Consultation n°08-2019-SPA/RAC

Assessment of the Ecological Status and MSP preliminary initial assessment in VloraMarine Area (Albania) in the framework of the MSP Pilot Project supported by the Italian Ministry of Environment, Land and Sea (IMELS) within the cooperation agreement with UNEP/MAP

Final Report

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Foreword

The present Marine Spatial Planning (MSP) study is elaborated within the framework of the IMAP, the ICZM Protocol and the MSP Decision (Decision on the MSP Conceptual Framework) and are part of the MSP Pilot Project "MSP Pilot project in synergy with SUPREME and GEF Adriatic projects outcomes and to strengthen the EUSAIR Strategy, to be developed into the Adriatic relevant marine areas, subject to major pressures" implemented within the Bilateral Cooperation Contract with the Italian Ministry of Environment, Land and Sea (IMELS). The project is financed by IMELS and is implemented by SPA/RAC under the coordination of the UNEP/MAP Coordinating Unit.

Particularly, the present study is aligned with the GEF Adriatic project. Indeed The GEF Adriatic Project major outcomes are the establishment of a National Monitoring Programme in Albania and Montenegro and the MSP process support in both countries.

This report has been realized in order to support the realization of a Marine Spatial Planning approach in the Vlora area and to develop guidelines for MSP in Albania, within the framework of the IMAP, the ICZM Protocol and the MSP Decision (Decision on the MSP Conceptual Framework).

Barcelona Convention Contracting Parties decisions (Decision IG.17/6 on "Implementation of the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment" and the Decision IG.20/4 on "Implementing the Ecosystem Approach Roadmap") reflect the wish to strengthen cooperation and seek synergies with the EU initiative, the MSFD, to achieve a shared vision of "a healthy Mediterranean with marine and biological ecosystems that are productive and biologically diverse for the benefit of present and future generations".

Additionally, Marine Spatial Planning (MSP) is based on the allocation of marine space in order to achieve sustainable development, including the protection of marine biodiversity and the conservation of marine resources, along with social and economic objectives, by overcoming the single-sector approach that focuses on a particular use of the sea.

According to the European Commission (EC), MSP fulfills four objectives:

- Reducing conflict on access to maritime space;
- Reducing cumulative impact of maritime activities on the environment;
- Reducing coordination costs for public authorities; and
- Improving certainty and predictability for private investments.

In the Adriatic Sea, implementing the Ecosystem Approach and improving sub-regional management capacity through Marine Spatial Planning aim to restore its balance.

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A. List of acronyms

AFDW	Ash Free Dry Weight
CBD	Convention on Biological Diversity
DCM	Decision of Council of Ministers
EcAp	Ecosystem Approach
EC	European Commission
EIA	Environmental Impact Assessment
EO	Ecological Objectives
GEF	Global Environment Facility
GIS	Geographical Information System
ICZM	Integrated Coastal Zone Management
IMAP	Integrated Monitoring and Assessment Programme
IMELS	Italian Ministry of Environment, Land and Sea
IMOC	Inter-Institutional Maritime Operational Centre
IMPAP	Integrated Monitoring and Assessment Programme
MoTE	Ministry of Tourism and Environment
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
NAPA	National Agency of Protected Areas
NEA	National Environmental Agencyt
NSDI	National Strategy for Development and Integration 2015-2020
PSSAs	Particularly Sensitive Sea Areas
RAPAs	Regional Agencies of Protected Areas
SEA	Strategic Environmental Assessment
SPA/BD	Protocol on Specially Protected Areas and Biological Diversity

SPAMI	Specially Protected Areas of Mediterranean Importance
SPA/RAC	Specially Protected Areas Regional Activity Centre
SPMCPA	The Strategic Plan for Marine and Coastal Protected Areas
UNDP	United Nations Development Programme
UNEP/MAP	United Nations Environment Programme / Mediterranean Action Plan

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E. BACKGROUND ACTIVITIES DEVELOPED TO SUPPORT THE PREPARATION OF THE MSP PLANNING OF THE VLORA AREA

The ***Kick-off meetings with NAPA was held on 6 November 2019 in the presence of*** Anis Zarrouk, SPA/RAC GEF Adriatic & Bycatch Projects Officer, Zamir Dedej, head of NAPA and Nexhip Hysolakaj, head of Karaburun Sazan MPA. Focus of meeting was (i) to inform MTE about the Study and MPS objectives as well as (ii) to ensure cooperation of all national and local stakeholders to support project activities

A Questionnaire *(see Annex 2) was drafted and distributed (on 20 November) to all local and national stakeholders (see the List of Stakeholders in Annex 2) on baseline data and info for the MSP implementation in Vlora Bay;*

An introductory note explained how participants can concretely contribute to the evolving process of MSP implementation in the Vlora Bay. The questionnaire aims at the development of a multilevel and cross-sector governance system, based on a holistic approach and on an integrated management of the natural resources, risk's prevention and conflicts resolution among uses and users of the Vlora maritime area. Results of the questionnaire will be used to contribute to the analysis of main problems related to MSP development and implementation as well as to the development of a common MSP methodology for the targeted site.

The Introduction workshop of 26 November was a good opportunity to presents the project objectives and take notes on participant comments although a number of national stakeholders were missing because of the earthquake of 26 November. The main result of workshop was the consensus of all participants (including active local NGOS and university staff) on the need of MSP for Vlora within SPA/RAC principles.

The other important action that started from the first day of project was insertion of data in the maps and shapefiles. Annex 3 contains the Maps and Annex 4 contains the shape files together with respective lists of maps and shape files.

The full team (international and local experts) was present in Albania from 24 to 28 November, to include the partiicpation into Vlora 26 November Workshop, and had opportunity to discuss a full set of data collected and to design the content of both reports: ***Task2: Study Report and Task3: MSP Guidelines Report***

The information and views collected through 6 November kick off meeting, the 26 November workshop and the site visit supported the specification and focus of work plan.

There were additionally meetings organized between all experts of the project to clarify issues about common understanding of this multidisciplinary assignment. All experts were asked to collect any data, studies and maps they have, asked to also discuss about them. A common approach was agreed and related roles for each expert either related to data collection or contacting stakeholders. Since the project is a multidisciplinary one (multilayer data should be collected and included in GIS), the team made ***site visit to Vlora***, directly after kick off meeting to meet all relevant stakeholders to see what data/maps they have and what is happening recently in Vlora bay, to affect the project area. It was important to continue scientific discussion with local stakeholders like local planning authorities, regional developing agencies, resource users, CBO/NGO active in the area.

The information and views collected through kick off meeting and first site visit supported the specification and focus of work plan, in line with the ToRs and three main tasks assigned, which are linked to each other and mostly are developed simultaneously like the following:

Task1: Data Collection and mapping

The Consultant collected and analyzed all available published or not published studies and projects related to Marine and Coastal biodiversity, marine and coastal habitats, fisheries, aquaculture, hydrography, former and current contaminants, marine litter, current and future touristic and offshore activities, current and future marine traffic including ports. Then, it took further with the detailed programme indicated in the ToRs, Section 5.2. points A,B,C,D, from page 11 to 16. Most of the existing documents were found including those unpublished, which were approached through the experts networking.

The data collected supported preparation of maps and shapefiles. Layers of anchor points, City/Village, Marine Infrastructures, Bathymetry (line and polygon), Hydrograpgy, Road network were defined and digitized using topographic maps in scale 1:25000.

The layers related to Business Tourism, Boat Itinerary, Camping, Diving, Oil platforms, Tour boat, Sea Traffic, were defined in cooperation with the experts of the project team.

Identification of the aquaculture was done using Google earth images. Kml files digitized from Google earth were converted in shapefile polygon.

Map of tourism development areas (raster) provided by Ministry of Tourism and Environment was georeferenced and area with priority for tourism development was digitized as shapefile polygon.

CISM project (Technical Assistance Project for the Construction and Management of an International Sea Science Center in Albania) was source of information to find a biocenosis map as a raster. The map was georeferenced and marine habitats were digitized for the area of gulf of Vlora.

“Strategic Plan for Marine and Coastal Protected Areas” was used as source of information to define and digitized the information related to fishing zone, no fishing zone, no use of bottom, no use of hydraulic dredges, no use of towed gears, Posidonia.

Point shapefile of Cultural Heritages, Natural Monuments was generated using different maps (raster) provided by the experts of the team.

All the layers were projected in reference System “WGS 1984 ***UTM*** Zone 34N”.
The software used to generate the shapefiles and to integrate in GIS System is ArcGis 10.1.

Task2: Study report

This activity consisted on data analysis alongside with continuation of data collection and GIS maps preparations. The Study Draft Report entitled “MSP preliminary initial assessment of Vlora area in Albania” is drafted according to the “shopping list” of page 16 of the ToRs.Most of the work was focused on the analysis of the data and insertion of the data into GIS maps which is submitted to SPA/ RAC. After the comments that were collected in the Validation Meeting of 23 January the Consultant has revised the 2nd Study Draft Report to convert it into a Final Study Report entitled “MSP preliminary initial assessment of Vlora area in Albania”

Task 3:MSP Guidelines Report

The preliminary "MSP Guideline Report of Vlora" is also drafted and submitted together with Study Report "MSP preliminary initial assessment of Vlora area in Albania" as they are linked together, i.e. the "MSP GuidelineReport" is supported by "Study Report"; As indicated in the ToRs, the MSP report guidelines for the bay of Vlora consists of the following:

- Data collected in a database and layer maps and related analysis.
- A list of the different national institutions and stakeholders involved in marine and coastal conservation and management, their possible implication in the MSP process and where possible and already identified, the needs for improvement of their capacity on marine spatial planning and management.
- Identification of the needs and ways to improve the existing legal and institutional framework for marine conservation and marine spatial planning. Critical can be issues of law enforcement.
- Propose MSP guideline for Albania to fill the gaps, correct the mistakes done so far and pave the way for a sustainable MSP for Vlora with clearly articulated action plan, interventions and related costs.

The Final "MSP Guideline Report" is delievered at the same day as final draft of Study Report "MSP preliminary initial assessment of Vlora area in Albania". The comments collected from client and stakeholders as well as new data collected have consolidated the final version of MSP Guideline Report. Part of this assignment is also the constant consultation process and cooperation with all marine stakeholders (like MTE, NAPA, Ministry of Infrastructure, NEA, Albanian Institute of Transport, main ports, etc) in terms of (i)collecting additional information and (ii) collecting comments and ideas on Vlora MSP to include the ones provided in the Validation Meeting of 23 January 2020.

The Consultant has engaged ***several consultations that associated all project activities and products*** like following:

Returning meetings with relevant stakeholders

The Consultant understands that Ministry of Tourism and Environment is the main stakeholder to validate the products, but the stakeholder list will vary to other Ministries and local government focused on Vlora region national and local stakeholders. That is why the local experts had frequent visits to clarify and certify the data and collect comments and ideas.

Meetings with local users (fishermen, etc) during data collection

The Consultant met sea and coast "users" like fisherman and staff of port authorities to better understand what is happening and what will happen in project area in terms of development and current and future pollution sources and quantities. Also, enterprises like water and waste water ones were met to understand their position with wastewater discharges in the sea and solid waste that can affect the sea.

Consultation with SPA/RAC staff related previous studies and GIS maps

The Consultant established a constant link with SPA/RAC staff to collect all previous reports and GIS maps as the baseline of the study as well as for communication during project activities. It was

also sometime taken advise from SPA/RAC in case of problems related to data collection or identification of any important issue which were relevant to affect the study objectives as it was the case of including PSSA proposal within this assigment.

The ***SPA/RAC*** "**ADRIATIC REGION WORKSHOP ON PSSAs"** organized in Tirana on 10-13 December was a perfect opportunity to intensify this communication and to discuss marine planning issues with high relevance to this study. To note is the exercise of application for PSSA of Vlora MPA supported by the activities of workshop with participation of NAPA staff and the Consultant.

Consultation with Stakeholders related legal framework

The Consultant reviewed the legal framework and met local stakeholders to see what the law enforcement status is related to all issues that is subject and focus of the study concerning habitats protection and contaminants discharge reduction.

Validation Meeting for 2nd Study Draft report

Validation Meeting was organized on 23 January 2020 and was converted into an open discusion technical workshop to mention the following .

Three Presentations rich in data, ideas and maps :

- Preliminary initial assessment report of Vlora area in Albania
- Marine Spatial Planning Guidelines for Albania
- GIS as a tool for Marine Spatial Planning

30 participants to represent main national and local stakeholders to include users' associations (fisherman, aqcuaculture, diving, tourism) who were very interested to listen and to have a voice what created a healthy scientific and social debate for more than 3 hours.

The following conclusive remarks were made:

- The representative of UNDP indicated that this small project, realised in a short time, has brought important results that will be used in the near future for improving the knowledge and awareness on the marine environment of Albania.
- The representative of the Navy indicated its willingness to participate to the process and to make available all the documents existing in its service
- The representative of NAPA reiterated the need for further action, in terms of legal, institutional, planning and management, associated to specific field activities, reinforcing awareness and communication on the importance of the marine environment. He also thanked the government of Italy for its financial support to the project.
- The maritime transport expert confirmed that the project was innovative and will be used to replicate the approach in other part of the countries.
- The Prefect of the region confirmed its support to the process and of the need for further implementation to facilitate the sustainable development of the Vlora Area and the southern region.
- The representative of SPA/RAC thanked all the participants for their input and confirmed the continuous support of SPA/RAC and the Barcelona Convention for the country sustainable future.

Details of Validation Meeting are provided in Annex 2.2.

1. SECTION 1 - General description of the study area

- The Vlora County is one of the 12 counties of Albania, and it is divided into seven municipalities (Vlorë, Delvinë, Finiq, Himarë, Konispol, Sarandë and Selenicë). The municipalities are further subdivided into administrative units and villages with a total area of 2706 km2. Vlora county is the 7th largest county in Albania. As of January 2019, it has a population of 189.311 inhabitants with a very slight increase compared to the previous year. In the overall as a county there is the Institution of the Prefect as a central authority and also the Institution of the County Council as a Regional authority. The municipality is the first level of local governance while the County (qark) is the second level. There are some important issues to be taken in consideration while analyzing the stakeholders having activities and interest in the Vlora Bay and obviously related to the maritime space;

- Population movement (emigration and internal migration) is a multifaceted phenomenon: manifested with land abandon because of emigration abroad (Orikumi area); land occupation, sprawl, and abusive construction because of internal migration and lack of control (Novesela commune); increase of human pollution and wastes etc.

- Vlora municipality, has a coastline in both the Adriatic and the Ionian Sea. It is the third largest town of Albania and the second harbor. A description by sub sectors of the Vlora study area is provided in the following table.

Region/Qarku	Municipalities	Adminsitrative Units
Vlorë	Vlorë	Vlorë
		Orikum
		QendërVlorë
		Novoselë
		Shushicë
	Selenicë	Selenicë
		Armen
		Vllahinë
		Kotë
		Sevaster
		Brataj
	Himarë	Himarë
		Lukovë
		Horë - Vranisht
	Sarandë	Sarandë
		Ksamil
	Konispol	Konispol
		Xarrë
		Markat
	Finiq	Livadhja
		Dhivër
		Aliko
		Finiq
		Mesopotam
	Delvinë	Delvinë
		Vergo

Figure 1: Vlora area map including administrative units.

1.1. Geographic description

Vlora bay is located inVlora County (Albania), with coastline length about 36 km. The eastern coast of Karaburun peninsula starts from Pasha Limaniupto Cape Galoveci bypassing capes Kallogeri, Rraguza, Sevasini, Shen Vasili, Gjata, Dim Kushta and Shen Jani.

The main Physical features delineating Vlora bay, from the city of Vlora (east) to cape Galloveci (west), can be divided in three parts:

- the eastern side of the bay, oriented N-S, with 14 km of coastline and a coastal road separating the sea from a mountain with increasing altitude from north (736 m at 2,5 km of the coast) to south (1136 m at 5 km);
- the southern section, 6 km long and oriented WSW-ENE, has a coastal road separating the sea and Orikumi lagoon. This southern bay is named Dukati bay;
- the western side of the bay, oriented WSW-ENE, is also the eastern side of Karaburuni peninsula which is relatively lower than the western side and has a larger coast with several gravel beaches: one at cape Kallogerit, four in the bay of Rragueza, three between cape Rragueza and cape Sevasini, two between cape Sevasini and cape Shen Vasilit, one before cape Gjata, one after cape Dim Kushta and one bigger one with military installations and a jetty after Cape Shen Janit; On this gravel beach one can observe the impact of big mined holes. From the bay of Veriut to cape Gjuhezes, the coast is formed of low jagged rocks with low bushy vegetation shaped by the wind. It is about 6 km long. A coastal trail gives access to the northern tip where is located a military base. The slopes are less important than on the eastern side of the peninsula, culminating to the north at 733m (Mount Hilqe) and to the south at 826m (Mount Koreta);

The geology pattern, on the eastern side of the bay is a succession of rocks of different ages, from Jurassic and Neogene (Aquitanian, Helvetian, Tortonian and Pliocene) eras.The southern part is mainly constituted of Pliocene rocks and recent sediments. The eastern coast is from the Upper Cretaceous era, essentially composed of limestones.

