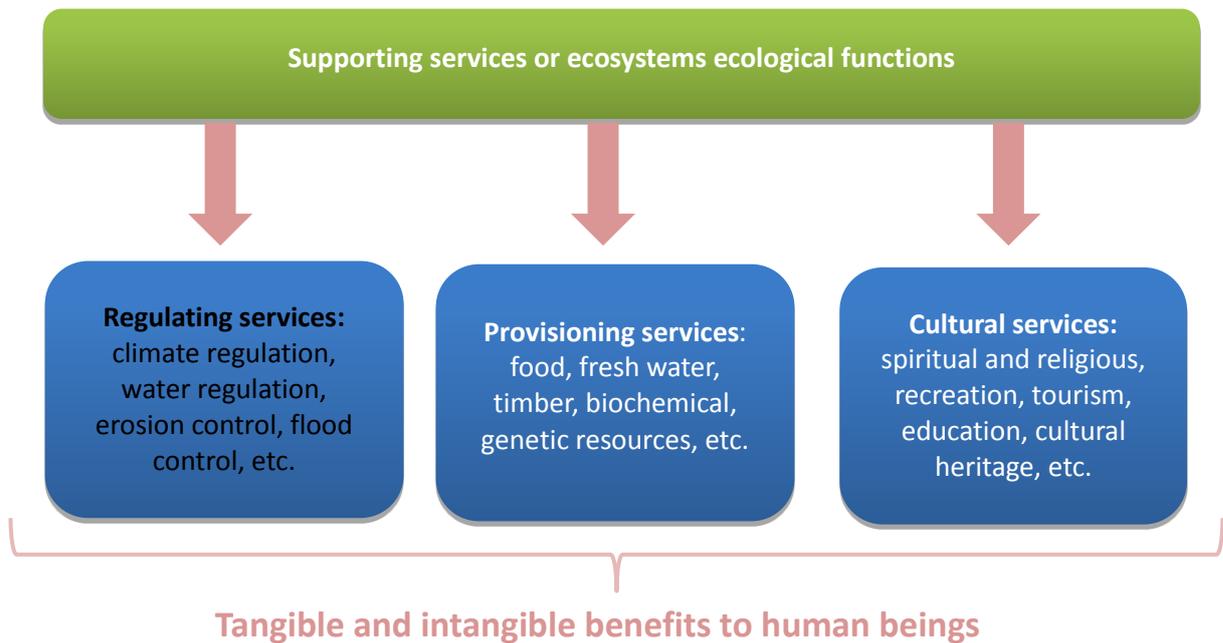
The use of these different valuation methods allows to monetarizeservices and goods supplied by ecosystems, and by extension biodiversity.

### **2.1.2. Classification of ecosystems services**

To select and identify ecosystem services of the KS MPA, the classification of the *Millenium Ecosystem Assessment*(MEA, 2005), which is the most commonly accepted by international scientific community to structure and carry ecosystem services economic valuation,was used. This classification differentiates four categories of services (Figure 3):

- **Provisioning services** describe the material or energy outputs which come directly from ecosystems. They include food, water and other resources like timber or medicinal ones.
- **Cultural services** represent the recreational, aesthetic, scientific or spiritual benefits provided by ecosystems. The latter play for example an important role for tourism activities, which in turn provide an important source of income for many communities.
- **Regulating services**:theyact as regulators in many natural processes. They include for instance local climate and air quality control, carbon sequestration and storage, mitigation of extreme climatic events, waste water treatment, erosion prevention, maintenance of soil fertility and pollination.
- **Habitat or supporting services**: these services do not benefit directly to humans but guarantee the good functioning of ecosystems. Supporting services can include

habitats which are essential for species' lifecycle and maintenance of genetic diversity.



**Figure 3 : Classification of ecosystem services**  
(Source: authors)

In this report, these four categories of services will be taken into account for the marine ecosystems of the Karaburun- SazanMPA.As the services provided by the ecosystems of the area are not limited to the only scale of the MPA, they will be estimated at a larger scale.

This type of valuation only displays the economic value of the ecosystems. Other non-use values,such as the spiritual and aesthetic values, and intrinsic values are not taken into account here, even if the authors acknowledge their importanceto justify the protection of biodiversity and natural habitats.

### **2.1.3. Assessing benefits of the MPA and financial strategy definition**

After the valuation of ecosystems services, two 10-years management scenarios (by 2026) will be elaborated and compared.**The first scenario corresponds to a basic management plan giving priority to biodiversity for its first years of implementation. The second scenario corresponds to an optimal situation where a large part of the actions planed by the management plan are effectively implemented, finding a good balance between protection of natural habitats and biodiversity and human activities.** The difference in net present value<sup>1</sup> between these two scenarios will then determine the benefits in terms of ecosystem services provided by one of these scenarios. This assessment of benefits and the

<sup>1</sup>The net present value estimates the present value of the discounted ecosystem services benefits expected in the future.

identification of the beneficiaries of the MPA will allow the definition of potential financial mechanisms and the development of an action plan for the sustainable financing of the Karaburun-Sazan MPA.

## 2.2. Karaburun Sazan marine ecosystems

The scope of the study is the MPA of Karaburun-Sazan. The total area represents 12,571 hectares (9,85 hectares for the marine area near Karaburuni and 2,72 hectares for the marine area near Sazan) (Management Plan for National Marine Park Karaburun-Sazan, December 2014, UNDP/WWF)(Figure 4).

This area shelters numerous natural habitats and displays a particularly rich biodiversity at the scale of the country. At least 36 marine species belonging to the international list of endangered or protected species have been identified in the protected area. Sazani Island for instance is the largest island of Albania and shelters a great ecological richness in terms of flora and fauna and a diversity of landscapes. Between 8% and 12% of the Albanian flora can be found on the island (Management plan for Sazani island, Albania, January 2015, CdL). It also has a great history and cultural heritage which makes it a great asset for the development of sustainable tourism activities.

### 2.2.1. Characterization of natural habitats

**As the Karaburun-Sazan MPA only stands on marine area, our study only focuses on marine ecosystems.** Land tenure remains however a sensitive issue for the management of marine ecosystems due to real estate development pressure along the coastline and the absence of effective protected area management on terrestrial ecosystems. As a consequence, land tenure is a relevant subject for the MPA management administration (Management Plan for National Marine Park Karaburun-Sazan, December 2014, UNDP/WWFMP for NMP of K-S, December 2014, UNDP/WWF). Predominant plant communities of Sazani island are the following ones: evergreen forests, white and green oaks, euphorbias and mastic trees and bay trees. The main land ecosystems are composed of typical Mediterranean vegetation with some local zones of beaches of pebbles and sand. The coastal area of the Karaburun-Sazan MPA is hence mainly rocky, while the coastal wetlands and dunes are covered mainly by halophytes and other brackish and freshwater vegetal associations.

The management plan of the Karaburun-Sazan MPA identifies the following coastal littoral zones, defined by their depth and their distance to the coast, which shelter different types of habitats (Table 1, Figure 4). Caves, canyons and small bays can be found in those coastal zones.

**Table 1: Marine habitat types identified in MPA Karaburun-Sazan**

(Source: MP for NMP of K-S, December 2014, UNDP/WWF)

Coastal littoral zones	Subdivision of zones	Biocenoses
<b>Mediolittoral</b>	Mediolittoral hard beds and rocks	Biocenosis of the lower mediolittoral rocks
		Biocenosis of mediolittoral caves
<b>Infralittoral</b>	<i>Posidonia oceanica</i> meadows	Biocenosis of the <i>Posidonia oceanica</i> meadows

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	Infralittoral hard beds and rocks	Biocenosis of infralittoral algae
<b>Circalittoral</b>	Circalittoral hard beds and rocks	Coralligenousbiocenosis
		Biocenosis of semi-dark caves

Considering these different coastal zones, three main marine ecosystems which are specific to Mediterranean ecosystems will be considered in our study.



Figure4:Map of the KaraburunSazani MPA

(Source: Management Plan for National Marine Park Karaburun-Sazan, December 2014, UNDP/WWF)

- ***Posidonia oceanica* meadows**

This endemic species of the Mediterranean Sea is on the list of the endangered or threatened species of the Annex II of the Barcelona Convention. *Posidonia oceanica* meadows host a large biodiversity of benthic macrofauna (sponges, molluscs or crustaceans) and holds an important place in the lifecycle of many marine species. *Posidonia* meadows are also a shelter for fishes, providing food and protection against their predators. In addition, their dead leaves prevent beaches from erosion phenomenon by forming large benches retaining the sand (Figure 5). Hence, *Posidonia* beds ensure numerous ecological functions and can be qualified as very productive habitats in terms of ecosystem services.



**Figure5 : *Posidonia* beds on a Mediterranean beach**  
(Source: authors)

*Posidonia* meadows are mostly located at the East of the Karaburun Peninsula (Figure 6), within the bay, where it is more protected from the swell. In the Bay of Vlorë they can suffer from important anthropogenic pressures caused by city development, pollution, and coastal erosion due to construction and sediment deposits in the water.

Invasive species like *Halophilastipulacea* also contribute to the regression of *Posidonia* beds. The following maps show that a large part of *Posidonia* meadows are located outside of the MPA's perimeter. **It would hence be essential for the MPA to have an area of influence larger than the strict limits of the protected area, particularly through education, in order to participate to the preservation of the external ecosystems too.**

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Figure6 : Habitat map of Sazan-Karaburun area and the Bay of Vlora

- **Coralligenous formations**

Coralligenous formations are also an important ecosystem of the MPA. There are mostly present along the Sazan island coastline and particularly in the circalittoral zone, which corresponds the continental shelf area that lies below the zone periodic tidal exposure. It can also develop in the infralittoral zone<sup>2</sup> if the light provided is sufficient to allow coralline algae to grow. Coralligenous can be considered as “hard bottom of biogenic origin mainly produced by the accumulation of calcareous encrusting algae” (RAC/SPA, 2003). This type of habitats displays high biodiversity and represents very attractive seascapes for scuba diving. Divers could indeed admire a large diversity of species of fishes, mollusks, crustaceans and sponges.

Coralligenous formations could provide important services to cultural services. They also bring supporting services by providing nurseries and spawning ground for fishes that could benefit to fisheries stakeholders. However, these habitats have to face different types of pressures: human activities like overfishing or pollution, invasive species and climate change.

- **Reefs and open waters**

The underwater landscape is also of exceptional quality with cliffs, submarine caves and associated fauna and flora, and in some places archaeological remains and shipwrecks. These ecosystems are essential for the development of fish biomass and marine biodiversity. Albanian littoral habitats are for instance frequently visited by rare marine mammals like the Monk seal, for which the caves of the area constitute an ideal habitat (MP for NMP of K-S, December 2014, UNDP/WWF). Common dolphin and bottlenose dolphin have also been observed in the area.

- **Synthesis**

Surfaces presented in the Table 2 will hence be considered in our study:

**Table 2: Surface ecosystems area**  
(Source: UNDP)

Ecosystems	area (ha)
Posidonia	194,03
Coralligenous formations	276,18
Reefs	498,88
Open waters zone	11601,73
Total of the area	12 570,82

<sup>2</sup>The sea-shore zone lying below the intertidal zone and extending to about 200 m depth or to the edge of the continental shelf.

### 2.2.2. Identification of ecosystem services

The identification of ecosystem services is based on the ecological functions and the human activities identified in the study zone. Regarding the socio-economic context of the zone, the main activities are well-documented. Prior the official creation of the Karaburun-Sazan MPA, strategic documents described the main activities of the Bay of Vlora and its main socio-economic stakes:

- Strategic plan of Vlora: Analysis Framework, UNDP, 2011 (UNDP, 2011)
- Socio-Economic Study / MCPA Karaburun-Sazani, UNDP - Improving coverage and Management Effectiveness of Marine and Coastal Protected areas, 2012

The management plan also provides a large amount of relevant information about the socio-economic activities displaying in the vicinity of the KS MPA. Hence the key economic activities in the sector of Vlora are tertiary activities like tourism (hotels, sea activities, bars and restaurants, shops, etc.)(Figure 7). Fisheries and agriculture (mostly livestock rearing) are also important sectors.

The main activities on land identified by the management plan include livestock breeding, honey production, hunting, forestry and collection of medicinal plants. However, we will only focus in this study on coastal and marine activities that ***include small-scale fisheries, excursion boats for tourism, diving and aquaculture.***

In the financial planning of the Karaburun-Sazan, Marine Protected area developed in November 2015, a first identification of ecosystem services was delivered, built on available literature and field mission (Table3).