Terrestrial environment, on the eastern side of Karaburuni has more areas deforested by fires among a landscape of maquis with a few pines and cypresses shaped by the wind. It is not as wild as the western part of Karaburun however the vegetation comes very close to the sea level. Small dry river canyons fall into the sea almost vertically.

Orikumi lagoon is nearby a restricted military area; it covers around 130 ha, has a maximal depth of 3 m and is permanently in communication with the sea by a 50 m long canal. In the southern portion of the lagoon, there is a limited input of fresh water. The lagoon is assessed not to be polluted by nitrates and pesticides.

The S-SW borders of the lagoon are composed of maquis associations: *Pistacia lentiscus*, *Myrtus communis*, *Phyllirea* sp. and the S-SE of associations of *Pragmitetum communis*, *Salicornietum fruticosae*, *S. radicantis*, *Juncetum maritime*, *J. acuti*, *Limonietum* sp. The lagoon phytoplankton population is abundant and similar to that of Butrinti, mainly composed of diatoms *Cheatoceros* sp., *Cyclotella* sp. and *peridinates Prorocentrum* sp. etc. The zoobenthos is composed of crabs *Carcinus aestuari* and molluscs *Cerithium vulgatum*, *Murex trunculus*, *Muricopsis inermis*, *Bulla striata*,

Venerupis pullastra, *Cardium edule*, etc. Fisheries in the lagoon are not very important. Mainly eels *Anguilla anguilla* ,*Venerupis pullastra* and *Sparus auratus* are fished producing 15 kv/year.

Vlora Bay is a quasi-enclosed water area which collect the pollution coming from open sea. The moderate West and North-West winds drive the pollution factors at the end of the bay serving as dumping pocket. In addition of that, the small bays during the coast line serve as pollution collectors for the above-mentioned reasons. That is why building up a watching and monitoring network is very useful to prevent the pollution especially oil slick to enter in the bay. The depth in the bay reaches 54 meters in SE of Rogozhe (Raguza) bay. The 50 m isobathic line comes 0.5 cables near to cape of Kala and starts going seaward reaching 6.5 cables in western quay of Vlore's port. There are about 7 shipwrecks, since WW II and later, which compound an historical sites and biodiversity for created during the years. They are: "Rosandra 3", "Regina Margherita", "Intrepido", "Rovigno", "Lucian", "Stampella", "Andromeda", "Po"; Also, these historical relicts are subject of continuous looting and pillage by metallic and treasure hunters which during their activity causing pollution as well. It is important to highlight these cultural and touristic patrimonies be under certain custodia and /or protection to allow for wise use of their touristic and historical values.

The marine environment of the Vlora bay reveals a coastline which is mainly rocky with small gravel beaches except the southern part which is sandy and the centre of the bay which is filled by sand and mud. The maximum depth in the central part of the bay is 55 m. On this substratum, there is locally an important coverage of algae and phanerogams (mainly *Posidonia oceanica*, *Zostera* sp. and *Cymodocea nodosa*). Large *Posidonia* sp. meadows, ideal nursery areas and swell shields, as well as *Cymodocea* sp. are seen in shallower depths on the eastern side of Karaburuni. Both *Posidonia* and *Cymodocea* sp. are protected in the Mediterranean Sea by law since 1988.

The first MPA in Albania was proclaimed on 28th April 2010. Embracing the coastal and marine area of Sazan Island – Karaburuni Peninsula with the National Marine Park status, it covers 12,570 ha.

Karaburuni Peninsula runs along the western part of Vlora Bay. It covers 62 km2 and separates the Albanian coast of the Adriatic Sea from the Ionian Sea. A narrow sea channel, named Mezokanali (in English: middle channel), separates Karaburuni from Sazan Island. Sazan Island is 4.8 km long, 2 km wide, and has a surface of 5.7 km2.

Below there are presented in brief the overall features of these main geographical sites and their particularities in composition of terrestrial and marine habitats. The description is extended in the presentation of terrestrial habitats for a wider understanding on the surrounding areas where diving activities can take place as well as to provide somehow an overview on the infrastructure and accessibility facilities.

Figure 2: Karaburuni Sazan National Park and Marine Protected Area.

The area of Rreza e Kanalit encloses about 30 km of coastline and extends from Bristani bay to Dhermi beach. It is part of the District of Vlora.Except by sea, the only access to the coast is North (through the military base of Pashalimani to Bristani bay) and South (Dhermiu). The landscape is impressive, with limestone cliffs falling into the water. In the backside a succession of summits very close to the coast such as mount Flamuri (826 m in altitude, 1.4 km to the coast), Sinan Dukes (817 m, 1.5 km), Kollovockes (1227 m, 4 km), Shëndëlliu (1499 m, 3.5 km) and near Palasa is Cika (2043 m, 5 km). From Cika Mountain, important masses of fallen rocks, forming locally a deltaic formation of rocks, fill some valleys which are only flooded during important rains. Many canyons (dry torrents) continue in the sea. The slope is sometimes abrupt and keeps on at great depths. A great number of caves can be seen by boat with freshwater percolating. Small bays with sand and gravel pocket beaches are generally found at the end of the marine canyons. The first pocket beach north of Dhermiu is in Valamir bay and has an old building for tannin exploitation with oaks; the largest beaches are at Grama and Llovizi beaches.

This part of the coast is mainly constituted of Upper Cretaceaous limestones and in some places of Upper Eocene (marls, conglomerates) and Oligocene (biogenic limestones). The most scenic Llogara National park in the Cika Mountains is covered with natural pine forest and has the most unspoiled seascape of the Adriatic. Along the coast, the vegetation is not very dense (mostly deforested) and generally low, except in some places, such as at the bottom of temporary rivers or around springs where maquis (with oaks and cypresses) can be observed. The area seems to have been burnt numerous times. The coast is incised with sinuous canyons which sometimes end up by grottoes which generally have freshwater springs percolating underwater or cascading into small ponds. Further south, the coast has more gentle slopes covered by oaks; in a small bay is an ancient ruined house where one can see the remains of acorn exploitation for tannin and pig food.

The sometimes-sinuous canyons end up by grottoes which generally have freshwater springs percolating underwater or cascading into small ponds. One grotto has a sculptured fresco, dated from the early Christian period, of a young girl seized by Dionysus. Another dome-shaped grotto is named Pigeon's cave as it’s shelter of wild birds. Some small bays have sandy beaches. The most interesting one is Grama bay. The lower part of the southern cliffs of this particular bay is covered by inscriptions (ex voto), some dating from the slavery period in the ancient Hellenistic period; one can also find on the same site an ancient quarry behind the coastal cliffs.

The canyons and caves often inaccessible represent an ideal habitat for monk seals which were reported in the area in 1982. These special habitats host freshwater fauna (brackish water fishes, shrimps, kingfishers, dragonflies, butterflies, mosquitoes, bats). Freshwater resurgence happens very often in the caves and along the canyons. The high vertical cliffs are suspected to be a perfect habitat for pelagic seabirds.

The underwater environment of the long sandy beach north of Dhermi has a white sand seafloor with *Posidonia* sp. and *Cymodocea* sp. at an average depth of 10-20 m. Along northern, the rocky rugged cliffs host mainly Cystoseira alga, while the more protected canyon walls have a flora and fauna very similar to those seen in western Karaburun with *Cystoseira* sp. algae, coralligenous "trottoir sidewalk" formations, sometimes over a meter large, built by red corallinaceae algae (the most interesting species of red incrusting algae *Lithophilium tortuosum*) grazed by Patella sp. , in sciaphilous (dark) areas a large number of red and orange encrusting sponges such as *Crambia* sp. cover the rock walls, the infralittoral is mainly composed of *Cystoseira* sp. with *Padina* sp., *Acetabularia* sp., *Wrangelia* sp., green anemones and pig tooth corals *Balanophyllia europea* in beaten areas grazed by sea urchins (making holes in the soft rock) and fish *Sarpa salpa* and

Peyssonnelia sp., *Halimeda* sp. and *Udotea* sp. in calmer and deeper areas. The depth increases very rapidly and *Posidonia* sp. and *Cymodocea* sp. start to grow in protected areas at 10-20 m deep. The sea bottom generally shows the erosive action of waves in the canyons (ripple marks and gradient in the size of gravel at the bottom of the cliff). The fish to be seen in the canyons are *Mullus surmuletus, Diplodus sp. Corisjuli, Serranus cabrilla, Anthias anthias.*

Thus, the underwater coastal environment and fauna is quite diversified and relatively abundant especially along the Kanali area which is a good fishing area for spear gun, lines and trawls at greater depths. Trawling is performed at around 230 m to catch *Merluccius merlucciu,.Trachurus trachurus, Parapenaeus longirostris, Mullus surmuletus, Exocetus volitans*. With lines, one catches Dentex sp., scombrids, groupers and lobsters. Spear fishing and illegal dynamite fishing has been recorded in the area. Large groupers are very appreciated especially by foreigners. However, they become much rarer as other rock fishes since fishing is badly controlled during the last years.

Archaeological remains (amphoras and anchors dated from 2C BC and middle-age period) are located in proximity to Grama bay and Palasa. Ancient quarries can be seen in Grama bay. These historical remains could also be touristically attractive for underwater explorers.

Karaburuni Peninsula, a rocky arm 16 km long and 4 km wide, is part of the district of Vlora.The northern and western coasts are 14 km long running from Cape Galoveci to Cape Gjuheza including a disaffected military base, then NNW to SSE from this Cape to Bristani bay (Orso bay on the Russian map 5384) where is located an abandoned military building and nearby a semi sinked commercial ship. The slopes are locally very steep on the western side of the peninsula, culminating in the central part at 825 m at mount Flamuri, in the north at 733 m (Mount Hilqe) and in the south at 839 m (Mount Koreta). The western coast of Karaburuni, incised by deep canyons (seasonal torrents) ending rarely (three times) in gravel or sand pocket beaches, is characterized by high vertical cliffs diving underwater at great depths. The bay of Bristani hosts an abandoned military building, a small jetty and several bunkers in its steep cliffs which are cut by canyons entering deeply into the coast. Nearby there is a crashed commercial ship. These cliffs are quite eroded and numerous caves (mostly underwater) can be seen where freshwater springs often percolate. There are fewer marine canyons than in Kanaliarea. The main part of the peninsula is composed of Upper Cretaceous lime stones (dolomitic, with rudists or globotruncana) and some formations of Upper Eocene (marls and conglomerates) or Aquitanian (limestones associated locally with conglomerates and marls).Terrestrial environment represents mainly Mediterranean maquis with oaks.Marine environment on the western side host a rocky substrate which prolongates the steep coastal cliffs. The wave swept supra-littoral has cyanobacteria dying in dark the rugged cliffs and grazed by *Littorina* shells, the mid-littoral is characterized by calcareous algae of *Lythophillium sp*. (the most interesting species of red incrusting algae *Lithophilium tortuosum*) forming a platform more than one meter large grazed by Patella sp., the infralittoral is mainly composed of *Cystoseira sp.* with *Padina sp. Acetabillaria sp*. In beaten areas grazed by sea urchins and fish *Sarpa salpa* and *Peyssonelia* sp., *Halimeda* sp. and *Udotea* sp. in calmer and deeper areas. Patches of *Posidonia oceanica* are seen in protected areas at 15-20 m deep on rocky platforms along the slope or at greater depth up to 30-40 m according to our diving observations made at the tip of western Karaburun. Both *Posidonia* and *Cymodocea* sp. are protected in the Mediterranean Sea by law since 1988. In grottoes at about 40 m deep, red cartilaginous algae Fauchea sp. are exuberant and very often seen with brightly coloured sponges. Echinoderms are also present with holothurians, sea urchins, sea stars (cushion stars), and ophiurians. The underwater coastal environment and fauna is quite diversified and relatively abundant especially on the western side of Karaburun. Trawling is performed at around 230 m to catch *Merluccius merluccius, Trachurus trachurus, Parapenaeus longirostris, Mullus surmuletus*. Spear fishing with bottles has been observed during our mission.

Large groupers are very appreciated especially by foreigners. However, they become much rarer as other rock fishes since fishing is badly controlled during the last years after the restricted area was open to people. During our dive at the NW tip of Karaburun, we saw the following fishes (most of them were in mating season with brilliant patterns): *Diplodus sargus*, *D. vulgaris*, *D. annularis*, *Serranus cabrilla*, *Spicara moena*, *Coris* sp., *Thalassoma pavo*, schools of *Boops boops*, in cavities were *Anthias anthias*, *Phycis phycis*, large groupers *Epinephelus* sp. and large moray eels quite aggressive.

The canyons and caves often inaccessible represent an ideal habitat for monk seals which were reported in the area in 1982 then more recently in 2019 (to be confirmed). Some of these caves are monumental (Haxhi Aliu cave up to 50 m high) with stalactites along the walls and hosting freshwater fauna (kingfishers, mosquitoes, bats), such as the one located in the bay of Veriut. Freshwater resurgence happens very often in the caves and along the canyons. The high inaccessible vertical cliffs are ideal for nesting pelagic seabirds. Shipwrecks located along the western coast of Karaburun are also touristically attractive for underwater explorers.

Sazani Island is located, about 10 km of coastline. It has an ellipsoid from oriented NNW-SSE with a length of about 4.8 km and a maximum width of 2 km. It culminates at 345 m over Gryke e Djallit. The western side is characterized by high vertical cliffs which are incised by deep canyons extended by caves mostly underwater as has been observed in Karaburuni. The most important canyons are at cape Pellumbave and at Gryka e Ferrit. On the eastern side, the coastline is lower and is formed in the SW by slanted folds of limestone plunging into the sea (comparable to those seen in Kakome bay).

The western part of the island is composed of Upper Cretaceous rocks (massive limestones or with rudists and globotruncana) and the eastern part is composed of rocks of Burdigalian age (lithographic limestones).Terrestrial environment of the Island (especially the western part) is covered with shrubs and herbaceous vegetation; Some portions of the original natural forest (*Cupressus* sp., oaks) survive in the eastern part. Wild pigs and rabbits are supposed to live on the island.Apart from military settlements, orchards (orange trees *Citrus* sp., and mostly *Oleus* sp.), bunkers in the eastern side and forested areas recently burnt, most of Sazani island's environment is preserved and one can still find patches of the original Albanian vegetation (maquis and original Mediterranean forest) which grows up to the edge of the coast.

On the western side a rocky substrate is found prolonging the island, some patches of *Posidonia oceanica* are in protected areas where the depth does not increase too much such as observed along Karaburuni. On the eastern side are seen one long gravel beach at the bay of Shen Nikolla and a smaller one at the bay of Japrak. Posidonia beds are found closer to the coast at shallower depths. A lot of munitions from the WWII as well as from the turmoil of 1997 are found along the coast at depths of 10-15m. Due to its military status the underwater coastal environment of the island has not yet been explored by scuba divers. From the dives done during the UNDP (Albania) 2018-2019 Missions it has seen a quite diversified and relatively abundant fauna and flora mostly comparable to what has been observed in Karaburun.

1.2. Human activities

1.2.1 The main recorded features, infrastructures and human activities are as follow:

- Fishermen are trawling in front of Vlora, at the tip of Karaburuni, along Sazani Island and the coast up to Vjosa River delta with trawls. They catch, between 80 and 250m depth, *Merluccius merluccius, Trachurus trachurus, Parapenaeus longirostris. Mullus surmuletus.*

- Shipwrecks (three signaled in Vlora bay but one was not possible to be located and dive) and two ancient quarries (one located north of Pasha Limani has sculptured red heads from the classical period) on the eastern coast have been reported in the area; these historical remains could also be touristic attractive for underwater explorers.

- Eastern part: road, housing, restaurants and bars in concrete, small enterprises often built too near to the coastline; the coastal dynamics are threatened by erosion. Cars drive on some beaches compacting the sand; a new fishing port is developed at the location between Treporti and Vlora city.

- Southern part: road, housing, fishing at sea and in the lagoon. Farmed lands (orchards) start in the surroundings of Pasha Limani and Orikumi, whereas in the nearby is located ancient Oriku, founded in the 5C BC by settlers from Euboea. During the roman period, it was a strategic naval base taking part in the wars between Caesar and Pompey. Numerous shipwrecks of that period are supposed to lie in the bay and lagoon where most of ancient Orikos is still submerged. The archaeological importance of the remains (which are mostly still underwater) is assessed to be greater than the ancient town of Butrinti.

- Western part: military track, Karaburuni has always played a protective role in Vlora's history as an Adriatic port. The main military base is at Pasha Limani (submarine base), bunkers and military buildings are essentially on the eastern side except for the big canons and bunkers at the tip of the peninsula. The inner part of the peninsula is desolate and waterless; one can only find shepherds with their flocks. The only accessible parts of the coast are by road from Orikumi up north to the military position at Cape Gjuheza. A number of potential shipwrecks (military and commercial vessels) are lying abandoned along the small beaches inside the coast of Karaburuni (facing Vlora bay). Several aquaculture sea cages are installed and operate recently along the western side of Vlora bay, due to the very good wind and wave protection.