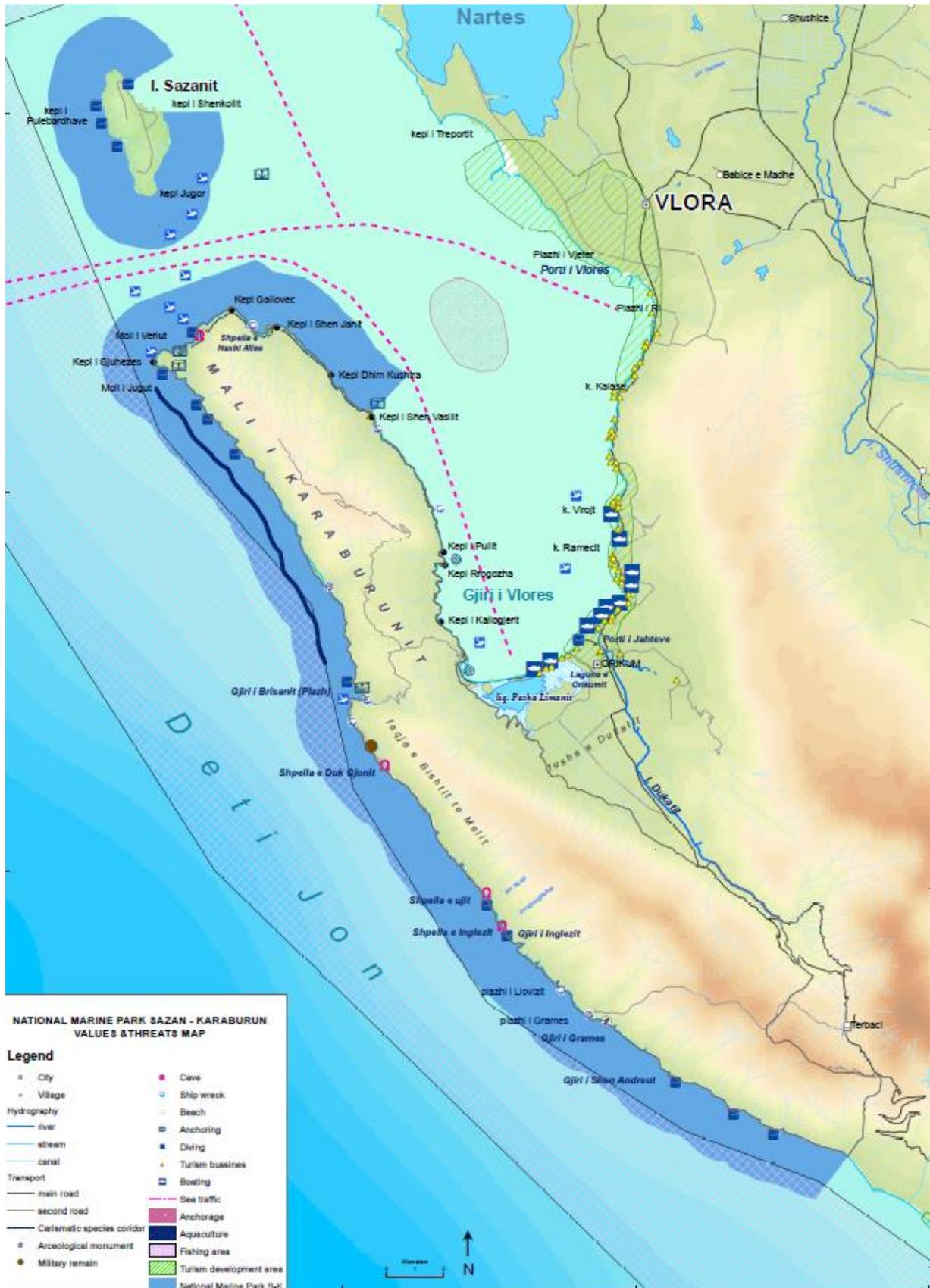


Figure 7: Map of activities and threats in the National Marine Park of Karaburun-Sazani

Category of service	Goods and services	Magnitude	Beneficiary
<b>Provisioning</b>	Commercial fisheries		Commercial fishers
	Aquaculture		Aquaculture producers (within and in close vicinity of the MPA)
	Commercially valuable materials		Tourism operators
<b>Cultural</b>	Visible wildlife (whales, dolphins, birds, etc.)		Boat tour operators, diving operators
	Aesthetic scenery		Boat tour operators, restaurant and hotels
	Outdoor activities (scuba diving, snorkelling, boating)		Diving operators, boat tour operators
	Cultural attractions (architecture, religious sites, etc.)		Boat tour operators
	Accessible beaches		Boat tour operators
	Sport fishing (non-consumptive)		Sport fishing operators
<b>Regulating</b>	Regulating sea water quality		Operators of tourism activities at sea, commercial fishers, aquaculture producers, hotels and restaurants
	Carbon sink		Global
	Coastal/storm protection		Sea activities
<b>Support</b>	Spawning sites		Global, commercial fishers
	Nursery for fish and other species		Global, commercial fishers

**Table3: Identification of the ecosystems services of the Karaburun-Sazan MPA in the financial planning of the MPA (Source: Vertigo Lab)**

This selection of ecosystem services needs to be adjusted with regards to new data collected and the more precise study of the ecological functions of the ecosystems of Karaburun-Sazan. Here is the list of ecosystem services we will study and evaluate here:

- Provisioning services :Artisanal fisheries
- Cultural services: Boat excursions: visible wildlife, aesthetic scenery, accessible beaches, Sea diving, Pescatourism (onboard tourism operated by fishers)
- Regulating services: Sea water quality, Carbon storage and climate mitigation, Protection against natural hazards.
- Supporting services: Biodiversity, Spawning grounds and nursery.

### **2.2.3. Pressures and threats on the KS MPA**

The ecosystems and natural habitats of the Karaburun-Sazan MPA are directly threatened by different types of pressures. Human activities and the growth tourism are the most important ones and need to be regulated in order to preserve the ecosystems services provided by the coastal and marine protected areas. The Figure 9, displayed in the management plan and previously presented in this document, shows the current pressures points and threats and the scale of the MPA: diving and boating areas, fishing zone, fish farms, etc. Within the perimeter of the MPA, leisure activities can generate important impacts on the environment, particularly with the pollution caused by the waste. Diving activities can also cause the degradation of some habitats like coralligenous communities and disturb the marine fauna. Illegal sales point are located and tolerated inside the MPA: they provide food and drinks for tourist as well as beach accessories. The monitoring of this type of activity seems essential to ensure the preservation of the KS-MPA ecosystems and reduce the sources of pressure inside the perimeter of the MPA.

At the scale of the bay of Vlora, various threats and pressures have also been identified and can affect the good health of natural habitats. The main threats identified are the following:

- Illegal constructions and uncontrolled infrastructure, urban and tourism development along the coastal zone with all the environment impacts it can bring (waste management, destruction of natural habitats, eutrophication and degradation of coastal wetlands, pollution with untreated waste waters and industrial waters, etc.)
- Illegal exploitation of fishery, forestry resources and illegal hunting, over-exploitation of natural resources with the increasing population on the coastal area, degradation of water quality
- Institutional framework of the management of ecosystems in Albania suffering from insufficient capacities (Kromidha, 2015)

## 2.3. Economic valuation of goods and services of ecosystems

This part of the study details the services provided by the ecosystems of Karaburun-Sazan Marine Protected Area. The economic values associated to these services will help the identification of the beneficiaries of the presence of the MPA and the definition of financial instruments to enhance its management and effectiveness. This evaluation will focus on marine ecosystems.

### 2.3.1. Provisioning services

These services correspond to direct uses values and are estimated thanks to the market price economic method.

- *Fisheries Resource*

The fisheries sector is quite small in Albania but this activity remains important in terms of employment for some coastal areas. Fisheries were once central for the South part of the country but the fish productions has largely decreased since the late eighties (Dimitrios Moutopoulos et al., 2015). **The capture of the Albanian fleet in 2013 amounted 3 599 tons for marine areas, coastline and coastal lagoons** (INCA, 2013). Fishers and maritime stakeholders are aware of the importance of a preserved environment for fisheries resources. Several episodes of important fish reduction in the lagoon of Orikum made the fishers determined to improve the health of ecosystems and water circulation in the lagoon (UNDP report, 2012). The bay of Vlora includes three categories of fishing activities: commercial fishery, artisanal small scale fishery and recreational fishery (INCA, 2011). The management plan of Karaburun-Sazan MPA provides general information about the Bay of Vlora fisheries.

#### *Commercial fisheries*

Vlora fishing fleet is the second biggest in Albania and is mostly skewed toward the bottom fishery. Hence, the majority of vessels are geared with trawlers that are used on the sandy bottom. This latter cannot be used in MPA Waters, mainly composed of rocky bottoms. Further, it is forbidden by law for large scale fisheries to fish inside the Vlora Bay (MP for NMP of K-S, December 2014, UNDP/WWF). As a consequence, commercial fishing effort is negligible in the Karaburun-Sazan area (Kapedani, 2011). **We will thus not evaluate the provisioning service of the KS MPA ecosystems for the commercial fisheries.**

#### *Artisanal fisheries*

The production of artisanal fisheries is difficult to estimate, in Albania and more generally in the Mediterranean Sea (Jacques Sacchi, 2011). There is no wholesale market for small scale fishery products in Albania and prices fluctuate depending on the demand and the season.

The management plan of Karaburun-Sazan MPA projects the realization of a report of the socio-economic study on local fisheries (Action's theme: supporting local communities and sustainable use of natural resources). A 2011 report identified 55 licensed boats for the small scale fishery in Vlora (Kapedani, 2011), located in the Vlora Bay and its surrounding but also in the south of the Karaburun Peninsula. 20 unlicensed boats have also been identified but their activity will be considered here as illegal and unreported fishing (INCA, 2011). **It**

has been calculated that the average days spent by small boats each year in the MPA is around 50, which means that the maximum fishing days is 3750 for the total fleet(Kapedani, 2011).

A fisheries management unit is based in Orikum, community situated at the entrance of the Karaburun peninsula. Different services are provided by the centre: fishing equipment sales, ship rental, berth for touristic boats, collection and sale of sea products, boat excursion for pesca-tourism. Between 35 and 40 fishers sell their products to the center on approximately 60 fishers fishing in the Bay (fisheries management center director, 14/03/2016). During the summer, the fishery management center sells 1.5 tons per day from artisanal fisheries and 5 tons including aquaculture products (fisheries management centre director, 14/03/2016). On the average, fishermen go out to sea 5 times a week in the Bay of Vlora during the low season whereas they go out every day during the summer season (to supply the touristic demand for fish). The centre has 35 summer seasons employees and only 15 during the low season. The fishing production of this centre is mostly sold to local populations and hostels. Prices vary greatly during the low season because the demand is not stable and lower (Doreid Petoshati, 12/03/2016).

The main species sold are: Shrimps, Red mullet, Sea bream, Sea bass, Hake, Sardinella and Atlantic horse mackerel. On average, the first sale price of marine fish production is 400 LEK per kilogram(FAO-Adriamed, 2010)(Table4).

**Table4: Prices of fish produced in Albania in 2001**  
(Source: AdriaMed, 2003)

Species	Prices (lek/kg) (1 US \$=140 lek)		
	<i>from fishermen to harvest or processors</i>	<i>from processors to retailers</i>	<i>from retailers to domestic market</i>
sea bass	1000-1200	1250	1500
sea bream	1000-1200	1250	1500
hake	500	530	600
red mullet	600	650	800
dentex	1200	1300	1500
trout	400	450	500
sardinella	100	120	200
sardine	100	120	200

A 2004 report from the Ministry of Agriculture and Food of Albania on small-scale fisheries evaluated the average daily fish catch per boat at 10kg<sup>3</sup>(Mimoza Cobani et al., 2004). Based on previous data, the annual fish catch per boat for the Bay of Vlora fleet was estimated at 1 560kg for an income of 4 680\$ per boat, which represents 5 930\$ in 2016 (726 670

<sup>3</sup> This appears consistent with the values given by the Orikum fisheries center's manager. During the high season, each boat would indeed fish 37, 5 kg daily (1, 5 tons per day divided by 40 boats).

ALL)<sup>4</sup>.The Karaburun-Sazan MPA participates in the production of fish resources in the whole Bay of Vlora, the income of each boat fishing in the zone is thus link with the quality of Karaburun-Sazan ecosystems. Artisanal fishing fleet of the area is composed of 55 boats (Kapedani, 2011) for an annual income of 326 150\$ (39 649 000 ALL). This value can be associated with the indirect contribution of the ecosystems of Karaburun-Sazan to the fish production of the area.

Considering these evaluations and the fact and the maximum value of fishing days in the MPA of 3750, we can consider that 37 500kg of fish are produce within the area of the Karaburun-Sazan MPA. This represents for the 55 boats frequenting the zone an annual income of 142560\$. The KS MPA ecosystems direct services to fisheries can be hence estimated to 17 549 000ALL. This value only corresponds to the fish production which is

The protection of the Karaburun-Sazan marine ecosystem bring services to fisheries located in the whole Bay of Vlora. The value of the provisioning service cannot be restricted to the MPA perimeter, which will be closed or is normally closed to fisheries. The value of the services provided by ecosystems to the fisheries can hence be estimated to 39 649 000 ALL.

realised inside the Marine Protected Area.

### ***Sport fishing***

Few people practice sport fishing in Albania, this is not a popular activity (INCA, 2011). Special permits are delivered within the Marine Protected Area for sport fishing but they do not meet a strong demand. It can somehow be difficult to make the difference between sport fishing and illegal unregulated and unreported fishery in the MPA. This illegal fishery is one of the biggest threat to the MPA and its fish stocks. The intensity of fishing effort and its effect on local population of species are unknown today.

### **Development perspectives of fisheries**

The fish production in Albania is slowly increasing since the early 2010's while the number of vessels of artisanal fishers is decreasing. This marks a global trend at the scale of the Mediterranean basin (Sacchi, 2011). The ecosystems' protection provided by the MPA also allows the preservation of the fishing resource and could bring new opportunities for fisheries. MPA contribute indeed to sustaining a fish population by allowing the resource to grow and to spawn within the MPA(FAO, 2011). However, artisanal fisheries still suffer from many issues like the augmentation of intermediate costs or weak productivity.

The main development perspective for artisanal fisheries in the Bay of Vlora is directly linked with the growth tourism. During the summer, the demand for fish product is largely

<sup>4</sup> Boat income is total revenue minus the total coasts. It can thus be considered as the added value of natural habitats and ecosystems for boats.

increasing; aquaculture products are essential to satisfy it. More and more fishers are also proposing tours and leisure fishery for visitors. Regarding pescaturism, discussions are ongoing with the Ministry of Agriculture to allow fishermen to take tourists onboard their boats by creating a permit including fisheries but also tourism (Doreid Petoshati, 14/03/2016).

- *Aquaculture*

Aquaculture is a growing sector for the Albanian economy. The majority of the Albanian maritime fish farms are located at the South East of the country and in the Ionian Sea. In 2012, the total aquaculture production was about 2010 tons (Eurofish). With the development of tourism and the increasing fish's consumption, aquaculture is more and more practiced in the Karaburun-Sazan MPA area (MP for NMP of K-S, December 2014, UNDP/WWF). Six farms are currently settled in the Vlora Bay (outside the MPA) Three other ones are in the process of being created. A request was made for the installation of a fish farm within the perimeter of the MPA but the demand was rejected. (NAPA, field study, 11/03/2016).

One of the aquaculture businesses "Alba Adriatico" was met during the field study in March 2016. "Alba Adriatico" is one of the 6 aquaculture businesses that operates inside the MPA K-S with a 6 ha sea surface and is classified as a big business, with an annual turnover of 1.4 million Euros (196 million ALL). It supplies restaurants, hotels and fish markets of the region. The quality of the fish is excellent, and this is due to the quality of the water of the MPA K-S. According to the owners (field study, March 2016). The business uses the name of the area as a competitive advantage in the fish market. The other 5 aquaculture businesses provide 400 tons of fish and are seasonal businesses with 5-6 workers and with an annual turnover 150.000-200.000 Euros/year (21-28 million ALL).

This activity is encouraged by the improvement of existing legal framework; licenses procedures have been for instance simplified. Aquaculture business is dependent onto the water quality and fish farms owners have the feeling that MPAs are beneficial for their business in a general and diffuse way (field mission near the KS MPA, on 8-9 November 2015).