- Along the coast acorn has been traditionally collected from the oaks (for tannin and pigs' food). There are archaeological sites in Grama bay and Palasa. On land, the main historical sites are: Palasa, below which Caesar landed in the roman civil wars and Dhermi with mostly ethnic Greek inhabitants, with churches worth visiting dated l3C to 16C.One commercial activity along the Kanali area is professional fishing (lines, trawling around 230 m to catch *Merluccius merluccius*, *Trachurus trachurus*, *Parapenaeus longirostris*, *Mullus surmuletus*) and occasionally illegal spear fishing with bottles by tourists. The farmed areas are around Palasa (which could be an interesting stop for trekkers) and around Dhermi (olive trees, citrus sp.). The only accessible parts of the coast are by road from Dukati through a scenic road climbing up steeply through Llogara pass at an altitude of 1050 m. It descends through a winding breath-taking series of hairpins up to Palasa and Dhermi.

- On the coast, a disperse number of resort places located on the beach with small docking facilities has been built recently and managed by locals. Gravel is collected from the beach however the upper beach is not impacted by erosion according to the line of bunkers (good reference for beach erosion). Bunkers are left on the beach and have been painted originally.

- Human activities in Karaburun have always shown to play a protective role in Vlora's history as an Adriatic port. The main military base is at Pasha Limani (submarine base), bunkers and military buildings are essentially on the eastern side except for the big canons and bunkers at the tip of the peninsula. The bay of Bristani, where a military base used to be settled, hosts several bunkers in its steep cliffs. The main commercial activity around Karaburun is professional fishing (trawling around 230 m to catch *Merluccius merluccius*, *Trachurus trachurus*, *Parapenaeus longirostris*, *Mullus surmuletus*) and occasional spear fishing with bottles. Large groupers are very appreciated especially by foreigners. The inner part of the peninsula is desolate and waterless; one can only find shepherds with their flocks. The only accessible parts on coast are by road from Orikumi up north to the military position at Cape Gjuheza and by trail in the central part of the peninsula and up to Bristani bay.

- Black patches of sulfurous underwater sources were observed in several areas at a depth around 15m. The western side of the island and the pass separating it from Karaburun is a good fishing area for trawls. Numerous shipwrecks (mainly on the western coast), amphoras close to cape Shen Nikolles on the eastern coast have been reported in the area; these historical remains could also be touristic attractive for underwater explorers. Such as in Karaburun, the huge canyons and caves represent an ideal habitat for monk seals (*Monachus monachus*) whereas the high inaccessible vertical cliffs are ideal for nesting pelagic seabirds.

- Human activities in the island (Sazani) relate to main defense installations both of Albanian and Italian navy (military base restricted area). The island formerly called Sessano was already an important military base in 1915 when it has been given to Italy accompanying the town of Vlora during the secret Treaty of London. Most settlements are built in the centre of the island in prolongation of the canyon of Gryka e Ferrit, crossing the island up to the well protected harbor on the bay of Shen Nikolla. Trails follow the eastern coastline along bunkers and canyons. Some parts of the NE coast (from cape Verior to cape Mixho) seem impacted by dynamite explosion (military purposes). The main commercial activity along Sazani Island is professional fishing (trawling at about 84 m to catch *Merluccius merluccius*, *Trachurus trachurus*, *Parapenaeus longirostris*, *Mulus surmuletus.* Some fishermen catch groupers and rock fish by lines. Recently, the island was declared a touristic site and visitors are allowed to access the site with touristic boats coming from different starting points located along the Vlora Bay.

The table below presents the different identified units and activities along the coast of Vlora bay. For each of them, one can find a short description of the main features and a preliminary list of impacts on environment or potential risks for the marine environment.

Table 1- Main features, activities and risks in the Vlora area.

Land areas	Main features	Impacts/risks
Vjosa river and mouth and Narta lagoon	Vjosa river is the only river of the area and the northern limit of the study area. The river and the surrounding areas constitute a coastal alluvial plain, with a low sandy coast subject to accretion or erosion according to the river flow and sediment transport. Vjosa river and the Narta lagoon are part of a declared Protected Landscape The whole site has been identified as an Important Bird Areas (IBAs) by Birdlife International. It is also listed as a site of interest by the RAMSAR Convention. Narta Lagoon is located in the north-western part of Vlora district, Adriatic Sea (geographical coordinates: 40° 32' N, 19° 28' E l). Narta is one of the largest lagoons in Albania with an area of about 3000 ha. The maximum depth is 0.9 m with an average of 0.7 m. Water exchange with the sea takes place through a channel with reduced water input (1-5 m3/sec) during the tide. Because of the reduced water exchange, shallow depth and intense evaporation, the water surface area of the lagoon is reduced by up to 30% during the dry season of the year. At present, 1/3 of the total surface is occupied by saltpans. Narta lagoon communicates with the sea through two artificial channels, a northern and a southern one. Connected to the lagoon there is the biggest saline exploitation in Albania, and is an interesting described wetland from the Ramsar Convention. Fishing activities in the river are mainly for subsistence and realized by the inhabitants of the different villages. At sea, according to the existing legislation, fishing is forbidden over a 2 km radius around the mouth of the Vjosa River.	Coastal erosion Risk of sea level rise Plan for an airport Plan for a tourism development

Vlora City	The city is located on the eastern side of the bay of Vlora and the foothills of the Ceraunian mountains, facing the Strait of Otranto (about 130 km between Albania and Italy - and located between the Adriatic and Ionian Seas). The area is profoundly affected by the sea and experiences a Mediterranean climate with hot, dry summers and cool, wet winters.	Sewage water and rainwater outflows are running in the bay and the quality of the water for tourism activities could be occasionally problematic, as well as the quality of fisheries and aquaculture products.
Vlora accessibility	It is served on the seaside by three main ports and multiple points for departure of nautical and tourism activities (see next section). On the landside, it is served by road with the SH8 Highway and the A2 representing a section of the Adriatic-Ionian corridor. Vlora is connected by train with Tirana, via Durres.	An airport is considered, but the proposed site is inside Narta lagoon, a protected landscape.

The ports of Vlora Bay	The coast of Vlora includes 3 maritime traffic ports and 2 military ports. The maritime traffic ports are, from North to South: -the port south of Narta beach Porti y Peshkimitfor fisheries and nautism, - the port of Petrolifera Italo-Albanese in Vlora is the nation's major export port for crude oil – about 200 thousand tons in 2008. Operating in a new position since 2009, it both realizes the imports of petroleum products including LPG and the exports of crude. On land is stored LPG, crude oil, and refined products for a 30 years period for energy supply to the country - the port of Vlora (Porti Vlora), for passengers ferries, being the second port for the entries in the country. The maritime traffic, for tankers, Ro/Ro (Roll on / Roll off), passengers, merchandises and fisheries represent an important number of port calls (in and out), has recorded about 1300 movements in 2014 and more than 2350 in 2018, a rate of increase that could create problems in the near future. Most of the ships are transiting from the coast of Vlora city to the offshore Adriatic via the channel between Sazan Island and Karaburun peninsula, Accidents and pollution could occur, endangering the marine life and reducing the attractiveness of this coast for tourism. The two military ports are the port of Pasha Limani, at the South western bottom of the bay of Vlora and the port of Sazan, on the island of Sazan, recently open to nautical access due to the creation of the Karaburuni-Sazan National Park.	Accidental pollution from oil and chemicals, in relation to maritime and land transport, processing and distributing oil products. Risk of accident between all kinds of maritime traffic: products and goods, passengers, fisheries and tourism
The coastal sea access points	Multiple access to the sea have been developed along the eastern coast of the bay of Vlora, mainly in relation with hotels (such as the Paradise Hotel) or restaurants facilities, providing services and in particular boats for transit to the National Park of Karaburun-Sazan.	In addition to the previous maritime traffic, the summer season and numerous weekends all over the year can sea and important movement of small boat between the eastern coast of Vlora bay and the national Park of Karaburun-Sazan, adding to the risk of collisions

Orikumi lagoon	Orikumi Lagoon is located in the Southwestern part of Vlora district (coordinates 40°19'N, 19° 25' E) with an area of 1500 ha. This lagoon has a maximum depth of 3m and is connected to the sea solely by a 50m long channel. Because of the mixing of lagoon water with fresh water (from a source of fresh water in south-western side of lagoon) salinity of water in various sites varies from 15 to 27 ‰. Potential Special Protected Areas (Barcelona Convention) Birdlife International has classified the lagoon as Important Bird Areas (IBAs) of lesser importance	Being at the southern bottom of the bay, with limited circulation and potential accumulation of pollutants and marine debris, the lagoon could face eutrophication and algal bloom, endangering or limiting the tourism, fisheries and aquaculture activities.
Sazan island	This State owned island includes a military base and a military harbour. The island is mainly covered by Mediterranean forest and scrubland (guarrigue) and surrounded by a marine protected area, except in front of the harbour.	Risk of fire Risk of coastal pollution Risk of over-frequentation
Karaburuni peninsula	The peninsula is state owned and access is restricted, but some agricultural activities have been agreed upon. It has long time been used as a military base and there are numerous remains of military settlements and activities. The area is mainly covered by Mediterranean forest and scrubland (guarrigue). The coast is mainly abrupt with high cliffs, small bays and caves .	Risk of fire Risk of coastal pollution Risk of over-frequentation
Vlora bay marine area	Maximum depth of 55m, average depth of 25m, Tide, maximum of 0.5m Current south to north offshore, counter current in the bay, speed strongly dependent on the strength of the wind Swell could reach 4m during storms Numerous activities and in particular maritime traffic, fishing, aquaculture and tourism	Coastal erosion mainly in the north eastern part, Accumulation of marine debris and pollutions in the southern part of the bay, sanitary risk Risks of accidents due to maritime traffic

2. SECTION 2. Legislation, institutions and stakeholders

The basis for the legal framework is the Albanian Constitution (declared in 1991, revised in 1998, after the ’97 turmoil), which recognizes the care for the environment as an important element of the Albanian sustainable development.

More specifically, in its chapter VI, Article 56, it recognizes the right on information on the state of the environment and its protection, among the basic Economic, Social and Cultural Rights and Freedoms. In its Chapter V, Article 59, it recognizes “a healthy and ecologically adequate environment for the present and future generations” and “rational exploitation of forests, waters, pastures and other natural resources on the basis of the principle of sustainable development” among the principal social objectives of the Albanian State.

As can be seen in the following paragraphs, Albania is strongly committed to conventions and agreements related to nature conservation, sustainable development and management of natural resources. The two following tables provide the main instruments to which Albania is Party at the international level and at the regional and European level.

Table 2: Albania commitment with international instruments.

United Nations Convention on the Law of the Sea, Montego Bay, 10 December 1982.	In force 6 November 1994, ratified on 23 June 2003
Convention of Biological Diversity, Rio de Janeiro, 5 June 1992, entry into force: 29 December 1993	Albania is a party to the CBD since 5 January 1994 and ratified it on10.11.1996
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar)	Came into force for Albania on 29 February 1996
The World Heritage Convention	Ratified by Albania on 1979

Table 3: Albania commitments with regional and European Instruments.

The Convention on the conservation of European wildlife and natural habitats (No 104, Council of Europe), (Bern Convention)	Ratified by Albania on 1998
Convention “On the Conservation of European Wildlife and Natural Habitats” (Bern Convention)	Ratified by the Albanian Parliament by the law “On the ratification of the “Convention on the conservation of European wildlife and natural habitats (Bern Convention)”, published in the Official Journal no.7, dated 4.4.1998(page 251)
Convention “On the conservation of migratory species of wild animals” (Bonn Convention) and its Agreements for Cetaceans (ACCOBAMS), European populations of bats (Eurobats) and conservation of African-Eurasian Migratory Water birds (AEWA)	Albania has acceded by the law no.8692, dated 16.11.2000 “On the accession of the Republic of Albania to theBonn Convention “On the conservation of migratory species of wild animals”and agreements of this Convention”, published in the Official Journal 43, dated 13.11.2000(page 1936)
ESPOO Convention (Finland) "On Environmental Impact Assessment in a Transboundary Context."	Albania ratified the convention on 4 October 1991. Following Albania ratified the amendments and the protocol

Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus,1998)	Ratified by Albania on 2000
CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, D.C., on 3 March 1973, amended at Bonn, on 22 June 1979)	Accession by Albania on 27 June 2003
Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona 1976)	Accession by Albania on 30 May 1990 and the amendments were accepted on 26 July 2001. The protocol on Specially Protected Areas was accessed on 30 May 1990 and the Protocol on SPA and Biodiversity ratified on 26 July 2001. More details on the ICZM and SPA protocols are included in the following section.

Albania commitment with ICZM Protocol and MSP Directive

Albania is a Party to Barcelona Convention and 8 of its Protocols, given in the table below:

Table 4: Albania commitments with the Barcelona Convention.

Barcelona Convention/ Protocols	Signature Ratification	Ratification	Acceptance of amendments	Entry into force
Barcelona Convention 1	---	30.05.90/AC	26.07.01	09.07.04
1976 Dumping Protocol 2	---	30.09.90/AC	---	
1976 Emergency Protocol 3	---	30.05.90/AC		29.06.90
2002 Prevention and Emergency Protocol 4	---	---	---	---
1980 Land-based sources Protocol 5	---	30.05.90/AC	Of 1996-26.07.01	---
1982 SPAs Protocol 6	---	30.05.90/AC	---	29.06.90
1995 SPAs & Biodiversity Protocol 7	10.06.95	26.07.01	Of 1995 26.07.01	25.08.01 Annex II & III-16.04.15
1994 Offshore Protocol 8	---	26.07.01	---	24.03.11
1996 Hazardous Waste Protocol 9	---	26.07.01	---	18.01.08
2008 ICZM Protocol 10	---	04.05.2010/AD	---	24.03.11

Since 1995, Albania embraced the Coastal Zone Management Planning Initiative in cooperation with the World Bank, the EU, EIB, UNDP, and UNEP through the METAP and the UNEP's MAP PAP and prepared its CZM Plan, providing a framework for implementation of relevant institutional capacity building and investment programs. This plan was approved by DCM no.364, dated 18.07.2002.

Albania became Party to the ICZM protocol since 2010, but did not adopt any specific legislation dedicated to ICZM. Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 **establishing a framework for maritime spatial planning** has not been transposed yet

into national legislation. An effort was made to fully transpose The Marine Strategy Framework Directive in a draft DCM (2014), but it has not been approved yet, either. Nevertheless, there is a number of acts and policy documents, such as those on nature and biodiversity, protected areas, water, fisheries and aquaculture, environment impact assessment and strategic environmental assessment, spatial planning, etc., supporting and in line with the ICZM principles and goals. They have transposed EU and/or have responded to the requirements of Multilateral Environmental Agreements where Albania is a party. On the other hand, as described in this report, numerous institutions are in place to implement, monitor and report on the status of implementation and achievements. A number of line ministries, implementing agencies and inspectorates are given responsibilities in different areas of activities covered under ICZM. National Territory and Water Councils are in place, Local Government has been given responsibilities, advisory commissions are in place, do's and don'ts, activities permitted and those prohibited are made clear in each legislation, criminal offenses in ICZM and marine areas relevant activities are identified. It is a well-known that implementation and enforcement of the law in Albania are not yet at the desired levels from lack of proper financing and of proper dedicated human capacities. One more reason, why the existing thematic legislation, described in this report, does not bring the wanted results for the ICZM in Albania, may be the lack of a framework legislation in this regard.

ICZM Protocol and the Marine Spatial Planning Directive may need to be considered (short to medium run) for transposition into specific dedicated national legislation, as a framework legislation, so to ensure the integrity and the synergy of the implementation of the existing thematic legislation, described in this report, as well as their proper monitoring and reporting.

Such framework law needs to provide the arrangements for the coordination at the national and local level of all activities carried out under specific legislation, so that the overall potential of the coastal zone and marine area are not exceeded and their resilience is not compromised.

On the other hand, financial, human capacities and training needs assessment is to be carried for the proper implementation of each of the laws of relevance for these areas. Identifying the sources of such funding and making them effective is another step that needs to be done. One or more follow up projects may be needed to deepen this analysis and take the necessary measures for proper ICZM and Marine Spatial Planning in Albania.

This report identifies the protected areas in Vlora, together with the respective legislation of their proclamation and those having already a management plan, the current legislation and policy documents relevant for ICZM and Marine Spatial Planning in Albania. It describes the responsibilities of different institutions under each legislation. At the end, it provides a comprehensive list of such institutions.

Table 5: Legislation approving Protected Areas in Vlora area as per IUCN categories.

IUCN Category	Area name	Year of designation
II	Llogara National Park	DCM96, dated 21.11.1966
II	Sazan-KaraburunMarine National Park	DCM.289, dated 28.04.2010
IV	Karaburun Managed Nature Reserve	Regulation of Min. of Agriculture no.1, dated 27.7.1977

Management Plans for Coastal Protected Areas in Vlora area

The following PAs in Vlora area have an approved Management Plan:

- Llogara National Park and natural ecosystem Karaburun-Rreza e Kanalit
- Orikum-Tragjas Management Plan
- Vjose-Narte Protected Landscape Management Plan
- Butrinti National Park Management Plan

IZCM relevant legislation

Law "On Biodiversity Protection", amended by Law 68/2014 dated 3.7.2014

This law aims to:

- Ensure the protection and preservation of biological diversity.
- Regulate the sustainable use of biological diversity components by integrating key elements of biodiversity into strategies, plans, programs and decision-making at all levels.
- Provide for the establishment of a network for the conservation of natural habitats and wild flora and fauna in the territory of the Republic of Albania.
- Determine measures to maintain or restore to a favorable conservation status the natural habitats and species of wildlife of Albania and of interest to the European Community.
- Ensure that measures taken pursuant to this law take into account economic, social and cultural requirements as well as regional characteristics.

The Ministry of Tourism and Environment is the central institution responsible for the conservation of biodiversity and the sustainable use of its constituents, at national and local levels.

The Ministry of Agriculture is the leading and responsible authority to ensure the conservation and sustainable use of indigenous breeds and varieties important for food and agriculture.
State, central and local authorities that, under specific laws, administer natural components of biodiversity resources, protect it by acting within this function.

The law calls for Biodiversity Inventory and Monitoring Network to be set up as a main source of information to support decision-making at all levels for the conservation of biodiversity and sustainable use of its components.
Ecosystems, habitats and landscapes are protected even when outside the representative network of protected areas. Their conservation includes:

a) protected ecosystems, habitats and landscapes;
b) specially protected ecosystems, habitats and landscapes;
c) degraded ecosystems, habitats and landscapes.

New activities or uses in protected ecosystems, habitats, and landscapes may only be carried after having been subject to environmental impact assessment procedures and having obtained environmental permits.

When violations of this law constitute a criminal offense a criminal prosecution against the persons responsible for the violation is filed by the Environment Inspectorate. When they do not constitute a criminal offense, the following violations constitute an administrative offense:

- capture, taking, keeping and use of protected animal species and plants;
- exploitation or new uses of specimen of animal or plant species, which violate the status of conservation of threatened species, when not approved by the Minister and not provided with environmental permit;
- occasional exploitation or use of specially protected species;
- use for the purpose of gaining an indigenous variety without the consent of its owner;
- deliberate importation or introduction of alien species or invasive alien species into terrestrial, aquatic or marine environments of the Republic of Albania without the authorization of the appropriate authority and without environmental permit;
- failure to provide, with the entry into force of the law, environmental permits of activities utilizing biological diversity and its components;
- transfer of the collected material as part of research activities to other parties, without the consent of the ministry and/or owner;
- collection from in-situ sources and the use of numerous quantities of plants, animals or microbial material, genetic material or other biological molecules, and associated data without environmental permits;
- non-issuance of environmental permit of activities identified in this law;
- unauthorized export of materials or samples collected from in-situ sources and associated data on collection activities;
- unauthorized use of small quantities of plants, animals, microbial, genetic or other biological molecules they contain, obtained from ex-situ sources, publicly owned or financed, and data on transfer of material obtained from ex-situ sources;
- transfer without agreement and without the owner's consent to transfer the obtained material and additional data to third parties;
- export without agreement the transfer of materials or samples and associated data from ex-situ sources to public ownership;
- gathering and documenting knowledge and practices without the consent of local communities or individuals;
- use of specially protected animals and plants by individuals.

Law 81/2017 “On Protected Areas”

It partly transposes Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. This law regulates the proclamation, conservation, management, management, sustainable use of environmentally protected areas and their natural and biological resources, based on the principle of sustainable development, to fulfill standard environmental, economic, social and cultural functions in favor of communities, as well as definition of roles and responsibilities of public institutions and private physical/juridical entities on the protection and sustainable management of PA, through:

- identification, definition and widening of protected areas;

- guarding, protection, rehabilitation and recovery of ecosystems and natural habitats, species, landscapes within protected areas;
- sustainable use of protected areas by integrating its elements in strategic planning and decision-making.

The purpose of this law is to provide special protection of environmentally protected areas and their important components of biodiversity and nature in them, through:

- proclamation of environmental protected areas, of particular importance for their natural, economic or social values, as part of the natural and cultural heritage of the environment;
- development and protection of environmental protected areas, national assets of particular importance for the rare and irreplaceable values of natural balance, biodiversity, as an obligation in the interest of present and future generations;
- facilitating the conditions for sustainable development and promoting (evaluating) ecosystem services;
- informing and educating the public about the state and usefulness of the protected environmental areas.

Management and conservation of environmentally protected areas is accomplished through the application of the following principles:
a) The principle of sustainable development. b) The principle of integration. c) The "polluter pays" principle. d) Precautionary measures.

Classification of protected areas is in line with the IUCN International classification and criteria:

- "Strict nature reserve/scientific reserves (category I)";
- "National Park (category II)";
- "Natural Monument (category III)";
- "Managed nature reserves / nature park (category IV)";
- "Protected Landscape (Category V)";
- "Protected area of managed resources (category VI)".
- "Municipal Nature Park (category IV)";
- "Green crown (category V)".

Environmental protected areas include: protected areas of national interest; protected areas of international interest including: "Ramsar" areas, special areas of conservation of interest to the European Community (SACs), sites of community interest for habitat and bird conservation areas and special protection areas (SCIs and SPAs); areas of special conservation interest (Emerald network areas); "Biosphere Reserve" areas; and natural heritage areas.

Environmental protected areas in the territory of the Republic of Albania are national property, public or private, while natural monuments are unalienable public property. Protected areas can be administered by the state, private entities, municipalities, or a combination of them. This is defined in the DCM that approves the protected area.

The territory of the protected area of the category "National Park", "Managed Nature Reserve" and "Protected Landscape"is divided into sub-zones: the central sub-zone (first level (strict)of protection); the area of traditional and sustainable use (second level of protection); recreation area (third level of protection); buffer zone; sub-zone of heritage and cultural landscape. The categories "strictly protected reserve" and "nature monuments" are only surrounded by a buffer zone.

Activities permitted in the protected areas, include: those in conformity with the Management Plan; monitoring of the ecosystem, habitats and flora and fauna; interventions for ecosystem regeneration; any activity in accordance with the decision of the National Territorial Council.

In the marine, lake and river protected areas, the following activities shall be permitted to be obtained after prior approval: monitoring of the ecosystem, habitats and flora and fauna; diving and underwater sustainable tourism with environmentally friendly methods; temporary, seasonal tourist constructions with lightweight, environmentally friendly structures; any other activity in conformity with the Management Plan; any other activity in conformity with the decision of the National Territorial Council.Military activities do not need a prior environmental permit.

In marine and coastal protected areas fishing for commercial purposes is prohibited. Commercial fishing is permitted only in marine and coastal protected areas of categories IV, V and VI, following the approval of the Director General of the National Agency of Protected Areas. Forests in environmentally protected areas are not classified as productive forests. Hunting is prohibited in all categories of environmentally protected areas.

Necessary interventions for regeneration and health of ecosystems in the protected areas are carried out by the inhabitants of protected areas, to meet their heating needs, on the basis of prior approval by RAPA of the technical project and the nominal list of inhabitants of the area, confirmed by the administrator of the local government unit.

Management of forest and forest assets, water and water assets, as well as other public and private property located within a protected area shall be carried out by the administration of the protected area and in accordance with the management plan of the area. The administration carries these activities on its own, through the local community and/or an entity authorized by it.

When these assets are private property, they shall be managed and used by the owner or legal user only in conformity with the site management plan and with the prior approval of the administration of the protected area.
State main stakeholders for conservation, planning and management

Ministry of Tourism and Environment
In particular, with regard to the protected areas, MoTE is responsible for:

- identification of measures related to the management of existing protected areas, their classification, ecological network, “Ramsar” areas, identification of new areas and procedures for their proclamation;
- coordinating the work of conducting studies, consultations and mapping for the proclamation of new protected areas;
- coordinating the work on identifying and evaluating habitats of conservation interest on wild fauna species;
- provision and preparation of national policies for the management of the Albanian protected area network;
- proposal for adding protected areas and their inclusion in the national network;
- contribution and coordination of work for the preparation of management plans for protected areas for their implementation;
- approval and publication of the plan of areas to be declared protected in the following year;

- approval of monitoring of protected areas and coordination of work for their realization.

In the field of nature protection, the MoTE is cooperating with the:

- Ministry of Agriculture and Rural Development (with regard to agricultural biodiversity);
- Territorial Development Agency (with regard to decision-making on land use);
- Ministry of Interior (with regard to recreational and tourism related activities);
- General Directorate of Customs for international customs control for trading endangered species of wild flora and fauna.

The main tasks of the **National Agency of Protected Areas (NAPA)** include:

- continuous management, direction, organization and control of the protected area structures under its control;
- updating and intensifying the content of conservation and management of areas, through the development of contemporary concepts, practices and schemes used by advanced sites in working with protected areas;
- management and administration of the network of protected areas, habitats and natural and semi-natural species of conservation interest, in accordance with the applicable Albanian environmental legislation, as well as with international environmental conventions and agreements;
- establishment and implementation of a standardized and formatted documentary system, with which the management structures of protected areas work throughout the territory of the Republic of Albania;
- the creation of the National Protected Areas File, Portal and Database, as a separate part of the Portal, the National Environmental File;
- performing periodic analyzes and generalizations on the basic problems of protected areas and continuous informing of the Minister;
- creation and implementation of the methodology for drafting protected area management plans;
- revitalizing environmental education and raising awareness of local communities and the general public about protected areas;
- promotion of forms, methods, rational ways for collecting registration, processing and dissemination of information on protected areas;
- approval of activities in protected areas,
- as part of the environmental permit process for activities that impact the environment in protected areas;
- supporting and developing sustainable economic activities within protected areas in cooperation with the State Aid Commission;
- financial management of the protected area network.

The directors of RAPA and the heads of monitoring sector of RAPA and NAPA enjoy the attributes of the Judicial Police while performing their duties.

Management Committees of Protected Areas are established to monitor the implementation of management plans in protected areas, including coastal and marine areas. They are composed of representatives of the: municipalit/y/ies where the protected area is located, NAPA, local

institutions related to agriculture, tourism, infrastructure, civil society, representatives of owners of forest and pasture located in the protected areas.

Administration of Protected Areas can be established for Category II and IV of the protected areas. Such bodies are established to control the implementation of the legislation on protected areas, wild flora and fauna and other activities carried out in the protected areas and proposes to the Director General of NAPA the certificate revocation/contract termination in cases where entities are in breach of these provisions; cooperates with the Forest Police Inspectorate, and other inspectorates, State Police and local government on implementation of this law and special laws for the prevention and extinguishing of fires; Prevents and takes measures in cases of illegal use and marketing of timber, forest and non-forest products, wild flora and fauna, medicinal, aromatic, ethereal and natural lime plants, forest and non-forest products of the area protected, as well as any other activity that is contrary to this law; files criminal charges for violations provided for in the Penal Code for protected areas;

DCM No. 866, dated 10.12.2014 "Approving the lists of types of natural habitats, plants, animals and birds of interest for EU"

This decision fully transposes Annexes I, II, IV and V of on the Conservation of natural habitats and of wild fauna and flora, as amended by Directive 97/62/ EC, Directive 2006/105/ EC and Regulation (EC) No 1882/2003 and Annex V of Directive 2009/147/ EC on the conservation of wild birds.

Law No. 44/2019 "On some additions and amendments to law no.7895, dated 27.1.1995"On criminal code of the Republic of Albania ", amended"

This law has fully transposed Directive 2008/99/EC of the European Parliament and of the Council of 19 November 2008 on the protection of the environment through criminal law.
…pollution of surface and ground water, … severe damage to animals or plants through the discharge, emission or introduction of ionizing radiation or a quantity of materials into … water, beyond the norms allowed by law, are sentenced to imprisonment of up to three years. The same offense, when committed in specially protected areas…., or when it has caused or is likely to cause severe damage to the ecosystem, biodiversity, flora or fauna, is punishable by imprisonment of one to five years.

Killing, destroying, possessing, taking specimens of protected species of wild flora and fauna or their parts or by-products, in breach of the requirements of applicable wildlife protection and protected areas legislation or permits and authorizations issued by the competent authorities, unless such a thing has occurred on a negligible amount of these specimens and has negligible influence on the conservation status of the species, shall be punishable by a fine or up to seven years of imprisonment.

Actions that violate the requirements of the legislation in force for protected areas or permits and authorizations issued by the competent authorities and which cause a serious deterioration of a habitat located within an environmental protected area, are punishable by a fine or up to five years of imprisonment.

Law no. 111/2012 “On integrated water management”

This law has partially transposed Water Framework Directive 2000/60/EC. The purpose of this law is:

a) protection and improvement of the aquatic environment, surface waters, whether temporary or permanent, inland marine waters, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater, and the status of them;
b) providing, preserving, developing and utilizing water resources as rational as necessary for the life and social and economic development of the country;
c) fair distribution of water resources, according to the purposes of use and their effective management and management;
d) protection of water resources from pollution, waste and waste over actual needs;
e) defining the institutional framework, at national and local level, for the implementation of a national policy for the management and management of water resources for the benefit of the community and the social and economic interests of the country.

The following are owned by the state and administered by state bodies: a) all water resources of the Republic of Albania; (b) all beds and banks of rivers, streams and other natural flows, whether temporary or permanent, curative, mineral, thermo-mineral and geothermal waters, canals, lakes, ponds, lagoons and natural or artificial catchments, islands and catchments; sand, rocks and soils in riverbeds, lakes and catchments, as well as groundwater geological formations; c) land derived from the withdrawal of water or the progress of the land in the direction of the water, when it relates to land owned by the State; d) all state-of-the-art hydro technical structures and works, such as dams, irrigation, drainage and navigation systems, drinking water stations and canals, and related works. Such state property rights are inalienable and timeless.

Integrated water resources management is based on the following principles: respect for the integrity of the water basins, based on the social and economic requirements of water resources, while protecting and preserving the quality of these resources and the quality of the environment for future generations; coordinating public control over water resources through territorial planning and socio-economic development projects, at national and local levels; rational use of water resources and discharge control; adherence to the principle of recovering the costs of water services, including environmental costs, in accordance with the “polluter pays” principle; the principles of environmental protection set forth in law no. 10 431, dated 9.6.2011 “On the protection of the environment”; ensuring a sufficient supply of good quality surface and groundwater for sustainable, balanced and equitable water use; taking preventive action not to damage water resources, as a priority, which must be corrected at the source. The integrated management of water resources intends to contribute in particular to: ensuring a sufficient quantity of surface and groundwater of good quality necessary for a sustainable, balanced and fair use of water; significant reduction of groundwater pollution; achievement of objectives, in accordance with relevant international agreements, including those intended to prevent and put an end to marine pollution.

Institutions in charge of management of water resources at the central level are the Council of Ministers and the National Water Council.

The **Council of Ministers** approves: the composition and rules of operation and organization of the National Water Council; the National Water Resources Management Strategy; appoints a special commission for the management of transboundary waters; determines the territorial boundaries of each water basin, their center and composition; approves the hydrographic boundaries of the water basins; water basin management plans; determine the areas, distances and widths between water resources banks.

The **National Water Council** is the central decision-making body responsible for the management of water resources. This is an inter-ministerial body chaired by the Prime Minister that addresses issues of integrated water resources management and management. Its competences are: approving the plans and projects, interregional and national, in the field of agriculture, urban planning, industrial and territorial development, when they relate to water conservation and management; taking the necessary measures to implement any international water convention agreement to which the Republic of Albania is a party; granting permits and authorizations for water use and discharges when the activity is carried out outside the confines of a single basin; any contracting authority must, before initiating a concession procedure for the use of water resources, obtain, in principle, approval from the National Water Council. It approves in principle the request for the concession for water resources. After concluding the concession contract, it provides the concessionaire with the permit for the use of water source, signed by the Chairman of the National Water Council. Where these water resources are of national importance, as determined by the Council of Ministers, the concession agreement shall enter into force after ratification by the Parliament; approving the regulation of the River Basin Council.

The **Water Resources Management Agency** is a state-owned legal entity depending on Prime Minister's office, organized centrally and at the basin level through the basin management offices. It has the following competences: to develop and implement policies, strategies, plans, programs and projects aimed at integrated water resources management, quantitative and qualitative conservation, and their further consolidation; to implement the provisions of international agreements and conventions on water and transboundary resources, of which the Republic of Albania is a party; to exercise the functions of the Technical Secretariat of the National Water Council; to propose to the National Water Council the concession of water resources; to propose to the National Water Council the granting of permits and authorizations for the use of water and discharges when the activity is carried out outside the confines of a single basin; to draw up the national inventory of water resources, both quantitatively and qualitatively; to develop and monitor the implementation of water basin management plans; to draft and monitor the implementation of transboundary water management plans; it is responsible for the economic activity of water resources; promotes the participation of water users in the management of water resources; Promotes studies and research on the development of technical innovations related to the use, discovery, exploitation, conservation, treatment, protection, administration and efficient use of water resources; in cooperation with scientific and research institutions, determine the fields of research and study for water resources, as well as the respective funds for them; coordinates and controls the work of local water resources management bodies; it can challenge the decisions of the Water Basin Council in court.