**However, aquaculture is mostly a pressure for the MPA ecosystems** (Table 5). NAPA observed for instance a loss of biodiversity near aquaculture farms. Besides, the development of aquaculture might conflict with the development of tourism and leisure activities such as diving and sailing. The presence of fish farms limits the available space for others activities and their pressure increases with their development. Fish farms can also affect the quality of bathing waters. A 2016 report on the challenge of the environmental protection of the Adriatic Sea and the development of new marine activities (Randone M., 2016) points out the potential impacts of aquaculture. If this activity is not well-managed and controlled, it could lead to serious environmental problems. The major concern is the release of farms organisms and the introduction of non-indigenous species into the environment. The effluent discharges from fish farm can also be an important source of contamination as they may carry uneaten fish feed, residues of therapeutic and antifouling products. Aquaculture can also generate water eutrophication or marine litter production that will affect the natural ecosystems and the biodiversity.

MSFD DESCRIPTOR	IMPACTS ON GES	FUTURE TRENDS
D1 Biodiversity	Pathogen transfer and effects on local wild marine organisms, therapeutans and antifouling effects on local wild marine organisms, destruction or disturbance of habitats	↗
D2 Non-indigenous species	Leakage or escaping leading to the introduction of alien marine species (e.g. fish, crustaceans, molluses, aquatic plants), alien parasites and pathogens	↗
D3 Commercial species	Capture of wild stocks for aquaculture needs: stock depletion and/or collapse	↗
D4 Foodwebs	Disequilibrium of prey/predator balance	↗
D5 Eutrophication	Organic and inorganic nutrient loss through the effluents	↗
D6 Sea-floor integrity	Local benthic impacts such as sediment anoxia, sediment chemical changes or changes in and/or absence of macrofauna, decline and severe effects on Posidonia oceanica meadows in contact with effluents at short, mid and long terms	↗
D7 Hydrographical conditions	Increase in particulate matter	↗
D8 Contaminants	Release of waste products derived from animal metabolism, antibiotic and biocide releases, antifouling biocides	↗
D9 Contaminants in seafood		
D10 Marine litter	Littering, waste discharge	↗
D11 Energy		

**Table 5: Impacts assessment of the aquaculture activities on the environment**  
(Source: Randone, 2016)

As the link between the natural ecosystems of the MPA and the aquaculture activities is not well documented (no data available about the level of quality water provided by natural habitats to the fish farms), we will not value the ecosystem services provided to aquaculture here. Moreover, this activity generates many environmental impacts that need to be carefully studied. Aquaculture seems today to be a threat for the Marine Protected area. Its development needs to be conducted in partnership with the MPA in order to install environmentally-friendly and sustainable procedures.

- *Provisioning services for agriculture*

Agriculture and livestock represent an important source of income for the populations close to the Karaburun Peninsula (MP for NMP of K-S, December 2014, UNDP/WWF). There is few characterization of coastal and land ecosystems and it will be difficult to evaluate the services provided by these ecosystems, particularly for livestock and agriculture. Moreover these activities are located outside the perimeter of the MPA. There is a common practice of extensive farming on the coastal part of the MPA: 25 livestock farms are installed on the peninsula at the buffer zone of the MPA, mainly cows and sheep (Doreid Petoshati, Fisheries centre management, 14/03/2016). Five beekeepers are also located in the area.

Regarding these activities, it appears that the action of the MPA outside its strict perimeter is essential to prevent this type of activity to be a source of pressures and threat for the marine habitats.

### 2.3.2. Cultural services

Cultural services correspond to direct use values and can be divided in two categories which will determine the economic valuation method used. Tourism can be first studied by the economic value of the goods and services linked to the natural habitats of the Karaburun-Sazan MPA. We will hence value the expenses of the tourists (food, accommodation, transport, activities, etc). Secondly, tourism is linked with social, cultural and educational values that will be estimated with stated preference approaches.

**Vlora Bay is one of the most attractive destination for recreation in Albania. However, the tourist pressure remains quite low today.** Indeed, there is no road access to the peninsula of Karaburun and the access to Sazan Island is forbidden (MP for NMP of K-S, December 2014, UNDP/WWF). The access by boat is possible but remains expensive (20\$US - (Genc Metohu, 2013)) as suitable beaches are mostly located at the western part of the Marine Protected Area and quite far away from Orikumi and Vlora. **In this part of the study, we will evaluate the services provided by the ecosystems to the touristic activities today and we will determine how they could evolve in the future.**

The Marine Protected Area is divided in four different zones where activities are regulated. The core zone is the most restrictive one in terms of human presence. Considering the high level of biodiversity present in this zone and the richness of its natural habitat, no activity should occur in this zone, nor in the effective management zone. However, we can notice that for instance on the map of threats presented earlier some diving spots are located inside the core zone of Sazan Island. Besides some natural ecosystems particularly productive in terms of ecosystem services like *Posidonia* meadows are located outside of the MPA and are not protected. **The management of tourism activities by the MPA within its perimeter but also the controls of touristic flows outside of the protected area are essential to protect these types of ecosystems.**

- *Nature tourism*

The contribution of travel and tourism to Albania GDP in 2014 was 5,9% which represents 82,3 billion ALL (INCA, 2015). The majority of tourists in the Bay of Vlora are national ones (65% to 75%) and the others are mostly from balkan countries or from Italy, Germany or Poland (INCA, 2012). Tourism is considered as a strategic activity and an axis of development by Vlora stakeholders. The development of nature tourism is a major stake for them and the sustainability of touristic activities an important point of their strategic plans for tourism (INCA, 2012).

Natural landscapes and environment are one of the main assets of the Bay of Vlora (Paloka, 2012). The preservation of natural habitats is thus essential for the development of tourism in the region. Sustainable tourism would allow to attract new types of tourists and in the same way, it will limit the impacts of touristic activities on the environment. It will require for example less infrastructure development.



**Figure8 : Beach in Orikumi**  
(Source: INCA, 2012)

In 2011, 78 802 tourists arrived in the port of Vlora (67 876 Albanians and 10 926 foreigners) (INCA, 2012). Beaches and sea baths represent the main type of tourism in the area (Figure 8), Orikumi and Radhima beaches are particularly frequented. The fisheries centre of Orikumi receives almost 2 000 tourists during the summer season. Commercial accommodation establishments are held by local people. Officially, 300 beds and 13 351 seats are available on the accommodation market but a lot of offers are undeclared ones and it is difficult to control this sector (INCA, 2015).

The touristic offer is thus for the moment concentrated on restaurants, accommodations and other services linked to the beaches. However, visitors and tourists visiting Vlora Bay plan to do others activities like diving, fishing, hiking, etc. (INCA, 2015). **The natural habitats of the Marine Protected Area contribute directly to these activities. In a survey realized during summer 2015 where 601 people were interviewed, INCA asked Vlora Bay's visitors the reason why they chose this destination for holidays and nature came as the third one (Figure 9).**

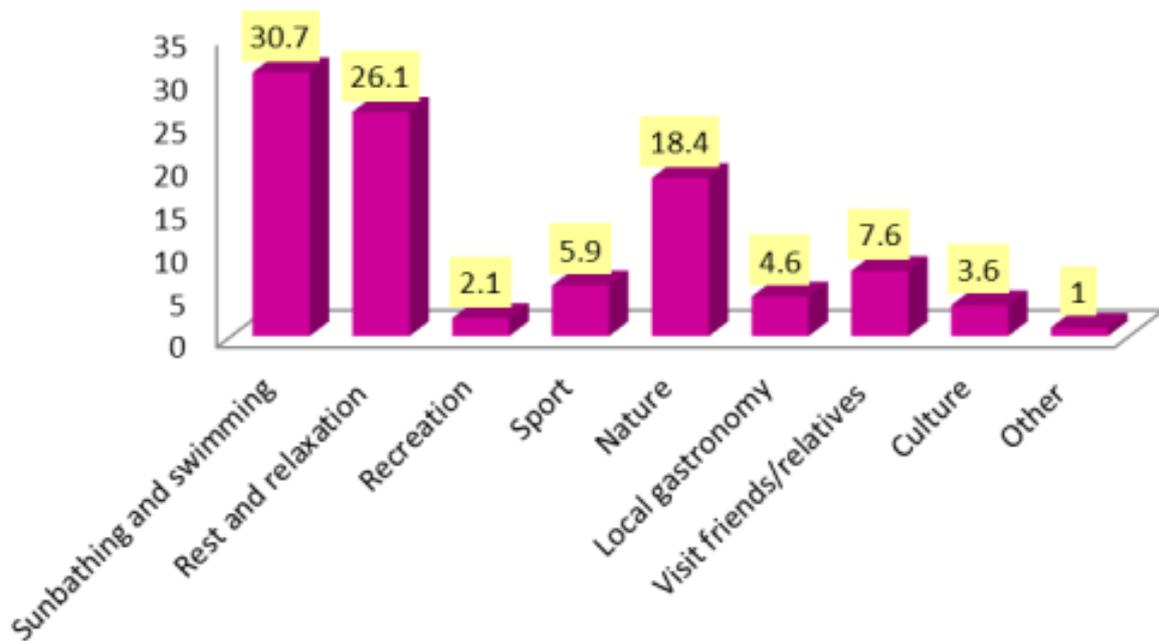


Figure9 : Reasons why tourists chose Vlorë Bay  
(Source: INCA, 2015)

Almost 45% of the foreign visitors interviewed had already visited the Karaburun MPA whereas only 33 % of Albanian tourists did. Touristic activities inside the Karaburun-Sazan MPA are not well documented, few excursion services and activities are provided by operators but they are not really developed. Hiking (without marked trails) is also proposed by local guides. 16 travel agencies are present in the region of Vlorë but they generally propose activities outside the Marine Protected Area. There are five small tourist points inside the MPA (NAPA, 11/03/2016) providing tourists with water, food, etc. One of them, met during the field study on March 2016, offers beach chairs and counted 4500 to 5000 visitors during the entire season. The activities listed by the tourists interviewed by the INCA were the following (Figure 10):

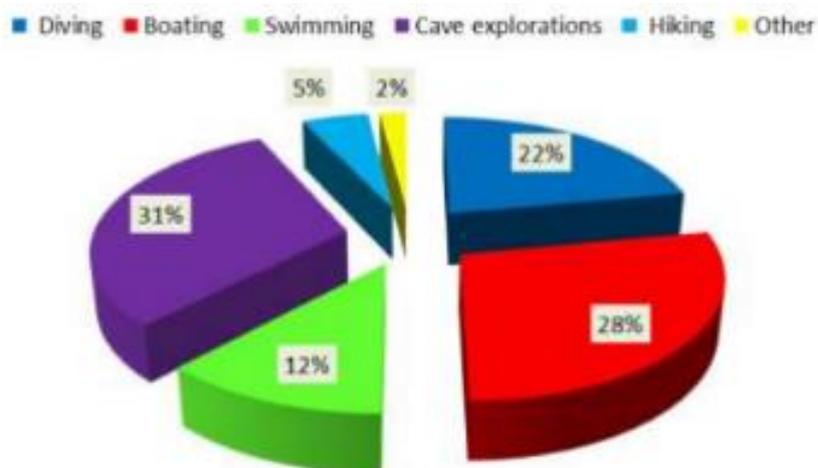


Figure10 : Nature based activities listed by Vlorë Bay's visitors

(Source: INCA, 2015)

**It is not possible here to evaluate precisely the services provided by the ecosystems of the Karaburun-Sazan MPA to all relevant touristic stakeholders. However, the link between natural ecosystems of the MPA and touristic activities can be assessed for some of them. If the hotels are less dependent from the MPA natural ecosystems, this later and their conservation are a key factor of the boat operators' business (field mission near the KS MPA on 8-9 November 2015).**

### Potential of tourism development

The tourism sector experiences a serious growth in Albania and in the Bay of Vlora and the Karaburun Peninsula thanks to a lot of assets: natural habitats, beautiful sceneries, archaeological and cultural heritage, etc. Tourism should thus continue to develop in the area in the next ten years. Over the past years, 45 hotels, 13 bars, 10 camping, 6 tourist villages and 192 residential constructions were built in the area Orikumi and Vlora (UNDP, 2012). Lots of these constructions are illegal ones and this uncontrolled movement of construction is a direct threat to the environment of the area. The seasonality of the recreation activities can also generate important impacts on short term periods. Tourist frequentation should finally rise with the development of new infrastructures like the access road of Radhima village to the national road.

**In this context, ecotourism and sustainable activities should be encouraged in the area. It would allow conciliating the economic development of the area with the preservation of its attractive natural environment. The Karaburun-Sazan Marine Protected Area have a key role in this development by protecting its natural habitats from the tourism pressure, proposing outdoor activities within its perimeter and extending sustainable practices to the whole Bay of Vlora.** The management plan takes into account the importance to support the local development of tourism. The preparation document of Sazan Island management plan also provides a sustainable development programme and proposes the implementation of ecotourism activities on the island (Management plan for Sazani Island, Albania, January 2015, CdL).

Tour operators also have an important role given that they will have to propose packages in adequation with the MPA objectives and the historical, cultural and natural context of the area (UNDP, 2012). Various activities can be displayed in the area: diving, snorkelling, swimming or walking on the east and north side of the Karaburun peninsula.

**Two main activities will be particularly evaluated and discussed here: excursion boats and sea diving. These activities can both be proposed by tour operators.**

- *Excursion boats and tours operators*

The coastal surroundings of the KS MPA are a great destination for excursion boats and tours operators. The numerous caves of the western part of the Peninsula and Sazan Island are particularly attractive to visitors as they offer unique and beautiful sceneries. Tours operators could propose packages with different activities or only scenery tours. Because of the military zone and the execution of a governmental moratorium on the circulation of

boats and yachts, the excursion boats in the MPA area have been very limited these past years (UNDP, 2013).

According to the management plan of KS MPA and NAPA, four boats were offering daily trip from Vlora, Rhadima and Orikum to the eastern part of the peninsula and to Sazan in 2014(MP for NMP of K-S, December 2014, UNDP/WWF).

The number of passengers boarded per year is unknown as the added value of this activity for touristic operators. The tickets prices differ a lot from one offer to another; they also change according to the number of passengers and the season (Table 1). During the field mission in March, we met the crew of “Teuta”. “Teuta” is a boat operator that provides touristic tours dedicated only to the K-S MPA and during the high season July-August. The business becomes operational in June, by providing not more than 3 daily tours for the whole month, while being fully operational for each day of the July and August months. This is a seasonal small business and its yearly turnover is 2 million ALL. Their touristic offer includes two itineraries: the first one starting from Vlora Bay Port towards the cave of Haxhi Ali, ShënVasil and back, with a price of 1.500 ALL per person and the second one starting from Vlora Bay Port towards the cave of Haxhi Ali, Sazan Island and back, with a price of 2.000 ALL per person (Table6).

**Table6 : Information on excursions boats within Karaburun-Sazani MPA**  
(Source: authors)

Boat – Touristic offer	Prices	Maximum number of passengers
<b>Teuta Boat<sup>5</sup></b>	1.500 ALL – 2.000 ALL	33 (without the crew, 2 persons)
<b>Hotel Regina<sup>6</sup></b>	3.400 ALL (25€)	Approximately 80
<b>Black Pearl<sup>7</sup></b>	1650 ALL (12€)	Unknown
<b>Illyricum tour<sup>8</sup></b>	Max. 10 350 ALL 75€ (decreasing price once 8 people are registered)	Unknown

Nonetheless, it is possible to approach the value of the services provided by marine habitat to boat operators by making some hypothesis on this activity. The economic study of the impacts of MCPA in the Mediterranean, undertaken by the Plan Bleu (Anaïs Mangos and Maud-Anaïs Claudot, 2013) provides economic assessments of MPA with similar characteristics to KS-MPA, like the Kas-Kekova Marine Protected Area in Turkey. In this study,

<sup>5</sup> Website visited on the 10th of May 2016, <http://allevents.in/org/teuta-boat-tours/7746850>

<sup>6</sup> Website visited on the 10<sup>th</sup> of May 2016, <http://hotelregina.al/guide>

<sup>7</sup> Website visited on the 10th of May 2016, <http://www.petitfute.com/v53888-vlora/c1173-visites-points-d-interet/c974-site-naturel/1566684-ile-de-sazan-ishulli-i-sazanit.html>

<sup>8</sup> Website visited on the 10th Of May 2016, <http://www.illyricumtours.com/tour-info.php?lang=1&id=23>

many excursions boats are organized, offering similar prices to the ones detailed above. These boats operate on average 130 days per year (90 days during the high season and 40 days during the rest of the year)(Basak, 2012). As the number of passengers boarded by excursion operators in KS-MPA, the following hypothesis is formulated:

- 1 boat of 80 passengers with a price ticket of 3.400 ALL (25€)
- 3 boat of 30 passengers with an average price ticket of 2000 ALL (14€)
- Average rate of booking for the four boats during the high season of 80% (130 days). We will not take into account here the low seasons days as it seems that boats do not operate during this time of the year
- One tour per day

The total income of these boats companies can hence be estimated to 46 787 520 million ALL (339 040 EUROS). Considering a percentage of intermediate consumption of 30% (Basak, 2012), the added value of the excursion boat's activity is 32 751 260 ALL (237 330 euros). **The services provided by the natural habitats of Karaburun-Sazan MPA can hence be estimated to 32, 75 million ALL.** This value might be overestimated or underestimated as data about the number of people boarded each year by these different companies lacks. Moreover, our hypotheses are quite restrictive (a boat can for instance propose several tours per day). It is however relevant to consider this value as a first approach of one indirect non extractive service provided by the ecosystems of the KS MPA.

### Potential of development of the boat operators

The number of boats operating in the zone has increased from one boat in 2012 to four boats in 2016 (Doreid Petoshati, UNDP, 11/03/2016). If the same growth pace is kept by 2026, almost twenty boats could operate in the Karaburun-Sazan MPA and the added value of excursion boat's activity may be quadrupled. The zone is however quite small and such a number of boats would probably exceed the loading capacity of the ecosystems and this activity could threaten the biodiversity of the area. Boat operators directly depend on the quality of these ecosystems; their degradation could thus affect their incomes.

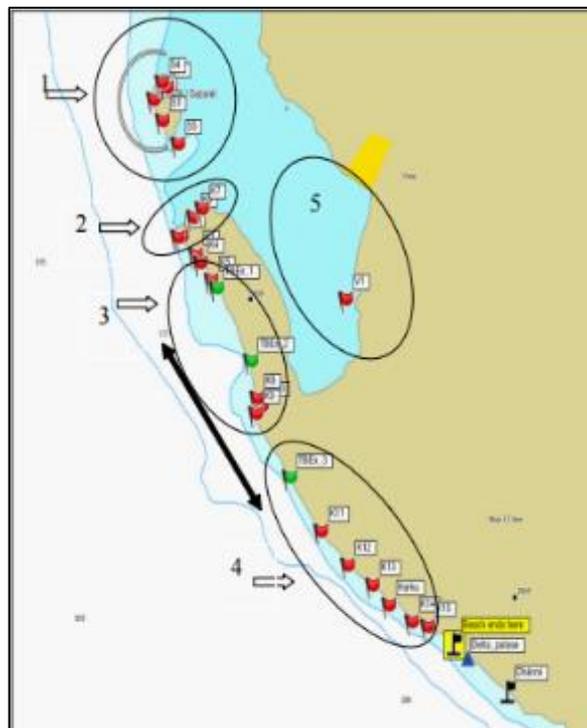
#### ▪ *Diving and scuba-diving*

Caves, reefs and coralligenous formations are great natural habitats for the diving activities. They allow visitors to observe a rich natural wildlife (Figure 11). Cultural sites like shipwrecks constitute also interesting diving sites. Uncontrolled, diving activities can generate important impacts on ecosystems: degradation of coralligenous communities, damage to plants life, nuisance to the faune, etc (Strategic Plan for Marine and Coastal Protected Areas (SPMCPAs), UNDP, 2011). Illegal spear-gun fishing, sometimes practiced by divers, can also threaten the fish population.



**Figure11: Haxhi Ali cave, Karaburun Peninsula**  
(Source : Arian Gaçe, 2011)

It is reported that recreational diving activities are mostly found in the area between Vlora and Saranda and the majority of them are located outside the MPA (INCA, 2012). However, few diving sites can be spotted inside the KS MPA; the coralligenous formations along Sazan Island coastline are for instance visited during the high season by divers. The western side of the Karaburun Peninsula also gathers excellent diving sites (Figure 12), with good visibility conditions for most of the year, but there are located in the most remote and unprotected part of the MPA and the meteorological conditions can make them quite unsafe for divers. It can be thus quite expensive to leave for a diving tour from Vlora or Orikum.



**Figure12: Map of the potential diving sites of the MPA and the Bay of Vlora**  
(Source: UNDP, 2012)

According to the management plan of the MPA, five associations propose diving lessons or diving guides inside the protected area. They can take from 3 divers to 10 divers and it has been estimated that during the summer 2014, they were approximately 300-500 divers in the area. During our field mission, we met the representative of “EkspeditaBlu” which is a diving centre that provides scuba diving and snorkelling packages to the inhabitants of the region and tourists. Their activities are focused along the coast of Vlora Bay, including the MPA of K-S. They offer touristic packages of 1.500 ALL/pp and 1.800 ALL/pp with their inflatable boat. For the activity of snorkelling they do not have a price, as it is included in the daily tour package. “EkspeditaBlu” offers lessons (1-3 months) for scuba diving at the price of 350 Euros/pp (49.000 ALL/pp), 10 persons per year are certified. The prices for the diving package lasting 3 hours along the bay is 50 Euros/pp (7.000 ALL/p) and it is offered for groups over 4 persons. “Ekspedita Blue” organizes diving for 50-60 groups during one year, where 94% of the diving starts inside the MPA. In summer 2015 they combined their activities with the daily tours offered by another boat tour operator called “Black Pearl”, by adding their offer to the price of the daily tour.

More precise statistics on the number of divers and the income of the diving centres are not available. To measure the ecosystems services linked to diving activities, we will considerate the price paid by tourists to dive within the area as the price they are willing to pay to enjoy and discover MPA's ecosystems and finally as the economic value of the service brought here

In the Marine Protected Area of Kas-Kekova (Turkey), which displays the same type of habitats than in Karaburun-Sazan, the average price for a diving lesson is 32 euros. According to the website of the Polish Diving Base - Albania<sup>1</sup> which proposes diving lessons and tours around Saranda, Blue eye Reserve and Porto Palermo MPA, the minimum price for a dive (introduction) is 50 euros (7000 ALL) which is in accordance with one of the package proposed by EkspeditaBlu. As the diving sites within Karaburun-Sazan are quite far away from the departures' ports, diving prices might be consequently more expensive. **As, the number of divers during the low season is unknown, the maximum of 500 divers during the summer 2014 is selected and we consider they all take the 50 euros package. Considering these data, the services provided by protected natural ecosystems to the diving activity can be value to 25 000 euros (3,450 million**

by natural habitats.

### Potential of development of diving activities

The number of divers in the MPA should increase in the coming years with the development of tourism at the scale of Vlora Bay. The construction of new infrastructure like a road joining Oriku to the western side of the Peninsula would also allow better access to interesting diving sites. RAPA, UNDP and INCA are also collaborating on the mapping of underwater trails in MPA Karaburun-Sazan which could bring new divers to come to the area (field study, March 2016). However, the number of divers authorized in the zone must be limited and this development controlled in order to preserve natural habitats. The World Tourism Organisation defines the load capacity of tourism as “the maximum number of tourists visiting at the same time a given site without causing any physical, biological, economical

and sociocultural destruction to the environment neither unacceptable degradation of the satisfaction level of the tourists”(WTO, 2004). This load capacity thus corresponds to the level of touristic activity which enables to have a maximum of economic benefits without damaging marine habitats.

In Karaburun-Sazan MPA, this load capacity will be the maximal number of divers which could practice their activity in the area without impacting the environment nor decreasing the level of pleasure and satisfaction of the others divers. To determine this capacity, the realization of frequentation studies is essential. Few researches exist on the impact of diving and boating activities on the environment within MPA’s and they have mostly been realized for tropical ecosystems and coral reefs (Clément et al., 2010). The diving management in others MPA of the Mediterranean Sea can give a quick view of the development potential for diving for Karaburun-Sazan (even if conditions and infrastructures vary a lot). For instance, Kornati National Park in Croatia have a surface area of 16 800 ha (12 571 for Karaburun-Sazan) and has registered 1000 dives per year while the 11 500 ha Kas-Kekova MPA in Turkey registers each year 9300 dives within its perimeter (Dalias et al., 2007). **The diving potential of the Karaburun-Sazan MPA seems thus quite important and need to be organized and structured in a sustainable way.**

- *Pesca-tourism*

As mentioned earlier in this report, more and more fishers propose excursions packages by boats. The fish market operator of Orikum offers for instance excursions with a boat for 40 people, at a price of 3000 ALL per person (field study, March 2016). This operator has also a boat for rental, a rather non-organized offer with 2 inflatable boats with capacities of 22 and 18 persons, at a daily price of 1500 ALL/pp. During the season 2015, they have provided 10 daily tours in total. The plans for the next year is to offer boat rental of 4-5 boats of 40 horsepower with a capacity of 4-6 persons each, without skipper and with a GPS, at the price of 5000 ALL for the whole day. These small fishing boats with small groups of 4 to 6 persons could go around the area or the beaches along the peninsula (MP for NMP of K-S, December 2014, UNDP/WWF).

**It is not possible here to estimate the added value of this activity for this operator, we can only formulate hypotheses on its turnover. If we consider that the boat offering 40 seats also provided 10 daily tours per year, the turnover of this activity can be valued to 1,530 million ALL. Besides, these excursions are not taking place for the majority of them inside the KS-MPA but they are directly dependent on the quality of the environment.**

**This value will be taken into account in our scenario because pesca-tourism might develop in the future and fishermen are willing to work with the MPA to develop this activity.**

- *Sailing activities*

Sailing is for the moment underdeveloped within the Bay of Vlora and nautical tourism is not developed in Albania for various reasons: the lack of infrastructure and reception facilities, the leisure navigation limited for years by a moratorium on the use of boats because of safety reasons (UNDP, MCPA Socio-economic report, 2012). Sailors are nonetheless seeking for great landscapes and natural areas; the Karaburun-Sazan MPA could become a favourite destination on the Adriatic Coast, thanks to its sheltered coast in the Bay and good

anchoring sites. In 2005, the Orikum Marina Port was inaugurated with a capacity of almost 600 berths. The presence of this infrastructure could facilitate the development of sailing within the Bay of Vlora in the years to come. Sailing could also be a path of development for the Karaburun-Sazan MPA. An anchoring buoy has been for instance settle to allow pleasure boats to stay in the Bay (Doreid Petoshati, UNDP, 11/03/2016).

#### ▪ *Education and research*

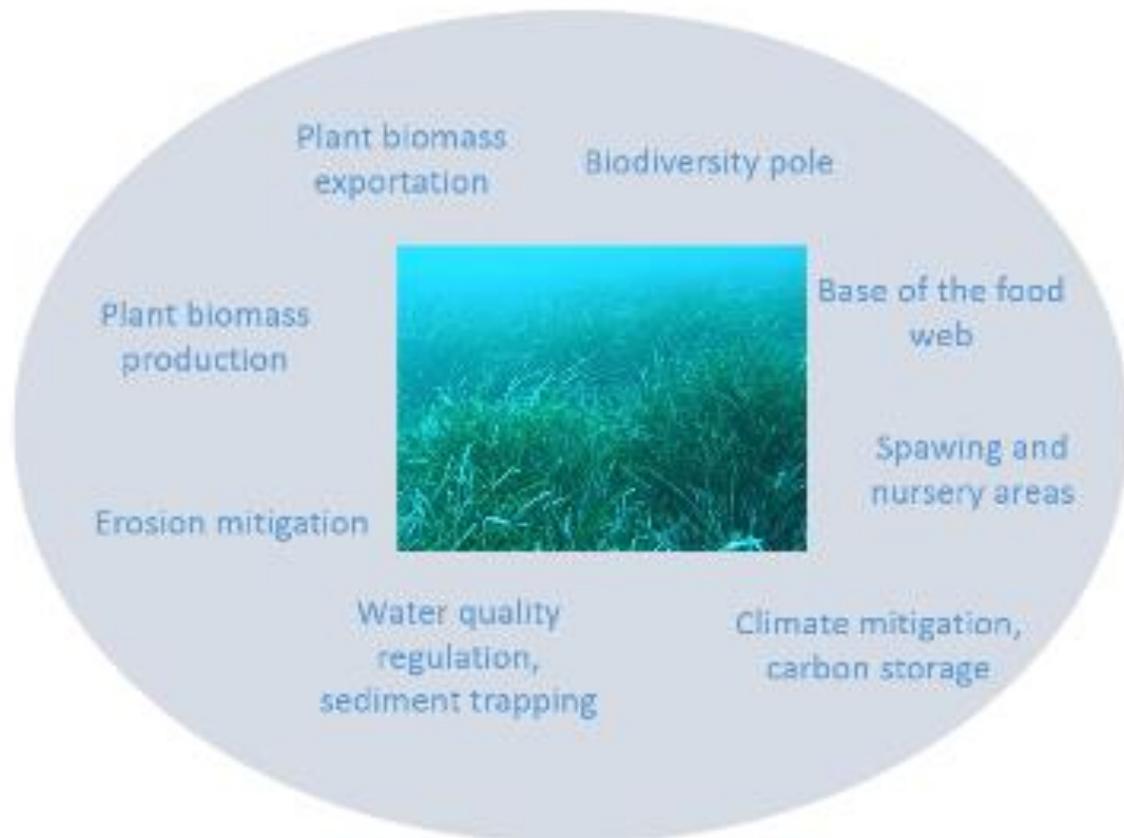
Among cultural services provided by ecosystem, education and research are important ones. Natural ecosystems are indeed a source of support for knowledge and education actions. To measure this service, it would be necessary to have precise information about the education actions led by the Karaburun-Sazan MPA (the total number of people joining education programmes for instance). The education service provided by the ecosystems of the zone will not be evaluated in this study because of the lack of data but the following list illustrate in a qualitative way the education actions and research projects led within the protected area :

- Organisation with INCA and the Orikum's school "BalilPelari" of the event "A day in my park" in which 40 students were introduced with natural and historical value of the area (Genti Kromidha, 2015).
- Meetings in Orikum with fishermen for the project "development of co-management methods for fishing conscious in MPA Karaburun-Sazan" realized by MedPAN in collaboration with RAF.
- Promotion of published brochure, organization of conferences and field trips with students and local stakeholders, organization of beach clearing sessions (UNDP, 2014-2016).