The **water basin council** is the body responsible for the integrated management of water resources in the relevant basin at the local level. It has the following duties: ensure the most rational conservation and development of water resources within the boundaries of the relevant water basin; Ensure the equitable distribution of water resources within the boundary of the relevant water basin, according to the purposes of use and their effective management and management; ensure the protection of water resources against pollution, waste and damage affecting their quality and quantity; identifies the relevant water bodies that need protection.

Water Basin Administration Office is the subordinate structure of the Water Resources Management Agency, which is established and operates in each water basin. It has the following duties: draw up a draft water resources plan for the relevant basin and submit it for approval to the water basin council; draw up the inventory of water resources in quantity and quality and periodically updates it; promote the participation of water users in the management and

administration of water resources; prepare reports, give opinions on water resources and submits them for further monitoring to the water basin council; prepare materials for the meetings of the water basin council. It monitors the implementation of the decisions of the National Water Council and the water basin council.

Surface waters are classified according to their chemical and ecological status. Ground waters are classified according to the quantitative and chemical status. Such classification for each water basin is approved by DCM, after prior approval by the National Water Council.
Protected areas, in accordance with this Law and other laws and bylaws, are designated for the purpose of protection of waters and aquatic ecosystems and shall include special protective measures. Protected areas include: hygienic-sanitary areas for protection of water resources, designated for the production of drinking water; protected areas, defined by law "On protected areas", fishing areas and shellfish rearing, in accordance with fisheries legislation; areas for thermal baths, for curative treatment and recreation; areas prone to eutrophication and areas at risk from nitrates and nitrite; areas intended for the protection of plants or animals, as well as habitats, where the conservation or improvement of water status is an important element of their protection. Certain river basins or watercourses may be determined as "special conservation areas".

Protected areas under this law are determined by the Water Resources Management Agency, in cooperation with the MoTE. Proclamation of such areas is made by DCM. Water Resources Management Agency, Water Basin Management Offices, Water Basin Councils and the MoTE design, manage, and update the inventory of protected areas as an integral part of the protected area management plan. The management plan of the protected area is included in the management plan of the respective water basin.

Water resources are used for: household, communal, agricultural purposes, including irrigation and livestock water; aquaculture, water transport, industrial, hydropower production; trade; tourism, entertainment, including navigation for entertainment; other purposes approved by the National Water Council.

Activities carried on professional bases in water basins or requiring water use may need a permit, authorization or concession.

Authorities drafting plans and studies of territory regulation need to also consider water resource management plans.

<u>Law no.8905, dated 6.6.2002 "On protection of marine environment from pollution and damage"</u>

This law aims at protecting the marine environment of the Republic of Albania from pollution and damage, prevention of pollution and damage caused by human activities at sea and in the coastal area, which disrupt the water quality, damage the marine and coastal resources, endanger fauna and flora, threaten human health, and impede the normal development of activities in this environment.
The marine environment of the Republic of Albania is an inalienable state property. It can be used and exploited for economic, commercial, scientific, social, sporting, tourist and military activities. This use can be made by state bodies, by natural and legal persons, domestic or foreign, only under the conditions provided by law. Environmental Inspectorate, the port captains, the state authorities that have licensed the activities, and other bodies designated by law are the authorities in charge of the control of the marine environment and the activities carried out there. To carry out its duties, the Inspectorate co-ordinates work with port captains, with the Fisheries Inspectorate, with the State Police, and with the Coast Guard of the Republic of Albania. The law forbids the following

activities from happening in in the marine environment: disposal of toxic and explosive hazardous substances and waste; disposal of a list of substances referred to in Annex I attached to this Law; spillage of hydrocarbons and wastewater; disposal of solid materials of any nature and kind, with the exception of fishing gear and equipment and materials required for the construction of ports; disposal of waste and any material from ships, platforms, installations and from the coast; transportation of hazardous materials and waste; the sinking of ships, cargo and goods of any kind; the sinking and abandonment of any installation that has served various activities; construction and operation of equipment emitting ionizing radiation; burning of materials of any kind; access to ports with unclean ballast of vessels of any kind, type and tonnage.

DCM No.797, dated 29.9.2010 "On the sanitary regulation for bathing water management"

This DCM fully transposed Bathing Water Directive 2006/7/EC. The regulation applies on bathing water, i.e. any element of surface water where the competent authority expects a large number of people to bathe and where there is no permanent prohibition on bathing or a permanent recommendation not to bathe.

The **State Sanitary Inspectorate** is requested to perform visual inspection (twice per month) of the bathing waters to detect pollution, including plastics, rubber and other wastes and take the appropriate measures to remove the sources of pollution and improve bathing water quality.

Below are the competences of different institutions:

Ministry of Health - function of leading, promoting, advising and coordinating activities related to the implementation of the sanitary bathing water regulation; updating and integrating the technical standards, based on new scientific and technical achievements or to improve the quality of bathing water; processing of monitoring data;

State Sanitary Inspectorate and local government: identification of bathing water and monitoring points. The identified bathing waters are recorded in separate registers; updating the bathing water list;- the fencing, prior to the start of the bathing season, of waters not intended for bathing and bathing waters permanently prohibited for bathing; public information.

State Sanitary Inspectorate: determination and updating of the bathing water profile; determination of a monitoring calendar before the start of each bathing season; monitoring; classification of bathing waters;

Local government: the right to extend or shorten the bathing season according to local needs or rules; location in the areas concerned, in a conspicuous place, as close as possible to each bathing water, of signs indicating the prohibition of bathing; signaling in a conspicuous place, as close as possible to each bathing water, short-term pollution forecasts.

MoTE: Taking measures to eliminate the causes of pollution and improve bathing water;
The microbe parameters monitored are the Intestinal Enterococci and Escherichia coli. Other physical parameters include: pH; color; Mineral oils mg/liter; Active surfactants acting with methylene blue mg/l; (Lauryl sulfate); Phenols mg l (phenol indicator) C6 H5 OH; Transparency; Dissolved oxygen (% of O2 saturation); Bituminous waste and floating materials, such as: wood, plastic articles, bottles, glass containers, plastics, rubber or any other material; Trash or debris; Ammonia (mg/l NH4); Kjeldahl Nitrogen (mg liter N).

Law 9115 dated 24.7.2003 “On Environmental Treatment of Polluted Waters”, amended

This law aims to protect the environment and human health from the negative impacts of wastewater, by setting the rules for their environmental treatment, as well as the obligations of wastewater dischargers. It applies on:

- urban wastewater;
- industrial wastewater;
- agriculture drainage waters;
- polluted waters of any kind.

The Ministry of Environment, regional agencies and the Environmental Inspectorate shall, in addition to the bodies designated by law for the management of water reserves, assist the functioning of the environmental treatment of wastewater treatment and control its implementation at all levels.

The law sets obligations for natural and legal persons, who discharge wastewater as well as for those involved on wastewater treatment. The following activities are prohibited:

discharge into the ground or surface waters of polluted waters beyond the limits set out in the environmental permit;

the treatment and purification of waste water in a place not designated for this purpose;

treatment and purification of polluted waters by natural and legal persons not licensed for such activities;

treatment and purification of polluted waters with inappropriate techniques and technologies not approved by a normative act;

mixing with surface waters of liquid discharges of solid waste landfills and dumps;

use of wastewater for any purpose or activity.

Urban Wastewater Treatment Directive has not yet been transposed into Albanian Legislation, but the following acts have been approved:

DCM No. 177, dated 31.03.2005 “On the allowed norms of effluent discharges and the zoning criteria for the recipient water environment”

DCM No. 246, dated 30.4.2014 "On the definition of environmental waters quality norms"

This DCM has fully transposed Directive 2008/105/EC on Environmental Quality Standards in the Field of Water Policy.

DCM No. 267, dated 7.5.2014 "Approving the list of priority substances in the water environment"
This DCM has fully transposed Directive 2013/39/EUof the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

DCM No.480, dated 25.7.2012 “On approval of national emergency plan "On response to determining pollutants in the republic of Albania"
The Inter-Institutional Maritime Operations Center (IMOC), the Ministry of Tourism andEnvironment, the Ministry of Defense, the Ministry of Interior, the Ministry of Infrastructure

and Energy, the Ministry of Finance and Economy and other state institutions are the institutions in charge of implementation of this national plan.

In 2009, the Government of Albania established an **Inter-Institutional Maritime Operational Centre**, in order to respond to the recommendation of the International Maritime Organization (within the framework of UNCLOS). This inter-ministerial institution has to ensure the surveillance of the Albanian maritime space, in order to carry out the organization, planning, coordination and direction of operations at sea, in compliance with national and international maritime legislation.
The IMOC is a national institution that guarantees the sovereignty and sovereign rights of the Albanian state in the maritime space through integrated management of national sources of the institutions that are responsible for, and have interests in, the sea.
The IMOC coordinates and leads (among others):

- Costal Operations for the control of the maritime border;
- Anti-Pollution Operations;
- Operations to enforce fishing regulations;
- Operations to preserve the ecological equilibrium and maritime environment;
- Operations for the protection and good management of fishing wealth (ethological bio-measurement);
- Operations for safety on the sea.

Law no. 64/2012 "On fishing"

This law has partially transposed Council Regulation no. 1224/2009/EEC; Directive 2000/60/EC; Council Regulation no. 2371/2002/EC on the protection and sustainable use of fishery resources; Council Regulation no. 1967/2006/EC; Council Regulation no.1005/2008/EC; Council Regulation (EC) no.199/2008; Council Regulation no. 104/2000/EC; Commission Decision no.1999/478/EC; Commission Decision no.2005/629/EC; Commission Implementing Regulation no. 404/2011/EU; Council no. 1224/2009/EEC.

This law regulates the fishing activity management and provides protection of marine life and inland waters, by promoting sustainable development in maritime and inland waters of the Republic of Albania. It aims:

- ensuring a rational and responsible use of biological resources, inland waters and marine waters of the Republic of Albania;
- laying down rules for the fisheries sector management;
- defining conservation measures for the protection of biological resources in marine and inland waters;
- promoting scientific and technological research and fishing data collection;
- ensuring the operation and management of fishing ports and centers;
- a structural policy, with the aim of restructuring the sector fisheries, ensuring sustainable development of the sector, strengthening competition of economically valuable development of fishing subjects, revitalization of areas dependent on fishing, as well as improving market supply and growth of production value;
- establishing a control system for fishing.

The following are subject to this law:

- Albanian and foreign nationals seeking to carry fishing activities in the maritime space and inland waters of the Republic of Albania.
- Albanian and foreign vessels seeking to carry fishing activity in the maritime area of the Republic of Albania.
- Activities of Albanian flag fishing vessels operating in the waters of other countries and offshore.
- All fishing activities taking place in the territory of the Republic Albania.

Supervision, management and regulation of fisheries and related activities is done by the ministry in charge of agriculture, which also cooperates with all ministries related to fishing activity. Consultative bodies related to fishing activity are: the Central Consultative Commission on Fisheries and Aquaculture and the Committee for the Coordination of Scientific, Technical and Economic Research.
Protected fishing zones are approved by DCM. In such areas the following activities are prohibited:

- to carry fishing activities;
- to capture or use fauna or flora;
- use sand or gravel, dump any contaminating material, or relocate the waters or damage the environment,
- to build structures on land or in water;
- undertake or perform other activities that may have a negative impact on the protected area ecosystem.

In order to protect the natural reproduction of marine and inland waters fish and their little ones, as well as other aquatic organisms, the minister may order a fishing ban for certain periods of time. The minister can also define the number of the fishing vessels, their power, fishing equipment that can or cannot be used in certain fishing areas, number of permits in a given area, etc.

Prohibitions for fishing and special areas:

- The capture, collection and / or trade of fish and other aquatic organisms with explosives, chemicals or any other way that kills, intoxicates or poisons them.
- keeping on shore explosives or chemical substances that kill, poison or intoxicate fish and other aquatic organisms.
- The use and on board of toxic, narcotic and corrosive substances; equipment generating electrical discharges; explosives; substances which, if joined together, may explode; towed vehicles, St. Andrew's crosses or similar devices, used for the collection of red coral and other coral species or other coral-like organisms; pneumatic hammers or other shock-absorbing devices, in particular of two-footed mollusks embedded in the rock; collecting end nets with an opening size of less than 40 mm for trawlers.
- Fishing in the port area, access roads and anchorages.
- Fishing with trawl fish, dragons, traps, kettles, shrimps, trawls, coastal and similar nets at the bottoms of vegetation, especially of Posidonia oceanica and other marine lanterns (lamparo).

Other prohibited acts include:
Fishing, keeping on board, transiting, deliberate placing on the market or for consumption in any period, area and by any means or equipment of these aquatic organisms:

• river coral - *Salmo letnica*, river;

- corals (Corallium spp.);
- Trout - *Salmotrutta magrostigma*; *Salmo marmoratus*;
- *Acipenser sturio* sticks;
- *Acipenser naccarii*;
- sharks - *Cetorhinus maximus*,
- Carcharœodon carcharias;
- sea cow - *Mobular mobula*;
- Dithers - *Lithophaga lithophaga*;
- sponges;
- sea mammals (whales, dolphins and seals);
- sea turtles (*Carretta carretta*, *Chelonia mydas* and *Dermochelys coreacea*);
- freshwater turtles (*Emys orbicularis*, *Mauremys caspica*);
- marine birds.

Fishing vessels equipped with commercial fishing permits are prohibited from using equipment that are not branded at designated locations beyond 12 nautical miles from the territorial sea.It is forbidden to provide fishing boats with motor power on end fishing smaller than 224 KW and greater than 746 KW.Fishing outside the territorial waters of the Republic of Albania is done with special authorization of the minister.

Fisheries Inspectorate is the responsible authority for monitoring/inspection of fishery activities and fishing effort. Monitoring/inspection is carried out at sea, in ports, during the transport, during the processing and in the fish and its by-products market. This function is carried out in cooperation with State Police, Tax and Customs Managements, Municipal Police, Coast Guard, Harbormaster, IMOC, National Food Authority and any other responsible authority.
Law no. 103/2016 "On aquaculture"

This law is partially aligned with Regulation (EU) no. 1380/2013;Council Regulation (EC) No 1999/2008 and Regulation (EU) no. 508/2014.

State or local government land property as well as water surface can be rented to legal and natural people interested to engage in aquaculture. A permit system is in force for aquaculture activities and a contract is signed for such activity to take place.

Areas designated for aquaculture are approved through a planning system so to integrate the activity of aquaculture in the aquatic, coastal and land area with other users, to avoid conflicts in the use of these areas.
Implemented to facilitate and develop aquaculture activity in the aquatic zone, coastal and land, including the permitting process and procedures of operation.

Three zoning categories are defined:
- areas suitable for aquaculture activity;
- areas not suitable for aquaculture activity;
- areas for aquaculture activity with special rules and / or restrictions.

Law no. 93/2015 "On tourism", amended

This law is partially in compliance with Article 2, Article 3 and with Annex of Council Directive no. 90/314/EEC "On travel, vacation and holiday package", and with Articles 2 and 3 of Regulation (EU) No 692/2011 of the European Parliament and of the Council of Europe of 6 July 2011 concerning European statistics on tourism and repealing Council Directive 95/57/EC.

The purpose of this law is to promote Albania as an attractive tourist destination for domestic and foreign visitors, supporting the development of sustainable tourism, ensuring that tourism service providers meet the demands of tourists, in a healthy and safe environment, and respecting the needs of today's host communities and future generations.

The object of this law are: Regulation of relations between public institutions and private entities, natural and legal persons, domestic or foreign, who exercise tourist activity in RoA; Regulation of cooperation and interaction of central and local government in defining policies and developing strategies in the field of tourism; Regulation of relations between state institutions and potential investors, based on public interest in tourism development.

Tourism and other related activities are based on the principle of sustainable development, including both economic, environmental and socio-cultural development.

Responsible authorities in the field of tourism are:

- Ministry responsible for tourism;
- Advisory Committee for Private Tourism Sector;
- National Tourism Agency;
- National Coastal Agency;
- territorial branches of tourism;
- Inspectorate covering tourism;
- local government units;
- commission for standardization of tourist activities.

Regional Committee on Tourism Development is established at each prefecture under the direction of the prefect to coordinate the work between central government institutions and local government units, on tourism issues. These committees are comprised of representatives of local government units, district representatives, representatives of local tourism associations, educational and educational institutions for tourism and representatives of the ministry responsible for tourism.

National Tourism Agency
The National Tourism Agency has these functions and competencies:It implements marketing policies in the field of tourism, promoting Albanian tourism at national and international level, to create Albania's image as a tourist destination in the international market.