**Education is an important part of the action of the MPA to extend its area of influence and awareness and to associate the beneficiaries of the Karaburun-Sazan Marine Protected Area to its management and its preservation.**

### **2.3.3. Regulating services**

These are the services provided by the ecosystems by acting as regulators in many natural processes. The valuation of these services requires a detailed knowledge of the ecological functions of the ecosystems. This type of valuation also reveals that some ecosystems and natural habitats can be more valuable in terms of goods and services produced than others. In the case of the Karaburun-Sazan MPA, *Posidonia* meadows hold a peculiar role. At the scale of the Mediterranean Sea, *Posidonia* meadows represent an exceptional habitats which provides lots of ecosystems services like water treatment, carbon storage and climate mitigation and a nursery and spawning ground for fish populations (Plan Bleu, 2010)(Figure 13).



**Figure 13: Services provided by Posidonia meadows**  
(Source: Vertigo Lab)

- **Natural hazards: coastal erosion & floods prevention**

Natural habitats and ecosystems participate in the protection of the coastline by diminishing the impacts of some natural phenomenon like coastal erosion and marine submersions.

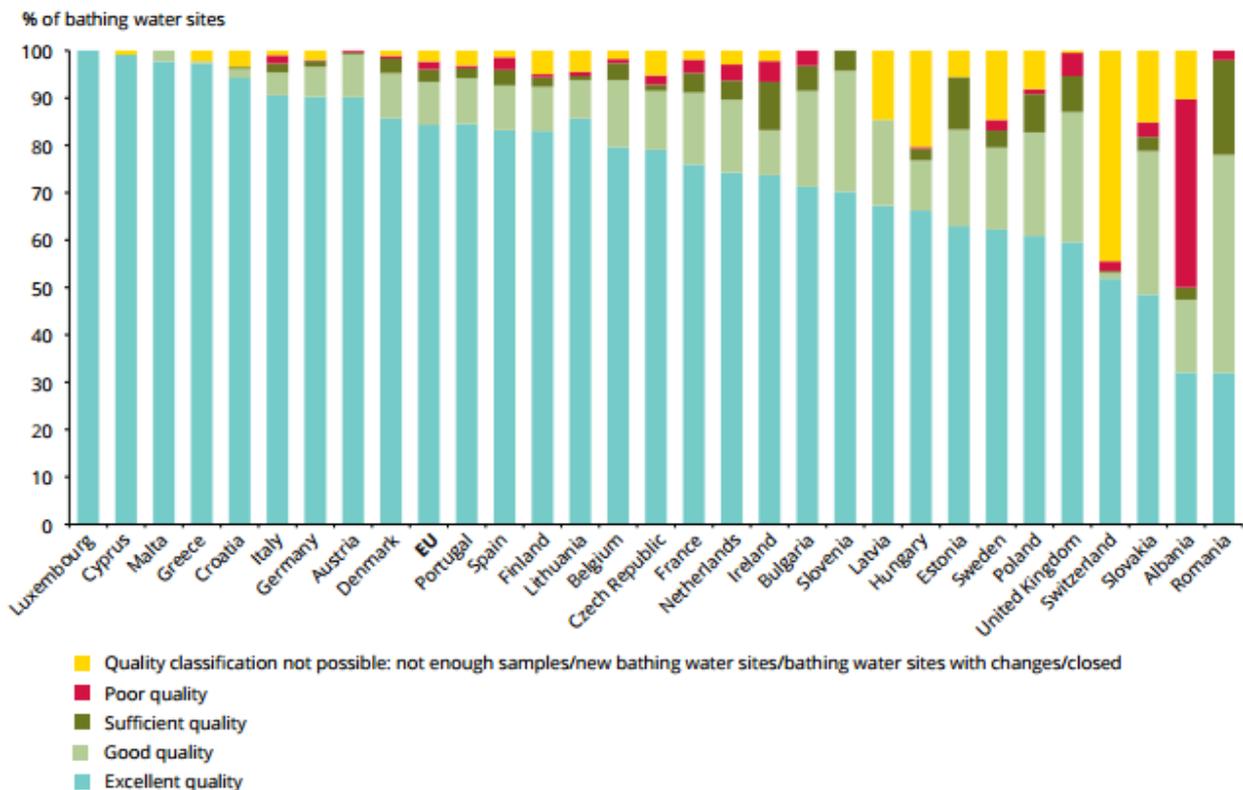
Coastal erosion is a major concern in Albania. Different causes have been identified to explain this phenomenon: the reduction of sand amount in the coastal zone due to human activities, the changing location of river mouth, the alteration of the usual pattern of coastal currents or the extraction of gravel and sand from the river beds and sandy beaches. At the scale of Albania, the erosion issue is more visible in the Adriatic part of the coastline and less visible in the southern part of the country where the KS-MPA is located (PAP/RAC, 2007). However, , some beaches of the Bay of Vlora are impacted by erosion (Laçi, 2010). One of the main coastal sectors impacted are the following: lowland coast of the bay of Vlora, the delta old Semani, the North section of Erzeni river mouth, Rushkulli and the beach of Patoku which almost disappeared under the impact of erosion. Seagrass meadows offer a barrier against the swell and strongly reduce erosion. Even after their death, *Posidonias* hoots form a blanket on the beaches, which mixes with sands and sediments and protect the beach from erosion. Their preservation can constitute an excellent measure of fight against erosion. More than 15 km<sup>2</sup> of *Posidonia oceanica* meadows are located outside the MPA (UNDP); by awareness and education actions, the KS-MPA could contribute to their preservation. **In the perimeter of the MPA, mainly composed of rocky coasts, there is no**

**documented case of erosion or habitations or activities to be protected (which would value this service), hence, we will not estimate this service here.**

A service of regulation of floods and marine submersions can also be provided by natural habitats like saltmarshes and coastal wetlands that can absorb the extra-water like (sponge effect) or allow the water to expand without damaging human constructions or infrastructures. Reefs can also play an important role by diminishing the waves' strength during storms. However, this natural risk is not detailed in the management plan of the Karaburun-Sazan neither in the assessment of natural risks for Albania (UNDP, 2009). We will thus not value the potential ecosystems services linked to the regulation of marine submersion in this study.

▪ *Sea water quality*

Albania's beaches suffer from quality issues, especially in the area of Dures and the Bay of Vlora. Seawater sampling of five beaches of the Bay of Vlora have for example been studied between January 2014 and August 2014 (Bofe et al., 2015). The results showed a high concentration of faecal indicators, especially during summer. This situation is due to various sources of pollution (poor sewage management, poor waste management, agriculture, etc.). The quality of sea water in Albania is quite bad compared to other European countries (Figure 14). This situation will surely affect tourism activities in the future.



**Figure 14: Bathing water quality in Europe**  
(Source: European Environment Agency, 2016)

Beaches closer to the city are Vlora are more impacted by pollution than areas less urbanized. The Figure 15 enhances the quality of sea water in different beaches near Vlora.

Vlora Beach 2009, minimum and maximum parameters for FC,FS		
	FC-50	FS-50
Old Beach Pion.Camp	355	317
Old Beach Cabines	437	318
Navy School	1519	1304
New Beach	466	429
Villa Block	41	23
Jonufer	33	23
Paradise Beach	28	16
B-R L. Borshi Beach	23	12
Radhime Hotel Grand	24	14
Boja 1	38	19
Komplex ORIKU	23	14
Norms/100 ml	100	100

Source: Ministry of Environment, Forestry and Water Administration (data is taken from the ye  
Comments and Analysis: Opem Data Albania (ODA)

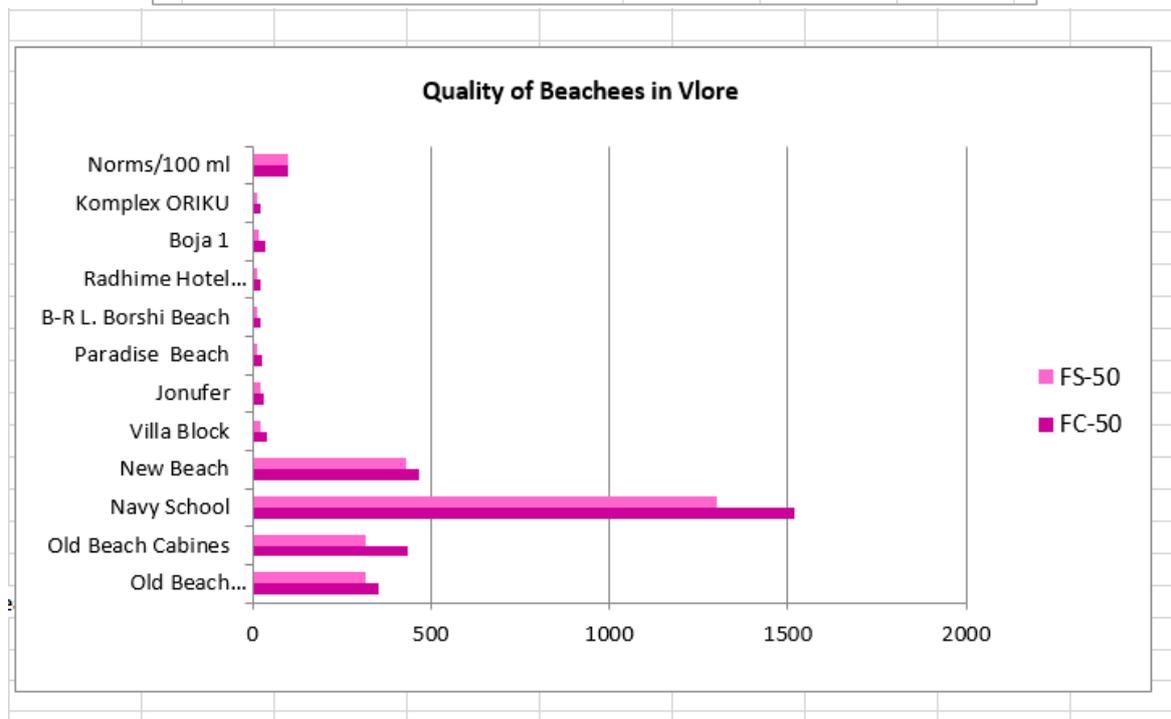


Figure15 : Quality of sea water of beaches in Vlora Bay  
(Source:Albanian Ministry of Environment, 2009)

Sea water quality is important for tourism but also for aquaculture and fisheries, the only ecosystem to provide water and waste treatment for coastal waters in the seagrass habitat (mainly *Posidonia meadows*). The most important fish farm in the Bay of Vlora has an annual turnover of 196 million ALL while the five other fish farms have an annual turnover estimated between 21 and 28 million ALL. A part of their turnover might be linked with the quality of the sea water they used for their production. We lack of economic data regarding the impacts avoided by the presence of *Posidonia Meadows* in the Bay of Vlora. In order to evaluate the services of quality regulation provided by the MPA's ecosystems, the transfer value method will be used. As study carried in France in 2014 estimated the value of the

service of water treatment ensured by *Posidonia Meadows* to 60€ per hectare per year (Campagne et al., 2015). **Adjusted to the Albanian GDP, the value of this ecosystem service can be estimated to 970 ALL/ha/year. At the MPA's scale, this service is thus valued to 188 207 ALL per year.**

This value might be under-estimated; it underlines the importance of the preservation of *Posidonia oceanica* outside the perimeter of the MPA. The meadows located near Vlora Beaches are essential to the quality of the sea water in the zone.

- **Climate mitigation and carbon sequestration**

Among land ecosystems, forests and grasslands contribute to climate change mitigation by storing and fixing CO<sub>2</sub>. Hence, Albanian forests have captured 178, 598 tons \$US for the period 2005-2012 (estimated as actual GHG emission reductions or net anthropogenic GHG removals by sinks). The market price at that time for 1 ton CO<sub>2</sub> was 4,4\$/ton (UNFCCC/CCNUCC, 2009). **As land ecosystems' repartition on the Karaburun Peninsula and Sazan Island are not given, marine ecosystems will only be studied.**

*Posidonia* meadows, as land forests and grasslands, can fix and store a significant part of CO<sub>2</sub> from the atmosphere (Figure 17). This carbon sink represented by seagrass meadows is considerable. Mac Cord and Mateao (2010) have for instance calculated that the *Posidonia Oceanica* meadows of the Balearic Islands could store a carbon value 35 times greater than tropical forests (IUCN, 2012). *Posidonia oceanica* meadows can store carbon on a short term scale (between 8 and 142 gC m<sup>2</sup> a<sup>-1</sup>) but also on long term scale (6 to 175 gCm<sup>2</sup> a<sup>-1</sup>).



**Figure16 : An illustration of the long term mechanism of carbon storage by *Posidonia Oceanica***

(Source: IUCN, 2012)

The potential carbon sink integrating short term and long term value can be determined between 14 and 662 gCm<sup>2</sup> a<sup>-1</sup> (IUCN, 2012). As data displayed about *Posidonia oceanica* meadows in Karaburun-Sazan is not enough precise too distinguish short term storage from long term, we will use this total value to estimate the regulation service brought by *Posidonia Meadows* within KS-MPA.

The value of one tonne of carbon dioxide is estimated in Europe about 15 euros (2070 ALL) which means that carbon contained by *Posidonia oceanica* would be estimated between 6 euros and 23 euros per m<sup>2</sup> (IUCN, 2012). As the carbon ton value is fluctuating in Europe and holds different values per countries (41 euros in Finland against 4 euros in Portugal for instance) (I4CE, 2015) and we do not have precise data on the biological condition of the *Posidonia* Meadows of KS-MPA, we will consider here the lowest value of six euros.

**194 ha of *Posidonia* meadows (1, 940 million m<sup>2</sup>) have been detected within Karaburun-Sazan Marine Protected Area, which therefore represent a value for the service of carbon storage by this marine ecosystem of 1,606 billion ALL (11,642 million of euros).**

**This high value of *Posidonia* meadows in terms of carbon storage inside the KS-MPA also underline the high value of the *Posidonia* located outside the KS-MPA. The beaches along the Bay of Vlora are indeed protected by large areas of *Posidonia* (1 658 ha). The education actions that the MPA will be able to organise about these ecosystems and the extension of its area of influence will be essential to preserve them.**

#### **2.3.4. Supporting services**

The Karaburun-MPA shelters a great biodiversity of species. The management plan of the area, as well as the inventories carried on Sazani Island, assess these different species and the visible wildlife living within the perimeter of the MPA. The role played by *Posidonia oceanica* in the lifecycle of many fish species allows for instance the sustainability of captures for fishers of the Bay of Vlora.

The presence of this biodiversity is essential for the production of the services provided before. Its value will not be estimated through economic methods; biodiversity can be assessed with non uses value methods.

#### **2.3.5. Synthesis**

The main part of the ecosystems services valued for the Karaburun-Sazan MPA are represented by the regulating services and the carbon sequestration function of the *Posidonia meadows*. The following table displays the values estimated for each service.

**Table 7: Ecosystems services values**

Services	Ecosystems and habitats	area considered (ha)	unit value (caséchéant) (ALL/ha/an)	Total value (EUR/an)	Total value (ALL/an)	Economic value per service (%)
<b>Provisioning services</b>					<b>39 649 000</b>	
<i>Artisanal fisheries</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	2 063	19 221	287 312	39 649 000	2,35%
<i>Aquaculture</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>
<b>Cultural services</b>					<b>37 731 264</b>	
<i>Boat excursions</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	12 571	2 605	237 328	32 751 264	1,95%
<i>Diving activities</i>	<i>Coralligenous formations, reefs</i>	775	4 451	25 000	3 450 000	0,20%
<i>Pescatourism</i>	<i>Open waters zones, Coralligenous formations, Posidonia meadows, reefs</i>	12 571	122	10 710	1 530 000	0,09%
<i>Education and research</i>	<i>Land and marine ecosystems</i>	<i>no evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>
<i>Sailing</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>	<i>Not evaluated</i>
<b>Regulating services</b>					<b>1 606 508 207</b>	
<i>Sea water quality</i>	<i>Posidonia meadows</i>	194	970	13 174	188 207	0,01%
<i>Regulation of natural hazards</i>	<i>Posidonia meadows, reefs</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>
<i>Carbon sequestration</i>	<i>Posidonia meadows</i>	194,03	8278809,277	11640000	1606320000	95,39%
<b>Supporting services</b>						
<i>Biodiversity, nursery and spawning grounds</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>	<i>not evaluated</i>
<b>Total</b>				<b>12 189 640</b>	<b>1 683 700 264</b>	<b>100,00%</b>

## 2.4. Assessment of benefits of the MPA management plan implementation

In this part of the study, two scenarios of MPA management by 2026 are presented and linked to the ecosystems services valuation previously displayed. The difference in net present value between these two scenarios will then determine the benefits in terms of ecosystem services. These scenarios are built on the information collected on the field, on the growth trends of economic sectors (and particularly tourism) and on the potential impact of human activities on the MPA ecosystems. These activities could indeed affect the ecosystem services provisions. The study carried out by the Plan Bleu on the economic impacts of marine protected areas in the Mediterranean sea (Anaï Mangos and Maud-Anaïs Claudot, 2013) was also helpful to design the following scenarios.

Here are some key facts and trends that will guide our scenarios:

- Tourism is a growth sector in Albania and sustainable tourism should be the major axis of development in order to encourage the local development of communities and to preserve natural ecosystems in the same way. New infrastructures are planned by NAPA administration like the installation of a snorkelling table for tourists and two mooring buoys.
- The willingness of beneficiaries of the MPA and stakeholders of the Bay of Vlora to participate to the construction of a sustainable sector is strong. About fisheries, NAPA wants for instance to develop a sustainable activity centre on the location of the fisheries management centre in Orikum by setting up an information centre near the fisheries management centre by the beginning of summer 2016 (fisheries management centre 14/03/2016).
- Other threats will be difficult to contain for the MPA management like the growth of aquaculture. New fish farms are planned and some of them are within the perimeter of the KS MPA. The potential environmental impacts of aquaculture on natural habitats will be taken into account in our scenarios.

In the financial planning of the Karaburun-Sazan MPA, developed in November 2015, two scenarios were already designed. **A basic management scenario** describes the minimum level of funding required to operate conservation programs while meeting basic program requirements to sustain functions of ecosystems in protected areas (Binet and Diazabakana, 2015). The second scenario was an **optimal management scenario** which describes the ideal level of funding required to operate all programs to reach and sustain optimal functions of ecosystems in protected areas. This scenario should ensure the achievement of short, medium and long term goals for the protected areas.

**The scenarios proposed in the following part of the study are in line with these scenarios even if there are more adapted to the reality and the stakes of the Karaburun-Sazan MPA management. The optimal scenario implies the full implementation of the management plan with a focus on the first years of implementation made on the framework of uses and activities within the perimeter of the MPA and awareness actions in order to extend the influence area of the MPA and allow the preservation of ecosystems located outside the MPA.**

### **2.4.1. Scenario 1: Basic management scenario**

The scenario could be qualified as a business as usual scenario with the implementation of management actions according to the management plan. **According to RAPA, there is no difference of priorities between the five main objectives but based on the practice administration, staff and financial capacities, the management staff is more focused on the biodiversity conservation and the management, administration and sustainability of the MPA.** We consider here only actions qualified as Priority 1, as specified in the management plan.

Among the priority actions of this scenario, there will be some regarding the framing of uses within the perimeter of the MPA like the following ones:

- The proposition of a legal framework for regulation of diving activities;
- The creation of an information centre on Karaburuni kiosk ;
- Facilitate clear and easy procedures for access of tourists operators (by sea and land); and
- Agree on regulation of boats in the MPA.

Nonetheless, others essentials actions will be implemented later like the study of the feasibility on a fee system (by 2018) or the introduction of quality standards of touristic businesses by 2020. In this scenario, emphasis will be placed on the conservation of biodiversity and the organization of the MPA in its first years. The setting of a clearer framework for uses within the MPA will be delayed to 2020, as for the awareness and education actions.

Regarding the environmental status of ecosystems, they will be strongly impacted by the growth tourism and the development of activities such as aquaculture. The biodiversity conservation measures might be mitigated by the lack of framework of uses within the perimeter of the MPA and the lack of education and environmental awareness outside the area of influence of the KS-MPA.

Finally, the actions implemented in the first years of the MPA will not concern its financial capacities which could make the realization of the management plan more difficult in the future and will not reduce its dependence to external factors and stakeholders.

### **2.4.2. Scenario 2: An optimal scenario, uses-oriented management plan in its first years of implementation.**

Like the first scenario, the protection of biodiversity will have a key position in the actions implemented but at the same time, the reflexion about the regulation of activities inside the KS-MPA will be implemented from the start of the plan. As the tourism and activities like boating and diving might grow very quickly, their early control will allow to limit damages on the environment and the natural habitats of Karaburun-Sazan. In this optimal scenario, the four zones of the Karaburun –Sazan MPA are respected by the users: the core zone and the effective management zone are not allowed to any human activity. The impacts of human activities on the KS-MPA ecosystems will be the same as in the first scenario until 2020 and should be smaller then.

Here are some actions that will be implemented in priority:

- Realisation of boats statistics
- Regulation and monitoring of aquaculture
- Develop and implement code of conduct for wildlife watching in cooperation with tours operators
- Introducing quality standards of touristic businesses
- Feasibility study to introduce a fee system
- Carrying a capacity study for excursion boats, local boats and tourists in the area
- Implementation of the theme D :awareness and education
- Improve communication and coordination with local stakeholders through regular meetings before and after the tourist season.

These types of actions could benefit to all the stakeholders who are often beneficiaries of the KS-MPA. The second scenario should thus bring greater benefits than the first scenario.

The implementation of pay-users mechanisms will allow the K-S MPA to develop new financial capacities. In this optimal scenario, we will also make the hypothesis that the financial and institutional contexts get more favourable to the actions dedicated to the preservation of environment. The context will give the MPA the possibility to implement others priorities actions at the same time.

### 2.4.3. Consequences of the management scenarios on the economic values of the ecosystems

Services	Current state	Scenario 1: Basic management scenario, priority on biodiversity conservation and progressive implementation of other actions	Scenario 2: Optimal scenario, focus on the uses and the beneficiaries of the MPA since the beginning of the implementation timeframe
Artisanal fisheries	<ul style="list-style-type: none"> <li>- Increasing fish production since 2010 but decline of the number of vessels.</li> <li>- Increasing demand of sea products during the high season, use of aquaculture products to satisfy it.</li> <li>- Fishermen are willing to work with the MPA and are willing to pay fees if necessary. NAPA wants to encourage sustainable fishing practices.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase of the fish biomass thanks to the reserve effect and high pressures from human activities (tourism, aquaculture). Degradation of the <i>Posidonia</i> Meadows along the Vlora Bay coast which represented nursery and spawning grounds for fish population.</li> <li>- Uncontrolled, illegal and unreported fishing inside the MPA, no control enforcement during the first years of implementation of the management plan.</li> <li>- No education actions outside the MPA before 2020, only sustainable fishing practices workshops for fishermen.</li> <li>- Improvement of the management of fisheries after 2020.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase of the fish biomass and production of the Bay of Vlora.</li> <li>- Better collaboration between the MPA staff, fishing management organisation, and municipalities to enforce the control in the area.</li> <li>- Awareness and education actions.</li> <li>- Development of all the actions of the theme « Local communities and sustainable use of natural resources”.</li> <li>- Better integration of local beneficiaries.</li> </ul>
		<p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>Small increase of the fish production at the level of the Bay of Vlora due to the reserve effect with small effects on fishermen income. These beneficiaries suffer from uses conflicts at the scale of the Bay, the effects of environmental degradation (marine litter for instance) outside the MPA area and illegal fishing practices (spear gun fishing for example).</p> <p>Increase of the fish production by 5%.</p>	<p><i>Impact of the scenario 2 on the economic value of ecosystems</i></p> <p>Increase of the fish production at the level of the Bay of Vlora due to the reserve effect and better environmental context. The preserved ecosystems of the KS-MPA bring regulating and provisioning services to fishermen.</p> <p>Increase of the fish production by 15%.</p>
Excursion boats	<ul style="list-style-type: none"> <li>- Four boats operating in the zone of the MPA and in the Bay of Vlora during the high season (one boat only before 2012). These companies are willing to pay extra fees as an entrance to the park in exchange of better infrastructures.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase of the number of boats (8 boats operating in the zone in 2020) and passengers, then stagnation after 2021 due to environmental degradation of the Bay of Vlora. Though actions led by the MPA to control and give a framework to boating activities, the lack of infrastructures for boating (only few buoys have been installed) and the lack of awareness and education of boat operators generate important environmental</li> </ul>	<ul style="list-style-type: none"> <li>- Data collection on boats and fisheries monitoring and evaluation, installation of infrastructures on the peninsula and on Sazan Island to welcome visitors and control their frequentation, introduction of quality standards of touristic businesses.</li> <li>Thanks to its variety of actions, the MPA is recognized as an essential stakeholder for the</li> </ul>

Economic valuation of the Karaburun-Sazani MPA  
September 2016

Services	Current state	Scenario 1: Basic management scenario, priority on biodiversity conservation and progressive implementation of other actions	Scenario 2: Optimal scenario, focus on the uses and the beneficiaries of the MPA since the beginning of the implementation timeframe
		<p>impacts in terms of waste management, over-frequentation of some natural sites, disturbance of the marine fauna and destruction of natural habitats.</p> <p>- No fee is implemented before 2022 and boat operators, who are direct beneficiaries of the MPA, do not participate in its preservation. Biodiversity conservation measures are taken and awareness actions are organized but they come too late with activities already installed within the MPA.</p> <p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>Increase of the benefits for boat operators, arrival of new beneficiaries with the arrival of four new boats. Increase of the benefits until 2020 and then decrease with the degradation of environmental conditions outside the zone and the degradation of some peculiar part of the MPA over-frequented.</p> <p>Increase by 15% of the added value of the boats until 2020 and then decrease by 30% until 2026.</p>	<p>preservation of natural habitats and the development of sustainable tourism within the MPA. Frequency studies have been realized to determine the load capacity of the area.</p> <p><i>Impact of the scenario 2 on the economic value of ecosystems</i></p> <p>Regular increase of the added value for boat operators: rising benefits by 15% until 2020, then increasing by 40% until 2026 thanks to the attractiveness of the zone.</p>
Diving	<p>Five associations are proposing diving activities inside the MPA area. There is not precise statistics about divers' frequentation but between 300 and 500 divers have been counted within the MPA zone during the summer 2014. Toward them, a diving centre placed near the MPA could be achieved through the collaboration with the MPA administration. They are ready to pay a fee for the MPA.</p>	<p>Karaburun Peninsula and Sazan Island offer great diving sites and the number of dives is increasing in the zone. As the biodiversity and natural habitats can be affect by divers, the MPA staff took measures to control this activity.</p> <p>Some sites have been secured; some buoys and one underwater trail have been installed. However, the management staffs do not have the capacities to control all the diving sites and its infrastructure cannot welcome all the divers. The activity generates environmental impacts despite the action of the management staff. The load capacity of the area has not been determined because of the lack of resources.</p>	<p>As for the scenario 1, measures have been taken to monitor diving sites. All diving sites are controlled and the impacts of divers measured. Thanks to the optimal level of preservation insured by the MPA, the area becomes more and more attractive and its natural ecosystems are not disturbed. Frequency studies have been realized to determine the load capacity of the area.</p>