National Coastal Agency (NCA)
NCA is in charge of protection and sustainable development of the coastal zone through the implementation of integrated coastal zone management policy, setting national standards for the coastal zone area used for tourism, monitoring legal compliance of marine tourism activities, etc.The operational objectives of NCA are:

- Conservation and sustainable development of the coastal zone;

- Implementation of policies and strategies for integrated coastal zone management;
- Coordination of area-related programs;
- Promotion of investments in the coastal area.

NCA guarantees the implementation of national policies and strategies in the coastal area, designed for integrated coastal management, and coordinates their implementation. One of the main tasks of this agency is the creation of a system of rules and standards for the management of public spaces along the coastline. This is intended to make good use of public or private entities in function of sustainable tourism development.

Standardization committee for tourism activities
This committee is established at the ministry responsible for tourism. It certifies tourism activities, issues and revokes relevant certificates.

Tourism Inspectorate controls the application of the criteria and conditions by the entities carrying out tourist activity, in accordance with the provisions of this law, bylaws in its implementation and other legal acts in force.

The local government units, pursuant to this law keep the inventory of the main tourism resources and the inventory of tourism enterprises in the territory under their jurisdiction.
Tourism development planning s an integral part and is drafted in conformity with the national territorial plan, tourism strategy and legislation in force for the planning and development of the territory as well as with the provisions of the legislation on land administration and protection.

Law No.10463, dated 22.9.2011 “On integrated waste management”

This Law fully transposed Directive 2008/98/EC on waste …It aims to protect the environment and human health and to ensure proper environmental management of waste through: a) preventing or minimizing waste or reducing the negative impacts of integrated waste generation and management; b) improving the efficiency of their use; c) reducing the overall negative impacts of resource use. It introduced the concept of waste hierarchy, extended producer responsibility, waste prevention programs, end-of-waste status, by-product, etc. It set the same objectives and deadlines as the Waste Framework Directive, regarding the separate collection of plastic waste and preparation for reuse and recycling. The law was amended, to fully ban the import of waste of any kind in Albania. Transit of hazardous waste through the territory of Albania is also forbidden. Only export is allowed following authorization. The law sets requirements on the re-use/recycling/recovery of used tires, with most of them being forbidden to be landfilled as whole, since January 2013, while those grinded since 1 January 2016. The law suffered from very poor implementation and none of the objectives was met, though the deadlines have passed.
DCM no.1104, dated 28.12.2015 "Approving the requirements to prevent ship generated waste and cargos residues be discharged at sea”

This DCM has fully transposed Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues. The goal is to protect the marine environment from ships while using the ports of the Republic of Albania. This DCM is applicable to all kinds of ships within any port in Albania. Before approaching the Albanian ports ships should give information regarding the type and quantity of waste and residues to be delivered and/or kept on board and the percentage they occupy in relation to the maximum storage capacity. Plastic waste is dedicated a separate distinguished line in the table of information. Before leaving the port, ships are issued a Certificate of Waste

Handling, indicating each specific type of recyclable waste, including plastic waste as a separate distinguished item, quantities handed over to the waste to the operator of the receiving installations and quantities kept on board. They pay a tariff to operators for the delivered waste management, covering plastic waste management, too.

DCM No. 178, dated 6.3.2012 “On incineration of waste”
It fully transposes Directive 2000/76/ EC on the incineration of waste.

DCM no.452, dated 11.07.2012 “On landfill of waste”
It fully transposes Directive 1999/31/EC on the landfill of waste and Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills.

DCM no.177, dated 6.3.2012 “On packaging and their waste”, amended
This DCM fully transposed Directive 94/62/EC on Packaging and Packaging Waste.

DCM no.866, dated 4.12.2012 “On batteries, accumulators and their waste”
This DCM fully transposed Directive 2006/66/EC on Batteries and Accumulators.

DCM no.705, dated 10.10.2012 “On the administration of End of Life Vehicles”
This DCM fully transposed Directive 2000/53/EC on End of Life Vehicles.

DCM no.765, dated 7.11.2012 “On rules for separate collection and treatment of used oils”
This DCM fully transposed Directive 75/439/EEC on Disposal of Waste Oils.

DCM No. 705, dated 10.10.2012 "On management of waste from end of life vehicles"
This DCM fully transposed the End-of-Life Vehicles Directive 2000/53/EC.

DCM No. 957, dated 19.12.2012 "On electric and electronic equipment removal"
This DCM fully transposed Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

DCM No. 608, dated 17.9.2014 "On collection and treatment of bio waste and the criteria and terms of their reduction".

DCM No. 127, dated 11.2.2015 "On requirements for the use of sewage sludge in agriculture"
This DCM fully transposed Directive 86/278/EEC on Sewage Sludge.

DCM No.387, dated 6.5.2015 "Approving the rules for the control of disposal of PCBs and used BCBs, de-contamination and disposal of PCB containing equipment"
This DCM fully transposed Directive 96/59/EC on Disposal of PCB/PCT;

DCM No. 575, dated 24.6.2015 “Approving the requirements for inert waste management”

DCM No.798, dated 29.9.2010 "Approving the regulation on hospital waste management"

2.1. ICZM RELEVANT POLICY IN ALBANIA

National Strategy for Development and Integration 2015-2020

The National Strategy for Development and Integration 2015-2020 (NSDI-II) is approved by DCM no. 348, date 11.5.2016. It emphasizes the need to:

- establish the Natural 2000 ecological network for Albania and the European Community;
- restructure and empower the protected areas management structures; and
- ensure more effective implementation of management plans for protected areas and action plans for species and habitats.

The NDSI-II, amongst others, sets as strategic objective "Enhance and strengthen the protection of nature" through:

- A targeted 17% increase in the surface of Protected Areas of the territory through the enhancement and integrated management of protected areas;
- The establishment of the ecological network "Natura 2000"; and
- The assurance of conservation status for 5% of threatened species and habitats.

Strategic Policies for the Protection of Biodiversity

The **Document of Strategic Policies for the Protection of Biodiversity** (DSPPB) is approved by DCM no.31, date 20.1.2016. This Document clearly identifies its goals:

By 2020, ensure full approximation and implementation of the EU acquis in the field of nature protection;

By 2015, have a strategic document for the biodiversity (NBSAP) revised and approved – in line with Aichi target 12;

By 2020 establish a conservation target of 17 % of terrestrial & inland water areas and 5 % of marine & coastal areas. Establishment of the National Ecological Network of Albania as an integral part of the Pan-European Ecological Network (PEEN) – in line with Aichi target 11;

Restore at least 15 % of degraded areas through conservation and restoration activities – in line with Aichi targets – this action will be achieved through the implementation of management plans for Protected Areas and through the implementation of single species action plans for species and habitats;

More sustainable agriculture and forestry – in line with Aichi targets;

Implement the Nagoya protocol on access and benefit sharing of genetic resources and benefits that arise from their use – in line with Aichi target

Strategic Plan for Marine and Coastal Protected Areas (draft)

The Strategic Plan for Marine and Coastal Protected Areas (SPMCPA) is prepared on April 2013 with the support of UNDP in the frame of the Project "Improving Coverage and Management Effectiveness of Marine and Coastal Protected Areas". This document comprises a situation analysis with respect to the need for and the opportunities and constraints to developing and delivering the SPMCPAs, criteria that might be used to identify areas to form part of an MCPAs network and an inventory of existing and proposed MCPAs against the criteria specified and justifies their inclusion in a network of MCPAs and a set of key outcomes and associated actions required for the development and delivery of the SPMCP. The draft has not been formally approved yet but serves as a guiding document for marine and coastal protected areas management.

Development Strategy of PAs – Short and Mid-Term Strategic Program 2015-2020

This document is prepared by the National Agency of Protected Areas (NAPA). The *Vision* of this document is to "transform the Protected Areas into territories for the conservation and protection of

nature and biodiversity, promoting a multitude of other values (tourism/recreational, cultural, gastronomic, aesthetic, health, spiritual, etc.), by supporting the sustainable development and positively affecting local communities". The document has not been formally approved, but it serves as a guiding document for the NAPA's work.

National Strategy on Sustainable Tourism Development 2018 – 2022

The National Strategy on Sustainable Tourism Development 2018–2022 (NSSTD) is a policy instrument looking at protection, conservation and management of natural and cultural resources and in particular the development of natural protected areas, sites with cultural and historical values, and natural landscapes. The vision is: "*Albania to be recognized as an attractive, authentic and welcoming tourist destination in the Mediterranean and Europe region, based on the sustainable use of natural, cultural and historical potentials for the development of diverse and high quality products, easily accessible from international markets*".

The main policy objectives in the field of tourism are: Increasing tourism contribution to the country's overall income; Balanced development of tourism supply and services; Increasing employment in the tourism sector; Improving living standards and alleviating poverty in the country; tourist areas throughout the country; increasing tourism spending (public investment); increasing revenues from tourism activities and services; and ensuring legal and institutional protection of the rights of travelers and visitors.

Fisheries Strategy 2016–2021

This strategy presents an overall strategic vision for the medium term development of the fisheries and aquaculture sectors in Albania. It sets out Albania's objectives and priorities that are compatible with those of the EU Common Fisheries Policy. The strategy contains the following Specific Development Objectives (SDOs) and relevant proposed measures related to artisanal fisheries and Monitoring, Control and Surveillance (MCS) of fishery activities.

SDO 6: Well-managed marine environment supporting sustainable artisanal fisheries

Develop Coastal Management Plans for fisheries and environmental protection. (with broader ICZM initiatives where existent)

Establish Coastal management groups & representative network to develop and implement Coastal Management Plans.

Identify critical fisheries areas and natural habitats requiring additional protection

SDO 9: A management and enforcement regime that controls access to fisheries resources in an equitable and sustainable manner

Measures to develop a comprehensive MCS strategy on coastal/inland water-bodies as part of a wider co-management approach, combined with capacity-building/training in MCS techniques

Rural and agricultural development cross-cutting strategy 2014-2020"

The Cross-Sector Strategy for Rural and Agricultural Development (CSSRAD) was approved by DCM No. 709, dated 29.10.2014. It was developed under Europe 2020 strategy for fast, sustainable and inclusive growth and Albania's overall strategic objective of EU membership. It has been prepared in line with the EU Strategic Planning Approach to the Common Agricultural Policy (CAP) 2014-2020, focusing at the same time on specific needs for the development of agriculture, agro-processing and rural areas in Albania. These needs and challenges have been grounded and analyzed through several sector studies and analyzes as part of the strategy preparation process.

Its main objective is to define a strategic framework for addressing the challenges facing the agricultural and agro-processing sector, as well as to develop rural areas in a sustainable economic, environmental and social way, by proposing policy instruments similar to the instruments of CAP, paying special attention to the preparation of sectors, policy instruments and institutional adjustment for EU membership to achieve a sustainable improvement of Albania's competitiveness.

Agro-tourism will be one of the tools of tourism promotion and economic development, but also of increasing the sustainability of tourism and the preservation and promotion of local cultural identity.

National Waste Management Strategy and Plan 2010-2025"

This strategy has been approved by DCM No.175, dated 19.1.2011. Implementation of the strategy implies a plan of measures to enable the segregation of waste at source. A 3 bins system is requested to be installed all over the urban areas:

- one to collect the dry recyclables, including packaging materials (plastic packaging, et), and other plastic waste items
- one to collect the wet recyclables i.e. the organic/bio waste, and
- one to collect the mixed waste, which do not make part in none of the two first groups.

The dry recyclables should be transferred into transfer stations for further and more detailed sorting. Then each particular waste stream should be taken by the respective recycling industry. Thus, the dry recyclables, which make for about 48% of the current waste arising in Albania, will go to industry for reuse/recycling/recovery and therefore be diverted from the landfill. A The Draft Strategic Policy Document and National Integrated Waste Management Plan 2018-2033 has been prepared and waiting for approval.

Sector strategy and action plan on transport 2016–2020"

This strategy was approved by DCM Nr. 811, dated 16.11.2016. The overall goal of this document is to develop a multimodal national transport, improve its sustainability, connectivity, interactivity and integrate it in a wider context to the regional, European and international transport. The document is in line with the goals for socio-economic development and EU integration of the country. The action plan is based on the following pillars: blue growth, interconnectivity (transport and energy networks); environment quality, sustainable tourism. The achievement of the integrated combined tourism model of coastal dimensions (beach and sun), cultural (archeology, heritage) and natural (eco-tourism) relies largely on an efficient road network that can connect to every corner of the country. Some destinations are of particular importance and need good quality road links: Coastal Destinations, World Heritage Sites and Eco-Tourism. The MIE (currently the Ministry in charge of Transport and Infrastructure) is the responsible institution for the implementation of this decision.

2.2. INSTITUTIONS WITH RESPONSIBILITIES ON ICZM

National Territory Council
This Council is headed by the Prime Minister as defined in the provisions of the Law “On territory Planning”.

National Water Council
This Council is headed by the Prime Minister as defined in the provisions of the Law “On Integrated Water Management”

Ministry of Infrastructure and Energy
MIE is responsible for territory planning developments and projects of national importance. Its implementation arms are the National Agency of Territory Planning and National Territorial Development Agency

Ministry of Tourism and Environment (MoTE)
MoTE is responsible for:

- environmental protection policy, sustainable use of natural resources, nature protection and biodiversity, sustainable development and management of forests and pastures, monitoring of water quality, nature and biodiversity, protection of natural landscapes, wild fauna, endangered species and protected areas; and the
- design and implementation of sustainable tourism policies.

National Coastal Agency (NCA)
It is a depended institution of the Ministry of Tourism and Environment. It is in charge of protection and sustainable development of the coastal zone through the implementation of integrated coastal zone management policy, setting national standards for the coastal zone area used for tourism, monitoring legal compliance of marine tourism activities, etc.

National Agency of Protected Areas
It is a depended institution of theMoTE organized at central (NAPA) and local level (RAPA). It is responsible for protected areas and has the task of administering and controlling them throughout the territory of the country.

Regional Agency of Protected Areas (RAPAs)
These are institutions, depending on the NAPA and based in each region. They constitute a specialized local institutional network that performs the tasks of protecting and developing environmental protected areas within that region.

Management Committees of Protected Areas
Management Committees of Protected Areas are established to monitor the implementation of management plans in protected areas, including coastal and marine areas.

National Environmental Agency
It is a depended institution of the Ministry of Tourism and Environment. It is organized at both central and local level.

Inter-Institutional Maritime Operational Centre (IMOC)

This inter-ministerial institution has to ensure the surveillance of the Albanian maritime space, in order to carry out the organization, planning, coordination and direction of operations at sea, in compliance with national and international maritime legislation.

General Maritime Directorate/Harbor Master Office

This is a body of marine specialists working 24/7 for maritime traffic control, pollution prevention, pre arrival information, navigational warnings, data collection from ships and other sailors at sea, with capability of coordination with other homolog offices in Albania and Italy and Greece. Although this structure can have a significant contribution in the response against oil pollution, their activity is very limited due to the lack of infrastructure, equipment and adequate training. But a part of that these institutions, if properly equipped with legal framework, personnel and equipment can have a large contribute in this regard. Actually, this institution is controlling the delivery from ships the oil residues and other cargo operation wastes pursuant to Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues. For other environment issue this institution has little or nothing activity.

Coast Guard Flotilla

Coast Guard Flotilla (CGF) is stationed in “BishtiPalles” Durres and “Pashaliman” base, Vlore with capability for patrolling, monitoring, conducting SAR operation, anti-pollution operation and other specific duties.

Border Police and Emigration

Stationed in Vlore port, with capability of controlling the coast line and territory of south Albania and conducting anti clandestine and other illicit operations. They role is limited only in monitoring and reporting in case of any oil pollution at se but have little expertise in oil pollution response. Also this institution needed to be supplied with specific legal framework and adequate training.

State Environment, Forests, Water and Tourism Inspectorate

It is a depended institution of the Ministry of Tourism and Environment. It is organized at both central and local level and is in charge of control and enforcement of environmental, forest, water and tourism legislation.

Fisheries Inspectorate

Fisheries Inspectorate is the responsible authority for monitoring/inspection of fishery activities and fishing effort.

Institute of Public Health

It is a dependent institution to the Ministry of Health and Social Protection. It monitors the quality of bathing waster and defines the areas complying with bathing quality norms in terms of Escherichia coli and intestinal enterococci.

State Health Inspectorate

It is a dependent institution to the Ministry of Health and Social Protection, organized both at central and local level. They control and enforce compliance with hygienic-sanitary regulations.

Municipalities

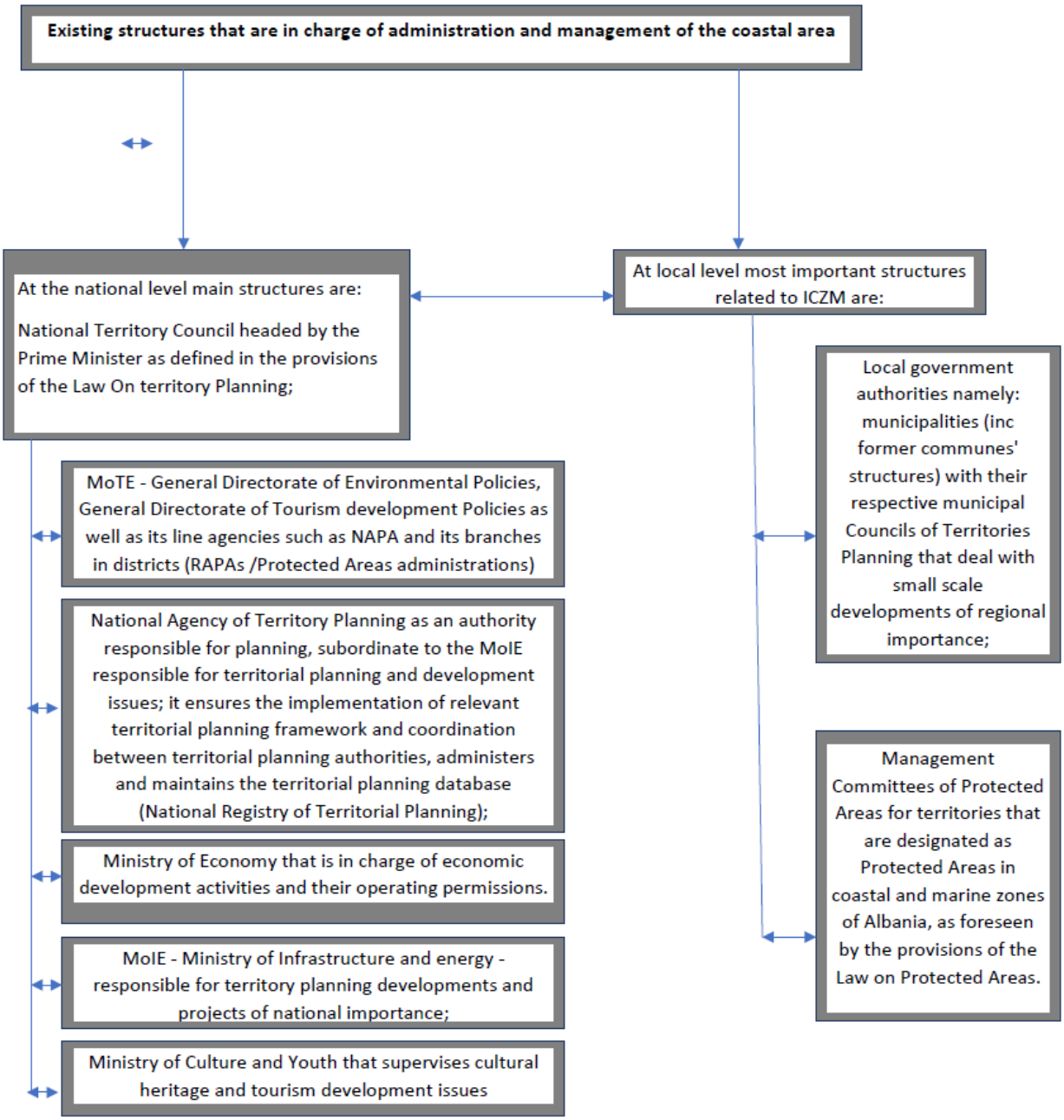
Municipalities are involved with the approval of small scale developments of regional importance. They cooperate with the RAPAs and with the administration of the respective protected areas; are in charge of collection and removal of waste, waste planning and land planning in the territory of their jurisdiction; have responsibilities under the law on aquaculture, etc.

Private owners in the territories of Protected Areas

Individuals, whose property is included within the territory of the environmentally protected area can participate in the planning, conservation and use of the area's natural resources and administer and use it in accordance with the requirements of the management plan.

Environmental NGOs

These represent the public interest when lobbying on planning and environmental issues. There is a number of active environmental NGOs in Albania.



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3. SECTION 3. General physical and biological description of the study area

3.1. CLIMATE

Climate - Precipitation
The mean annual precipitation for the whole territory is 1485 mm, and the mean annual runoff 891 mm, or about 40km3, which is discharged in the sea by rivers. Water regime is typical Mediterranean; about 82-85% of the annual runoff is observed during the wet season (Oct.-May) and only 6-9% during the dry season (Jul.-Sept.).

Climate - Winds
The wind regime in Vlora is different in the Ionian sea and in the Adriatic sea.
In the Ionian Sea, the prevailing winds during winter are mainly from N or NE directions named "Bora" and can reach a great force. In transitional periods the winds vary frequently.and often the southern wind of "Shirok" is prevailing. The "Sirocco" wind coming from south blows in this region in spring and summer and can be dry or moist. In summer, there is usually a light wind blowing from the SW and NW northwest.

In the Adriatic, in general, the prevailing winds are winds of north and north eastern (30-36%) and southeastern (18-24%). The northern winds in winter are often strong, reaching 40m/s and are named "Murlan" or "Bora", generating strong waves dangerous for the coastline and for ships. In winter, the winds are more often coming from the South.During spring, the wind regime is mixed, but SE winds (about 25-30%) are prevailing. In summer, offshore winds are most often from NW (about 20-40%).
In the autumn, the wind direction is very unstable.

3.2. COASTAL AND MARINE ENVIRONMENT

Coastline description
Generally, the coastline northern part of the study area has a low profile and is sandy and the southern part is rocky with high cliffs and rocky shore with pebble and gravel beaches. The coastline of Vlora Bay-Vjosa River Mouth area has continuously modified its configuration by sedimentation of alluvium transported by Vjosa River water and the swell of the Adriatic Sea. The Karaburuni peninsula is known for its high cliffs, coastal and underwater caves and small pebble beaches such as Grama bay and is considered dangerous during storms with strong winds and high swell that can reach 4m.

Underwater topography and bathymetry
The Bay of Vlora maximum depth is 55m, with an average of 25m. Offshore of Karaburun peninsula and Sazan Island, the depths are quickly reaching 100 to 800m at a short distance from the coast. The channel between Karaburuni and Sazan is very narrow considering the importance of the maritime traffic and has a maximum depth of 50m.

A Multi Beam survey was conducted and provided a “model” of the submarine landscape and shipwrecks (to name authors.) The Vjose River is the dominant source of sediment for the continental shelf. The (Vjose River) sediment distribution is under the control of a complex, local circulation pattern that is defined by the peculiar regional shape of the gulf due to tectonic activities.

The research has identified the wreck of the hospital ship, Po, situated in the south-east area of the bay (Figures 2A and 3). The research has also plotted the wreck of the Daisy Queen, also a large and important ship, just off Cape Linguetta and other wrecks, as yet unidentified, both within the bayand off Cape Linguetta. A minefield laid effectively between Sazan Island and Cape Linguetta, at the small opening of the gulf for the passage of ships.

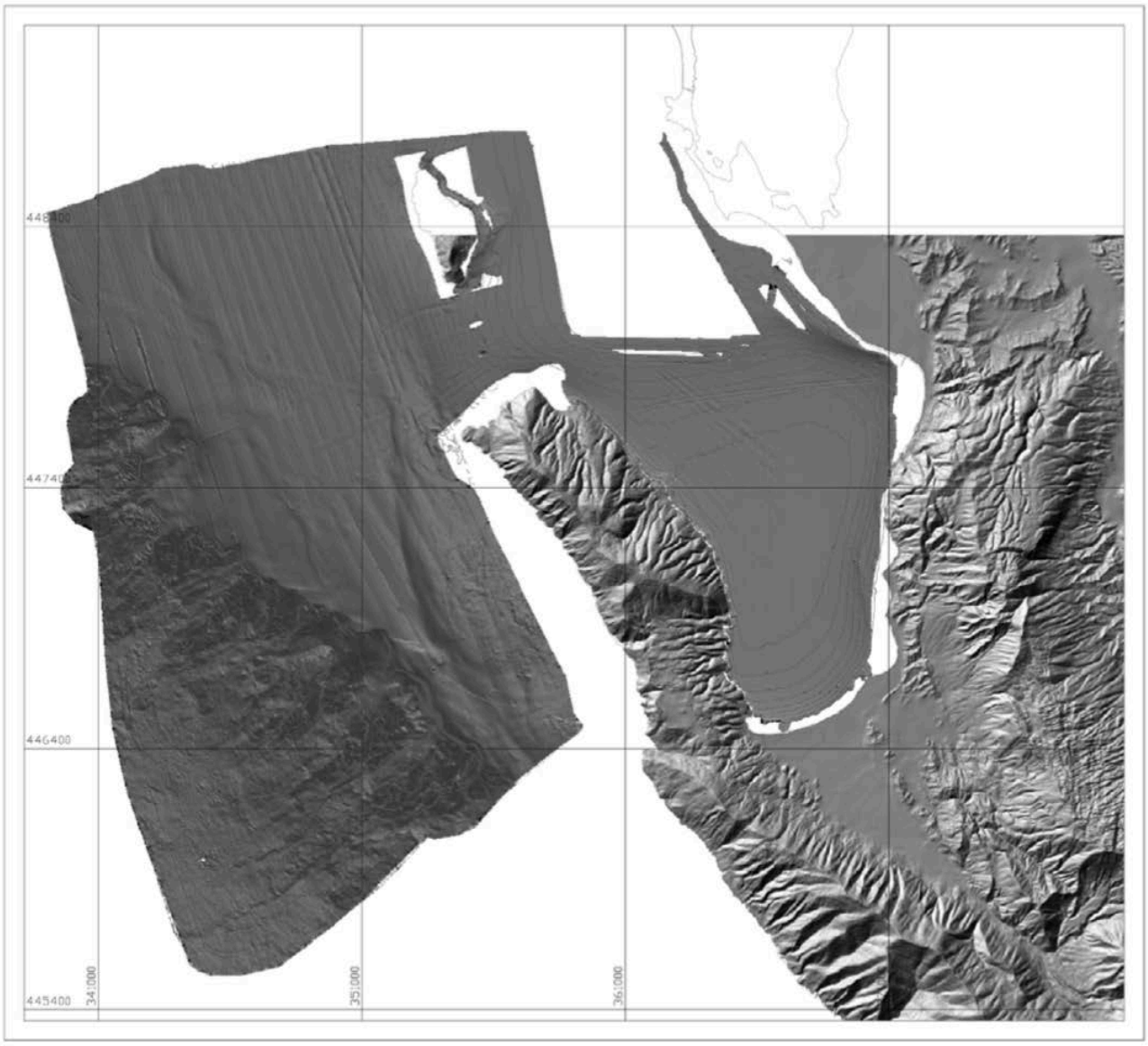


Figure 3: Morpho-bathymetric map of Valona gulf with location of shipwreck (detected in the study area)(s. Interval of bathymetric contour lines is 50 m, map was plotted in UTM34, zone north.

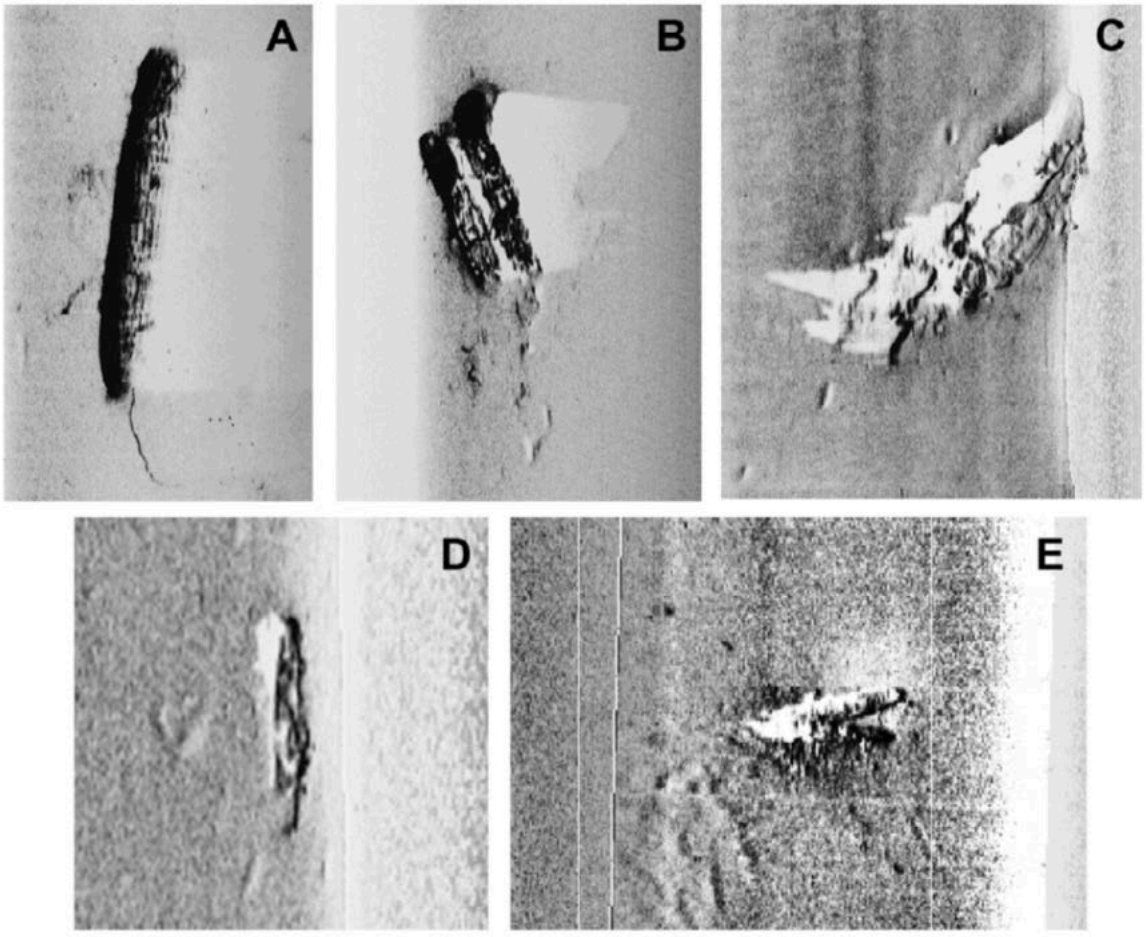


Figure 4: Snap shots taken from side-scan sonar data, representing all shipwrecks detected in the study area. Locations are indicatively reported in Figure 1). A: Hospital ship Po (sunken during World War II). B: Unknown shipwreck. C: heavy cruiser Regina Margherita (World War I). C: Unknown shipwreck (submarine). D: Unknown shipwreck sunken within the western sector of the Gulf of Valona.

Some of the detected “anomalies” are displayed as seabed marks that can clearly be ascribed to human activity, such as:

- Linear morphologies resembling tracks on the sea floor: some are caused by trawling nets used in the intense exploitation of fish stocks in the Gulf. More marked traces are the result of mines weeping.
- In the southern part of the bay, near the Albanian navy base, the seafloor is dotted with circular features, (Figure 4). This is the typical aspect of terrain impacted by explosions, so mines, exploded on the sea floor, likely caused them.

3.3. HYDROLOGY (COASTAL)

Freshwater and sediment input in the area
The only permanent river bringing sediment to the sea is the Vjosa river located in the north of the bay. The mouth of the river is changing rapidly in winter and over the years, the area shows a strong erosion process, reaching locally 10m per year. Other input of freshwater comes from the rainwater drainage and of the discharge of sewage water (missing data).

3.4. HYDROLOGY (MARINE)

Tide and waves
The tidal process is irregular and it has a period of 12 hours. It is characterized by oscillations with small amplitudes. Thus, in 50 % of cases the mean daily amplitude is more than 25 cm and only in 1 % of cases its value is more than 49 cm (Selenica, 2018). The highest sea waves in the coastal zone are 3 to 4 m. Altogether, during storms with strong winds, associated with low barometric pressure and high water levels, the maximum high reached on the shore could be 5m, creating sea intrusion in particular in lowland areas such as the Narta lagoon.

Currents
The prevailing currents on the coast of Albania are coming from the south, as an overflow of the Ionian Sea, entering the Adriatic from the eastern side of the Straits of Otranto, generating coastal current from south to north with counter currents in the main bays. The flow velocity in the Ionian Sea, moving northward along the Greek coast, is larger than the Adriatic, but usually does not exceed 0.5-0.7 knots. When strong southeast winds blow, and especially after the western winds, the speed of this flow increases considerably.

3.5. GEOLOGY, GEOMORPHOLOGY AND TECTONIC

Coastline geology
The coastal zone of Vlora Bay is mainly composed of Upper Cretaceous to Triassic limestones formations, from Karaburuni peninsula to part of Vlora city, with abrupt landscape falling into the sea and a narrow coastal strip. In the north, the mountain chain is continued with Neogene's deposits hills, forming the wetland of Narta and the coastal plain.