Economic valuation of the Karaburun-Sazani MPA  
September 2016

Services	Current state	<b>Scenario 1: Basic management scenario, priority on biodiversity conservation and progressive implementation of other actions</b>	<b>Scenario 2: Optimal scenario, focus on the uses and the beneficiaries of the MPA since the beginning of the implementation timeframe</b>
		Coralligenous communities in some part of Sazan Island are particularly impacted and the fauna on the western side of the Karaburun Peninsula disturb.	
		<p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>New diving clubs are opening; one is installed near the Orikum fishing centre at the entrance of the area. The number of divers increases by 80% between 2016 and 2020. Then, it decreases by 20% between 2021 and 2026 as some diving sites are made less attractive with the degradation of natural habitats.</p>	<p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>New diving clubs are opening; one is installed near the Orikum fishing centre at the entrance of the area. The number of divers increases by 100% between 2016 and 2020. Then, as the load capacity is getting close (it could be set for instance at around 1000 divers per year), it increases by 20% between 2021 and 2026.</p>
<b>Pesca-tourism</b>	This activity is not well-developed in the Bay of Vlora yet. It nonetheless represents a new source of income for fishermen. The fishing center proposes some tours with fishers and would like to extend this activity.	<p>The Karaburun-Sazan MPA help some fishermen to develop this activity but the MPA does not have the financial and staff capacities to train fishermen to adopt sustainable practices. So pesca-tourism activities cannot be monitored and can be compared with illegal fishing within the perimeter of the area.</p> <p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>This sales revenue of the activity increases by 30% between 2016 and 2026 but generate negative impacts on the environment. Some boats are operating in the MPA area and they are not monitored. Illegal fish captures are reported and some ecosystems like <i>Posidonia Oceanica</i> are damaged by the boat anchors.</p>	<p>The MPA accompanies fishermen in the development of pesca-tourism. It is a way to promote cultural traditions and also to valorise Bay of Vlora's products. In the optimal scenario, the MPA has sufficient capacities to allow the development of sustainable activity within its perimeter.</p> <p><i>Impact of the scenario 1 on the economic value of ecosystems</i></p> <p>With the monitoring of the MPA, the sales revenue of Pesca-tourism increases by 100%, it becomes a sustainable activity attractive for the Bay of Vlora. This activity is not practiced inside the MPA but it directly depends on the quality and the good health of ecosystems.</p>

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Services	Current state	Scenario 1: Basic management scenario, priority on biodiversity conservation and progressive implementation of other actions	Scenario 2: Optimal scenario, focus on the uses and the beneficiaries of the MPA since the beginning of the implementation timeframe
Climate mitigation	The KS-MPA shelters 1964 ha of <i>Posidonia Oceanica</i> . This Mediterranean ecosystem provides lots of services: water regulation, coastal protection, carbon storage or spawning grounds for fish populations.	The basic management scenario would succeed to protect the <i>Posidonia</i> meadows located within the perimeter of the Marine Protected Area, as well as coralligenous communities. However, little surfaces of <i>Posidonia Oceanica</i> could be threatened by activities such as diving and boating. The basic management scenario will not neither allow to protect the <i>Posidonia</i> meadows located outside the MPA. Without education and awareness raising actions, it will be impossible for the MPA to extend its area of influence and help to the protection of important ecosystems directly threatened by the human activities.	The optimal scenario should allow the protection of ecosystems within the perimeter of the MPA. It should also allow the organisation of awareness raising initiatives that could lead to a better protection of the ecosystems of the Bay of Vlora.
		<i>Impact of the scenario 1 on the economic value of ecosystems</i> Decrease by 1% in 10 years	<i>Impact of the scenario 1 on the economic value of ecosystems</i> Increase by 3%
Sea Water quality	<i>Posidonia Oceanica</i> ensures the preservation of the water quality for tourism and aquaculture within the perimeter of the MPA but also for the beaches of Vlora	The MPA cannot protect the ecosystems outside the MPA regulating the quality of water. Sewage waters and the deterioration of the quality of environment decreases the attractiveness of the area for tourism.	The MPA's presence ensures a better preservation of natural habitats and the quality of water is improved, which brings benefits to fishers, aquaculture and tourists operators.
		<i>Impact of the scenario 1 on the economic value of ecosystems</i> Decrease by 1% in 10 years	<i>Impact of the scenario 1 on the economic value of ecosystems</i> Increase by 3%

#### **2.4.4. Synthesis of the benefits associated with the two management scenarios proposed**

The environmental impacts and pressures detailed above as well as the projecting trends of tourism and fisheries activity are translated here into losses and gains of ecosystem services. These values depend on the evolution of the different ecosystems of the Karaburun-Sazan MPA but they cannot be linked directly to productive surfaces in terms of services. Indeed, the provisioning services and cultural services benefits estimated here are linked with the general state of the ecosystems and consequently of the MPA. An outstanding ecosystem is *Posidonia oceanica* which plays a great role in climate change mitigation with its carbon storage function.

This table below (Table 8) presents the net present value calculation for each management scenario on the 2016-2026 period which is the sum of present economic value (NPV) for the considered period. The difference between the two scenarios is then calculated. This difference represents the benefits of the optimal implementation on the management plan of the MPA, with a focus made on the monitoring of the uses and beneficiaries oriented actions.

The benefits of the optimal management scenario are estimated to 338 million ALL in 10 years, representing nearly 14, 1 million of ALL per year. Carbon sequestration ensured by *Posidonia oceanica meadows* is the most important contribution to these benefits. The preservation of this ecosystem is thus essential for this service but also for the provision of others services like artisanal fishing and cultural services. *Posidonia oceanica* ensures the regulation of the quality of sea water, which represents an important criterion for the attractiveness of the area. This ecosystem also plays a role in many marine species' lifecycles; its preservation brings benefits to fishing activities.

The direct-use values associated to cultural activities also represents 15% of the benefits of the implementation of the optimal management scenario. The protection of ecosystems and the preservation of biodiversity will also contribute to the attractiveness of the area in comparison with others destinations and will allow the development of sustainable tourism activities that will beneficiate to many stakeholders.

**Table 8: Net present value for the two management scenarios over the period 2016-2026**

Services	Ecosystems	Total present value for the scenario 1 (2016-2026)	Total present value for the scenario 2 (2016-2026)	Value difference between the two scenario	Percentage	Annual benefits (ALL)
<b>Provisioning services</b>				- 18 746 170	5,72%	- 1 874 617
<i>Artisanal fisheries</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	385 379 370	404 125 540	-18 746 170	5,72%	- 1 874 617
<b>Cultural services</b>				- 47 918 356	14,62%	- 4 791 836
<i>Boat excursions</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	309 223 696	347 484 341	-38 260 645	11,67%	- 3 826 065
<i>Diving activities</i>	<i>Corraligenous formations, reefs</i>	40 050 940	43 820 402	-3 769 462	1,15%	- 376 946
<i>Pescatourism</i>	<i>Open waters zone, Coralligenous formations, Posidonia meadows, reefs</i>	20 219 963	26 108 212	-5 888 249	1,80%	- 588 825
<b>Regulating services</b>				- 261 190 170	79,67%	- 7 462 576
<i>Carbon sequestration</i>	<i>Posidonia meadows, reefs</i>	15 210 218 489	15 471 408 659	-261 190 170	79,67%	
<i>Sea water quality</i>	<i>Posidonia meadows, reefs</i>	1 782 130	1 765 107	0	0,00%	-
<b>Total</b>		<b>#REF!</b>		<b>-327 854 696</b>	<b>100%</b>	<b>- 14 129 029</b>

#### **2.4.5. Costs associated to the two scenarios**

The first business plan for the MPA realized in November 2015 (Binet and Diazabakana, 2015) estimated the costs for **the implementation of the basic management scenario to 139 332 142 billion ALL** over 10 years. This basic scenario corresponds to the one we elaborate here. **Regarding the optimal management scenario, the costs implementation were estimated to 203 846 500 million ALL**, which is inferior to the benefits generated in the optimal scenarios by the ecosystem services.

### 3. Phase 2: Harnessing the potential for MPA long-term financing

Phase 1 highlighted that MPA can be viewed as a business operation providing “customers”, understood here as users or ES beneficiaries, with a number of “products” taking the form of ecosystem services.

Depending on the valuation method, the economic value of these “products” can either be a first indication of the amount MPA users would be willing to pay to benefit from an ecosystem services back up by the existing MPA, or an assessment of financial flows depending on goods and services provided by well-managed ecosystems. Following results of the economic valuation of ecosystem services produced in Phase 1, Phase 2 aims at identifying mechanisms through which these financial flows can be transferred from the ecosystem services’ beneficiaries to the MPA management (Lujan, 2015).

The following section thus presents an evaluation of potential for local user-pay mechanisms and offers a projection of these new sources of revenues for the MPA financing.

In this phase, we assume the implementation of the previously defined optimal management scenario providing beneficiaries with maximum benefits but consequently asking for maximum revenues to ensure the financing of associated management activities.

#### 3.1.1. Evaluation of potential user-pay mechanisms

User pay mechanisms are understood here in a broad sense. They include all financial mechanisms designed to transfer a financial flows from an ecosystem services’ beneficiaries to the MPA management. In other word, costs of management activities that guarantee the provision of ecosystem services could be borne by beneficiaries of these services (in or outside the MPA), in the limit of the value of benefits associated with these services as presented in the Figure17.

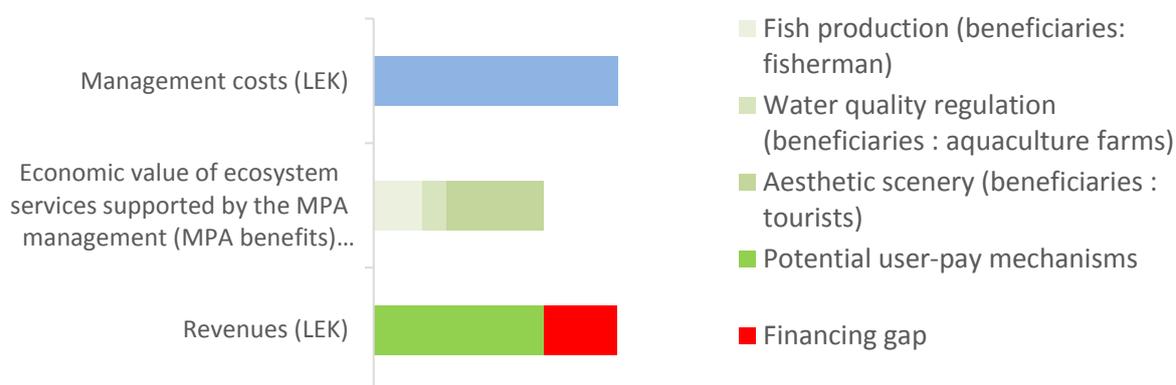


Figure17: Example of user-pay mechanisms identification

Understanding the nature of the Karaburun-Sazan MPA benefits in Phase 1 was an important first step to determining who should, and who will be willing to pay for conservation. The

first step in the identification of potential user-pay mechanisms thus consists in the identification of beneficiaries of ecosystem services back up by the existence of the MPAsuch as locals, tourists, downstream beneficiaries and global customers,to justify their implication in the MPA financing.

Based on the previous economic valuation of ecosystem services, the following table presents beneficiaries of ecosystem services (users) within the bay of Vlora and the contribution of the MPA management to the value of these ecosystem services (MPA benefits).

**Table 9: Identification of beneficiaries of the KaraburunSazani MPA**

Ecosystem services classification	Goods or services associated with the MPA management	MPA benefits	Beneficiaries
<b>PROVISIONING SERVICES</b>	Artisanal fisheries		Artisanal fishermen
<b>CULTURAL SERVICES</b>	Boat excursions		Tourists, tourism operators, hotels in the vicinity of the MPA
	Diving activities		Tourists, diving centres, divers
	Pescatourism		Tourists, artisanal fishermen, sport fishing operator
<b>REGULATION AND SUPPORT SERVICES</b>	Carbon sequestration		All

Annex 1 presents different financial mechanisms and associates them with goods or ecosystem services they allow to remunerate. On the basis of these financial mechanisms and the identification of beneficiaries of the MPA, it is finally possible to identify 7 potential user-pay mechanisms. These user-pay mechanisms are presented in the following table.

Except for the payment for ecosystem services, all identified user –pay-mechanisms were presented in the Karaburun-Sazani business plan (Binet and Diazabakana, 2015). Regarding the payment for ecosystem services associated with carbon sequestration, the development of these

mechanisms could be associated with the financing of activities participating directly in the protection of *Posidonia* meadows such as the settlement of mooring buoys within the MPA. Annex 3 describes the potential of development of such a mechanism.

**Table 10: Identification of user-pay mechanisms**

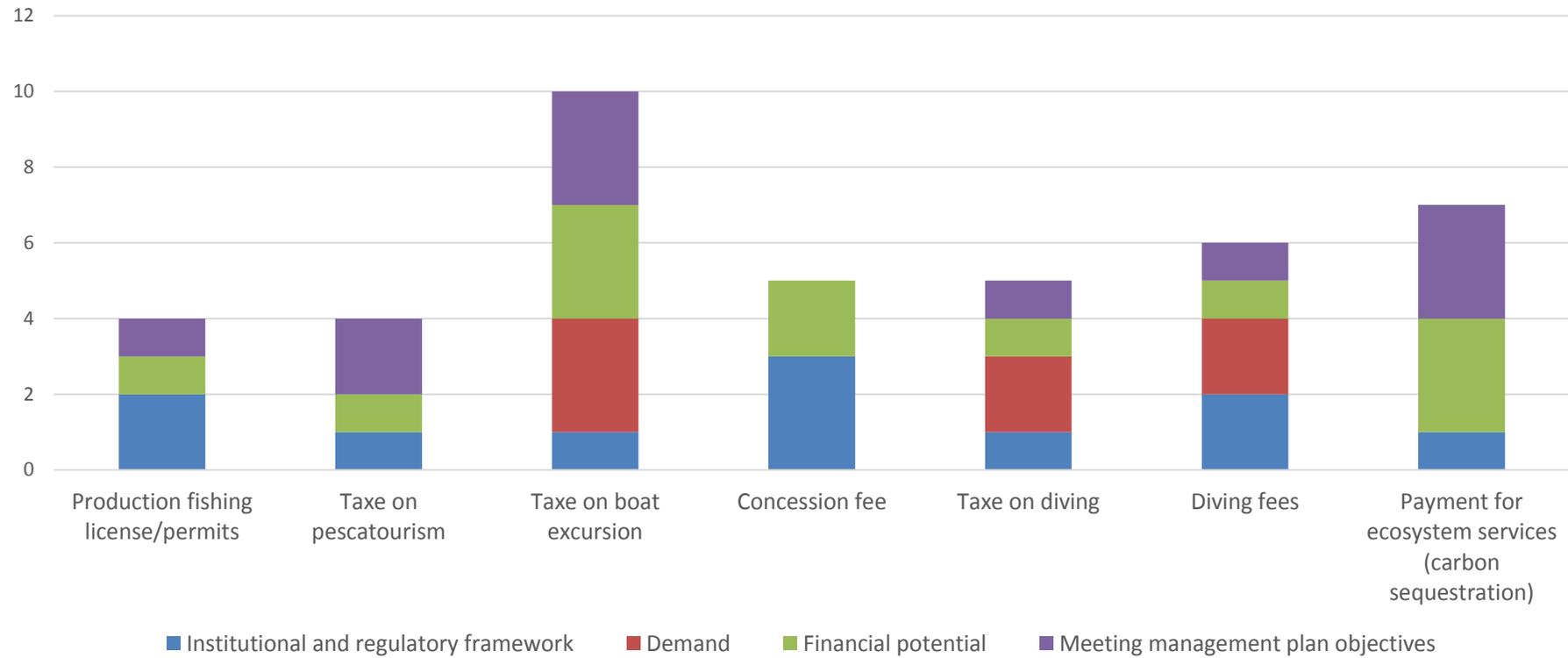
User	Use	User-pay mechanisms
Artisanal fishermen	Artisanal fisheries	Production fishing license/permits
	Pescatourism	Tax on pescatourism
Tourism operators	Boat excursions	Tax on boat excursions
		Concession fee
Hotels	Boat excursions	Tax on boat excursions
		Concession fee
Diving centers	Diving activities	Tax on diving
Divers	Diving activities	Diving fees
Sport fishing operators	Pescatourism	Taxes on pescatourism
All	Carbon sequestration	Payment for ecosystem services (carbon sequestration)

Once these mechanisms listed, it is important to assess their feasibility in light of the socioeconomic, institutional and political context of the MPA management, in order to clarify the feasibility of such mechanisms. Also, it is important these user-pay mechanisms are compatible with

the conservation objectives of the MPA. Indeed, having users in the MPA is not an end in itself and should not become an additional pressure for ecosystems.

Based on mechanisms description presented in the KaraburunSazani business plan, session of work with regional management team during the development of this business plan and interviews with local stakeholders, it was possible to evaluate the long-term feasibility of each mechanism based on four criteria individually scored on three points: institutional and regulatory framework, demand, financial potential and meeting the management plan objectives. The explanation of these criteria is presented in Annex 2. Results of this feasibility analysis are presented in the figure below.

Figure18: Feasibility of financial mechanisms in the KaraburunSazani MPA



### **3.1.2. Projections of future MPA revenues**

The estimates for users-pay mechanisms revenues as detailed in the Karaburun-Sazani business plan were fine-tuned in accordance with previous assumption regarding the development of tourism and fishing activities.

**Table 11: Details of potential financing mechanisms in Karaburun-Sazani MPA**

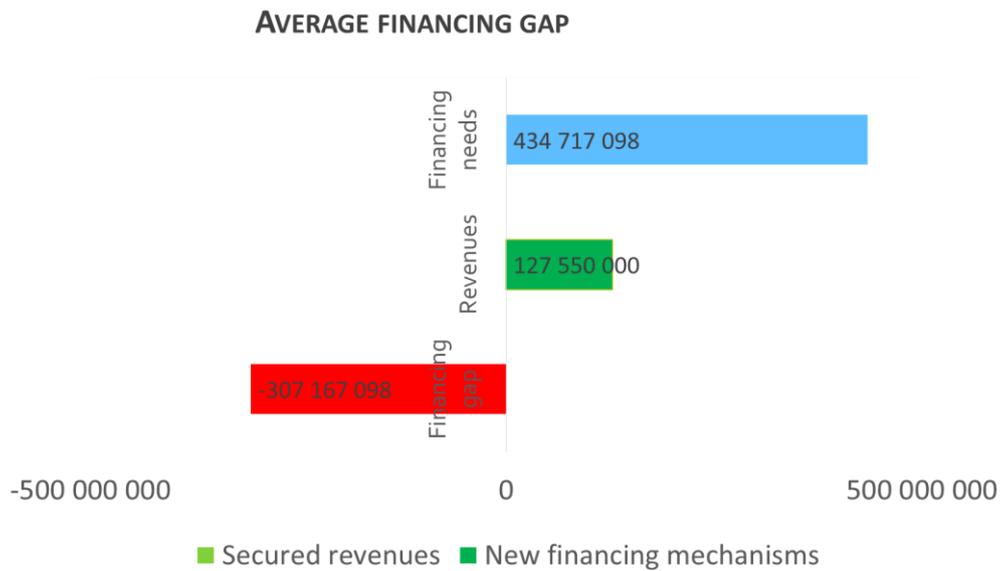
Financing mechanism	Payee	Potential number of payees (2015-2016)	Social acceptability	Technical feasibility	Price estimate/ unit	Potential annual revenues in 2017-2021	Potential annual revenues in 2021-2026
<b>Artisanal fishing license/permits</b>	Small-scale fishers	Around 55 licensed boats	++, ok if benefits highlighted	++	5,000-20,000 ALL/boat/year	275,000-1,100,000 ALL	275,000-1,100,000 ALL
<b>Tax on pescatourism</b>	Tourists	Around 200 passengers	++	-	500 ALL/tourist/day	100,000 ALL	140,000-175,000 ALL
<b>Tax on boat excursions</b>	Tourists	Around 22 000 passengers	++		500 ALL/tourist/day	11,100,000 ALL	11,100,000 ALL
<b>Tax on diving/diving fees</b>	Divers	Around 300-500 divers	++		500 ALL/tourist/day	150,000-250,000 ALL	375,000 ALL
<b>Payment for ecosystem services (carbon sequestration) – Voluntary markets<sup>9</sup></b>	Boats (pleasure boats, excursion boats)	Assuming an average occupancy rate of 80%, around 300 boats	+++	+	280 ALL/boat/day	84,000 ALL	84,000 ALL
<b>Concession fee</b>	Tourism operators, boat rental	4 large boats for excursion (capacity max. 30 people), about 30 small boats (cap. Max. 7 people)	+	++	30,000-150,000 for big boat, 10,000-50,000 for small boats (1%-5% of estimated turnover of a boat)	420,000-2.1 million ALL	420,000-2.1 million ALL
<b>Payment for environmental service (clean water for</b>	Aquaculture producers	4 companies	+, ok if benefits highlighted	-	50,000-200,000/farm	200,000-800,000 ALL	1 million-3 million ALL

<sup>9</sup>Voluntary markets assemble companies or private individuals who want to compensate for their greenhouse gas emissions, without these reductions being made compulsory from a legal point of view (Landreau, 2012)

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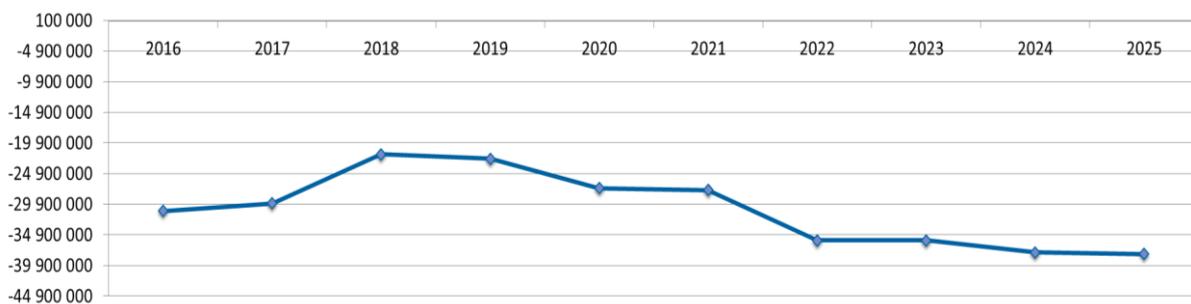
aquaculture)			and ecolabel developed				
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In line with these revenues projections made over 10 years, the business plan developed in 2015 was updated to highlight the financing gap that will have to be filled in by non-user-pay mechanisms (e.g. government’s budget allocations, private capital donations, corporate long-term contributions, debt-for-nature swaps, trust funds, etc.). Taking minimum revenue assumed for each user-pay mechanism, it is estimated that identified user-pay mechanisms, if they are all implemented, would provide MPA managers with an income covering 30% of estimated optimal management costs (Figure19 and Figure20). Results are presented in



detail in the table.

**Figure19: Estimated average financing gap after the implementation of user-pay mechanisms in the Karaburun-Sazani MPA**



**Figure20: Evolution of the financing gap**

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**Table 12: Estimated average financing gap for the optimal management of the Karaburun-Sazani MPA over the 2016-2025 period**

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Recurrent costs</b>	20 294 800	23 264 296	24 953 142	28 690 903	30 779 445	33 103 207	35 689 506	38 568 880	41 775 470	45 097 448
<b>Sub-total human resources</b>	5 520 000	6 970 000	6 970 000	8 830 000	8 830 000	8 830 000	8 830 000	8 830 000	8 830 000	8 580 000
<b>Sub-total maintenance</b>	14 400 000	15 912 000	17 593 200	19 463 162	21 543 750	23 859 398	26 437 421	29 308 353	32 506 332	36 069 527
<b>Sub-total other costs</b>	374 800	382 296	389 942	397 741	405 696	413 809	422 086	430 527	439 138	447 921
<b>Investment costs</b>	23 010 000	18 810 000	9 110 000	6 110 000	8 810 000	6 810 000	13 510 000	10 610 000	9 410 000	6 310 000
<b>Sub-total new equipment</b>	5 700 000	4 700 000			700 000	4 900 000	4 000 000	800 000		
<b>Sub-total infrastucture purchase</b>										
<b>Sub-total studies</b>	6 560 000	3 360 000	6 360 000	3 360 000	6 060 000	3 360 000	5 860 000	3 860 000	5 860 000	3 560 000
<b>Sub-total</b>	10 750 000	10 750 000	2 750 000	2 750 000	2 750 000	2 750 000	2 750 000	2 750 000	2 750 000	2 750 000
<b>Sub-total mission</b>										
<b>Sub-total offset measures</b>										
<b>Sub-total cofinancing</b>										
<b>TOTAL FINANCING NEEDS</b>	43 304 800	42 074 296	34 063 142	34 800 903	39 589 445	39 913 207	49 199 506	49 178 880	51 185 470	51 407 448

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	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Secured revenues</b>										
<b>TOTAL SECURED REVENUES</b>										
<b>New financing mechanisms</b>	12 329 000	12 329 000	12 329 000	12 329 000	12 329 000	12 329 000	13 394 000	13 394 000	13 394 000	13 394 000
<b>Artisanal fishing license/permits</b>	275 000	275 000	275 000	275 000	275 000	275 000	275 000	275 000	275 000	275 000
<b>Tax on pescatourism</b>	100 000	100 000	100 000	100 000	100 000	100 000	140 000	140 000	140 000	140 000
<b>Tax on boat excursions</b>	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000	11 100 000
<b>Tax on diving/diving fees</b>	150 000	150 000	150 000	150 000	150 000	150 000	375 000	375 000	375 000	375 000
<b>Payment for ecosystem services (carbon sequestration)</b>	84 000	84 000	84 000	84 000	84 000	84 000	84 000	84 000	84 000	84 000
<b>Concession fee</b>	420 000	420 000	420 000	420 000	420 000	420 000	420 000	420 000	420 000	420 000
<b>Payment for environmental service (clean water for aquaculture)</b>	200 000	200 000	200 000	200 000	200 000	200 000	1 000 000	1 000 000	1 000 000	1 000 000
<b>FINANCING GAP</b>	-30 975 800	-29 745 296	-21 734 142	-22 471 903	-27 260 445	-27 584 207	-35 805 506	-35 784 880	-37 791 470	-38 013 448

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## 6. Annexes

### Annex 1 : Financial mechanisms Mécanismes de financement mobilisables selon les biens et services rendus par une MPA

(Source : Conservation Finance guide)

Goods and ecosystem services		Potential financial mechanisms
Ecosystem services classification	Supported by the MPA management	
Provisioning services		
Coastal fishing	No	Resource extraction fees
Traditional fishing	Yes	Resource extraction fees, licence, biodiversity funds from companies
Use of genetic material for pharmaceutical and / or biotechnological use	No	Bioprospecting fees
Extraction of petrochemical products (oil and gas)	No	Resource extraction fees, fiscal instruments
Commercially valuable mineral extraction	No	Resource extraction fees, fiscal instruments
Raw material for the design of handicrafts	No	Resource extraction fees, biodiversity funds from companies
Cultural services		
Wildlife observation	Yes	Entrance fees
Landscape aestheticism	No	Entrance fees
Outdoor activities	Yes	User fees
Access to the beach	No	Entrance fees

Goods and ecosystem services		Potential financial mechanisms
Ecosystem services classification	Supported by the MPA management	
Cultural attractions	Yes	Entrance fees
Pesca-tourism	Yes	License, Entrance fees, User fees
Mooring	Yes	User fees
Scientific research	Yes	Entrance fees, licence, Bioprospecting fees
Services de régulation et de support		
Water quality regulation	Yes	Fiscal instruments
Climate change regulation	Yes	Fiscal instruments, insurance
Nursery for exploited areas	Yes	GEF, Biodiversity funds, licence
Protected species conservation	Yes	GEF, donations
Wave energy	No	License
Shield against erosion / storms	No	Insurances, fiscal instruments

## Annex 2 : Explanation of feasibility criteria

(Source : Dessane, 2015)

Criteria	Explanation
Institutional and regulatory framework	The level in which national policies, regulations and procedures allow the given financial mechanism and/or (if not in place) its development
Demand	Whether the stakeholders interviewed perceive and express an actual need for the mechanism(s) in question.
Financial potential	Importance of revenues generated by the mechanism.
Meeting the management plan objectives	Relevance of the mechanism to meet the management plan's objectives.

### **Annex 3: Potential development of a payment for carbon sequestration**

According to most recent estimates by Pergent et al., 2014, “the amount of the carbon stored in Posidonia meadows is estimated to range from 71 to 273 kgC/m<sup>2</sup>. Based on this value and estimating that an ecological mooring, for instance, could save the destruction of 5% of seagrass per year over 450 m<sup>2</sup> (average surface of turning basin for one mooring), by preventing anchoring in vulnerable seagrass meadows, it is possible to estimate that an ecological mooring could save between 5.8 tons and 22.5 tons of CO<sub>2</sub> released per year (surely, this value is given here as an illustration, but the upper estimate of 22.5 tons is consistent with estimates by Murray et al., 2011). While considering the budget for full installation and maintenance of an ecological mooring to be about 830 000 ALLs over 10 years, the price of a carbon credit for an ecological mooring project could range from 3 600 to 14 250 ALL. This credit also integrate substantial ecosystem services benefits, such as support for fisheries, regulation of water quality, regulation of coastal erosion, etc.

Costs for the installation of ecological mooring to stop anchoring could thus be borne by boats (pleasure boat, excursion boat) in the form of daily fee or by private companies that would purchase blue carbon credits through their financial support.