Tectonic
In line with the geo-tectonic findings (Lacombe et al., 2009), Albania is one of the most seismically active areas in Europe, geo-tectonically lying adjacent to the recently extremely active neighbouring Apennines of Italy. The wider Vlora area thus finds itself in an interplay of so-called endogenous (geo-tectonics, seismic activity), exogenous (erosion, denudation, flooding, fluvial displacement and material transportation, lagoon-type water inundation etc.), and anthropo-geographical (urbanization, resettlement, industry, mode of production) factors. An earthquake with its epicenter in Durres north of the study area took place on 25 November 2019 with a magnitude of 6.4 with numerous replica, one of 5, 6 and one of 5.1 that were all felt in Vlora bay and in Tirana. Geo-morphologically speaking, the Vlora–Elbasan transfer zone separates the Adriatic plain, as the major Albanian plain, from the so- called Ionian zone (outer Albanides) in the south-eastern direction. The alluvial plain at the Adriatic coast is weakly stratified, with moors and lagoons

stretching continuously from Orikum (south of Vlora) to Shkoder in the north. It has developed through the processes of sediment accumulation in the Periadriatic submarine tectonic depression. Generally, the majority of sediments, as well as those in the Vlora region itself, come from the Ionian zone, since the inner Albanides are separated from it by the so-called Kruja zone (a tectonic thrust) between the Krasta-Cukali and Ionian zones (Fig. 2). Under intensive processes of erosion, the Periadriatic basin was filled with material from the surrounding mountains carried by the main Albanian rivers (Drin, Buna, Vjosa, Shkumbini, the Seman/Osum-Devoll catchment, and so on), allowing into the Adriatic Sea.

The area is subject to violent earthquake such as the one occurring in Durres in 1267, 1273 and 2019, the most recent ones in November 2019 was felt in Tirana and Vlora. The most recent one in Tirana was in 1988. Two important ones were centered in Vlora in 1851 and 1930. It is possible, considering the underwater morphology with the steep external slope offshore the Karaburuni peninsula, that such an earthquake could in the future be followed by a tsunami hitting the coast of Albania and Italy.

3.6. Marine biology (fauna and flora, benthic and pelagic, local and exotic species)

The composite environmental system of the Albanian coast was generally preserved in its natural and pristine state until a few years ago, and it could represent one of the last hot-spots of biodiversity within the Mediterranean marine ecosystems (Anonymous, 2002). In recent years, complex natural processes and uncontrolled human activities have occurred in this area (mainly related to urban and tourism developments) and are exposing the Albanian coast, and in particular theVlora Gulf, to a strongly increasing impact, as summarized above and reported in more specific previous studies. On this basis, a loss of relevant coastal habitats and a resulting extensive decrease in the ecological value of the coastal zone and marine habitats are expected. Habitat loss is particularly severe in coastal marine ecosystems, where human activities have historically been concentrated (Airoldi and Beck, 2007; Martin et al., 2005). These processes are already acting in some areas as described in the few reports on the Albanian coast (Anonymous, 2002) and as well documented along other European coastlines (Airoldi and Beck, 2007), although vast gaps still remain in our knowledge of habitat loss on temperate coastlines. This is particularly worrying because these coastal areas contain some of the most productive and varied, but also degraded, ecosystems in world (Edgar et al., 2000; Suchanek, 1994).

Therefore, knowledge of coastal habitats and detailed information on the structure of the benthic communities are essential points for defining a baseline for future research and for directing sustainable conservation and management of the Albanian coasts.

Karaburun-Sazan National Marine Park (Albanian: Parku Kombëtar Detar "Karaburun-Sazan") proclaimed Marine Protected Area in 2010 is nowadays the only National Marine Park of Albania. In 2016, following the SPA/BD Protocol criteria, it was included within SPAMIs List. The park covers a marine area stretching 1.9 km along the coastlines of Karaburun Peninsula and Sazan Island, near the Bay of Vlora. The marine park is quite 16 kilometers long with a width varying from 3 to 4.5 kilometers, and covering in total 12,428 ha of surface. Karaburun Peninsula itself is a Managed Nature Reserve while Sazan Island is a military zone in Albania. Vlora bay 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. Sazan 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 Sazan 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. The coastal area of the Karaburun-Sazan MPA in hence mainly rocky, while the coastal wetlands and dunes are covered mainly by halophytes and other brackish and freshwater vegetal associations. The ManagementPlan 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 6: marine habitats types identified in MPA Karaburun Sazan (Source: MP for NMP of K-S, December 2014, UNDP/WWF).

Coastal littoral zones	Subdivision of zones	Biocenosis (B)
Mediolittoral	Mediolittoral hard beds and rocks	B. of the lower mediolittoral rocks
		B. of mediolittoral caves
Infralittoral	*Posidonia oceanica* meadows	B. of *Posidonia oceanica* meadows
	Infralittoral hard beds and rocks	B. of infralittoral algae
Circalittoral	Circalittoral hard beds and rocks	Coralligenous B.
		B. of semi dark caves

▪*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 macro-fauna (sponges, mollusks 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. Hence, Posidonia beds ensure numerous ecological functions and can be qualified as very productive habitats in terms of ecosystem services. Posidonia meadows are mostly located at the East of the Karaburun Peninsula, within the bay, where it is more protected from the swell.In the Bay of Vlora 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 *Halophila stipulacea* also contribute to the regression of Posidonia beds. The 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.

▪Coralligenous and Pre-Coralligenous formations

Coralligenous and Pre-Coralligenous formations are also an important ecosystem of the MPA. There are mostly present along the Sazan Island coastline and particularly in the circa-littoral zone, which corresponds the continental shelf area that lies below the zone periodic tidal exposure. It can also develop in the infralittoral zone if the light provided is sufficient to allow coralline algae to grow. Coralligenous and PreCoralligenous 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 and Pre 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 will hence be considered:

Table 7: Surface ecosystems area (Source: UNDP, date).

Ecosystems	Area in hectares (ha)
Posidonia	149,03
Coralligenous formation	276,18
Reefs	498,88
Open water zone	11 601,73
Total of the area	12 570,82

3.6.1. BENTHIC COMMUNITIES of soft sediments

The **northernmost** zone of this biocoenosis was characterized by the presence of a particular facies of gastropod *Turritella communis* extended northward off the Sazan Island (Figure 1). A wide, dead, muddy matte of *P. oceanica* was recorded along the **eastern** and **southern** coasts of the Gulf, where it replaced the previous living *P. oceanica* meadow in the past few years, with a surface area of 9.47 km2 (about 8% of the mapped area). A wide bed of non-indigenous green alga *Caulerpa racemosa* var. *cylindracea* covered part of the muddy mattes inside the Vlora Bay. The **narrow residual** areas covered by *P.oceanica* meadow (total surface of 9.47 km2; about 5% of the mapped area) were restricted to the southeastern coast of the Gulf, from Plazhi Vjeter to Kepi Lumit and near Orikum, between 4 and 14 m in depth, and to the small area of Punta Linguetta along the Karaburun Peninsula. Moreover, a large Posidonia bed was recorded off the Sazan Island (Figure 1).

A *Cymodocea nodosa* bed is present as a facies on the **shallowest sandy bottoms** closed to the Vlora beach (Figure 1). It could be clearly recognized as the particular facies of Mediterranean infralittoral zone known as ‘‘Biocoenosis of the superficial muddy sands in sheltered areas (SVMC; sensu Pere`s, 1967; Pere`s and Picard, 1964) with eel-grass *C. nodosa*.’’

Finally, the muddy detritic bottom (DE; sensu Pere`s, 1967) was also identified as a narrow belt along the **Vlora town coast**, slightly deeper than Caulerpa colonization belt. These last communities were only identified by underwater videos, ROV, and scuba dives.

The hypothetical map the benthic biocoenosis of the Vlora Gulf shows a total of 151 taxa identified on the soft Botton of the Vlora gulf, a and 54 species recorded for the first time in the Albanian waters, also enhancing the importance of new studies at national (Albanian) scale. In addition, for species found that were not included on he Italian checklist for the Adriatic Sea (Relini, 2008), representing a contribution on regional scale that fills in some of the knowledge gaps about macro-benthos of south-east Adriatic Sea.

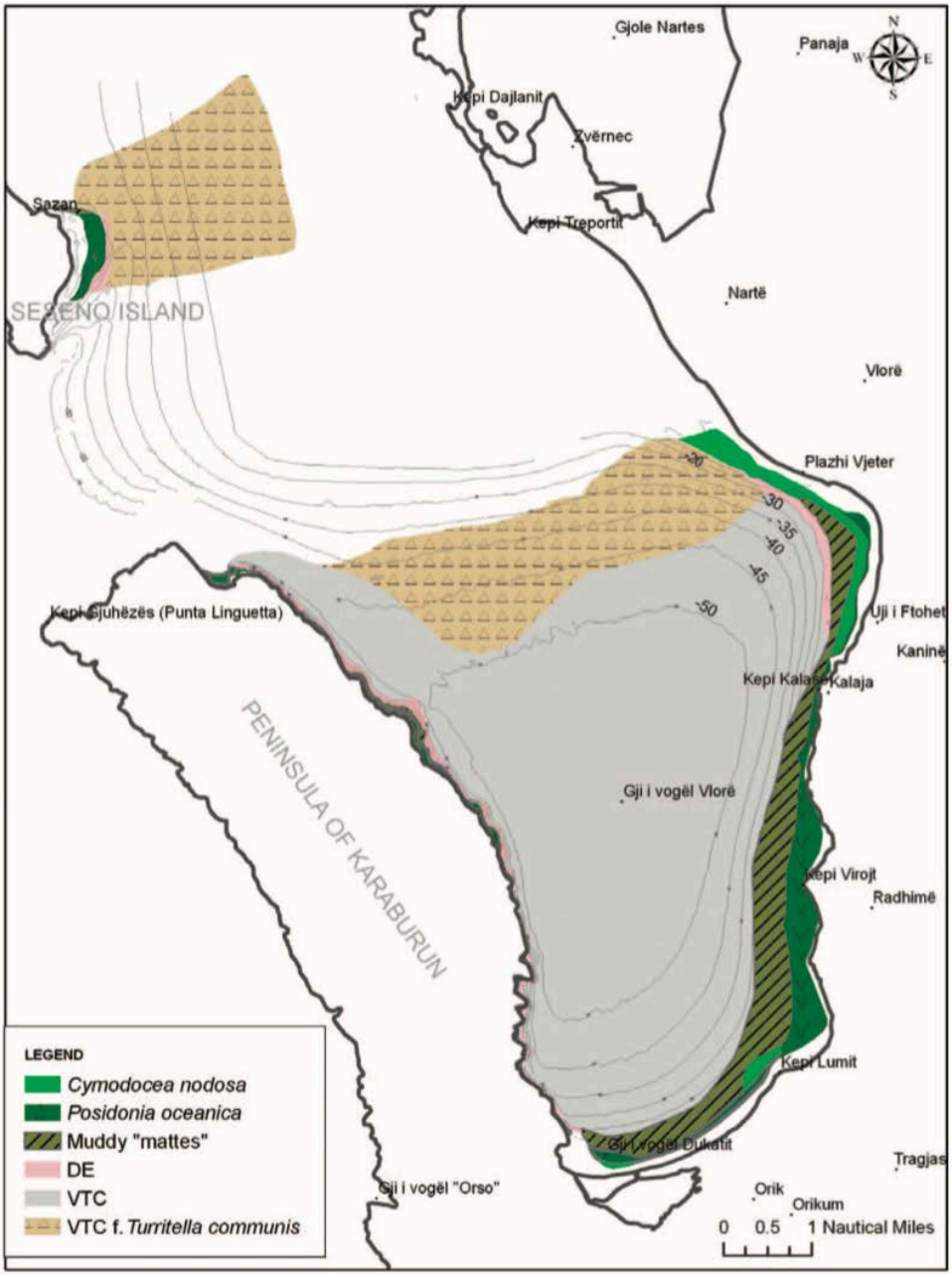


Figure 5. Map of the benthic communities in Vlora Bay (Maiorano et al., 2011).

The species assemblages and the community structure on the soft bottom of the Vlora Gulf seem to be severely affected by the relevant environmental forcing from both natural and anthropogenic

activities, particularly those related to continuous and massive terrigenous transfer.The species assemblages were characterized by few broadly tolerant native species adapted to the environmental instability, and the identified biocoenosis seemed to be progressively mud-covered by excess sedimentation. Thus, because of the strong sedimentation process, habitat losses seem to have been produced in the past few years and are causing replacement of the native biocoenosis, as previously documented through- out Mediterranean from the Rhone Delta (Meinesz, Lefevre, and Astier, 1991) to the Venice Lagoon (Rismondo, Guidetti, and Curiel, 1997) and Taranto seas (Matarrese et al., 2004).

The integrated contributions of both qualitative and quantitative analyses by means of different methodological devices could put in evidence the presence of benthic communities variously distributed on the soft bottom of the VloraGulf. The biocoenosis of **VTC terrigenous mud** was widely extended throughout the Vlora Gulf from around 20 m to the maximum depth of 50 m and was mostly characterized by the dominance of limicolous species. such as the sea cucumber *Labidoplax digitata*, the gastropod *Turritella communis* and the annelids *Maldane glebiifex* and *Sternaspi sscutata* that can also justify the low biodiversity detected in this biocoenosis.
All species are reported in Tables presented in annexes.

On the **shallower coastal belt**, a muddy Posidonia matte seems to have replaced the previous Posidonia meadow, which is now restricted to narrow residual patches of seagrass along the eastern side of the VloraGulf.The increasing sedimentation due to uncontrolled discharges and wastes of inert materials together with the intense solid transport from the coast, have produced strongly negative consequences on Posidonia, because their leaves were covered by sediment and were severely damaged, with a consequent quick degradation of the entire meadow.Also in other areas of Vlora Bay, this condition of severe suffering for Posidonia was also highlighted during many underwater explorations.

Although there is no organized, comprehensive inventory of the distribution and extent of seagrasses in Albania, a rapid, local regression and fragmented pattern of Posidonia meadows were already detected along the coast, particularly in those areas heavily affected by huge human impacts and uncontrolled tourism activities (Beqiraj et al., 2008; Pittito et al., 2009).

Although, in all the studies analyzed, the highest biodiversity indices were detected inside the Posidonia meadow, a fragmented seagrass with a relatively poor species richness and abundance of benthic fauna was previously documented in the Vlora Gulf (eastern coast of Karaburun Peninsula), compared with those seagrass areas distributed along the southern Albanian coast, where fewer impacts (Beqiraj et al., 2008; Pittito et al., 2009) and less-modified water movements and sedimentation have occurred.The comparison between the Posidonia meadow and the muddy matte shows that the biodiversity was much lower in the muddy matte communities, which was mostly represented by the annelids *Glycera unicornis*, *Pseudoleio capitella fauveli*, and the brittle sea stars *Amphiura chiajei* and *A. filiformis*, and had few micro-filter feeders, such as bryozoans and sponges.

Habitat conversion also occurs when more structurally complex natural habitats are converted to less-complex habitats, which usually have lower diversity and productivity (e.g., Beck et al., 2001; Heck and Crowder, 1991). Moreover, in this degraded condition, the settlement of **opportunistic alien species** (Galil, 2000; Occhipinti-Ambrogi, 2000) is common, and that also has occurred in the Vlore area, with species such as the green algae *Caulerpa racemosa* var. *cylindracea*, which has covered part of the muddy matte inside the VloraGulf. The mud deposition causes a condition of continuous instability on the bottom, which do not allow the settlement of well-structured biocoenosis, but only seem to favor species with a wide ecological tolerance (Currie and Parry ,

1999; Leppäkoski et al., 1999; Nicolaidou, Pancucci, and Zenetos, 1989). **All these considerations indicate a progressive decay in the benthic biocoenosis of the Vlora Gulf, especially when compared with the findings of the few previous studies.** The loss of patches of seagrass within a larger bed of *P. oceanica* and its replacement with a wide, muddy matte are a clear example of fragmentation and habitat degradation that, together with the consequent decrease in biodiversity, represents a severe warning for future conservation policy. In fact, habitat degradation is a serious issue that has ecosystem implications and often leads to definitive loss of natural habitats (Airoldi and Beck, 2007).

Both natural and human impacts operate on the fragile coastal ecosystem of the Vlora Gulf where two strong environmental forcings are recognized as most responsible for the habitat degradation:

- the copious sedimentary inputs coming from the Vjosa River;
- the pollution from the urban sewer from the town of Vlora and the relative;
- hinterland that are continuously associating in the degradation of the water quality and the relative decay of the ecosystem.

These impacts have been increasing in the past few years, and a higher level of development is expected in the future, which could cause the loss in the global value of the ecosystem services, estimated to be 10 times higher that any terrestrial ecosystem (Costanza et al., 1997).Thus, the health and the equilibrium of the soft bottom benthic communities of the Vlora Gulf as well as their future evolution are in danger from the future plans for human activities and the eventual control system on the most impacted natural processes, such as the natural solid sediment transport. Further uncontrolled building activities along the coast could again modify water movements and sedimentation with irremediable consequences on the described ecosystems.

In this context, a serious management policy is needed, and no delay should be tolerated.These considerations could represent a starting point for further relevant research in the area as well as a suggestion for the first conservation policy for the first proposed Marine Protected Area in Albania (Sazan Island– Karaburun Peninsula, western coast).

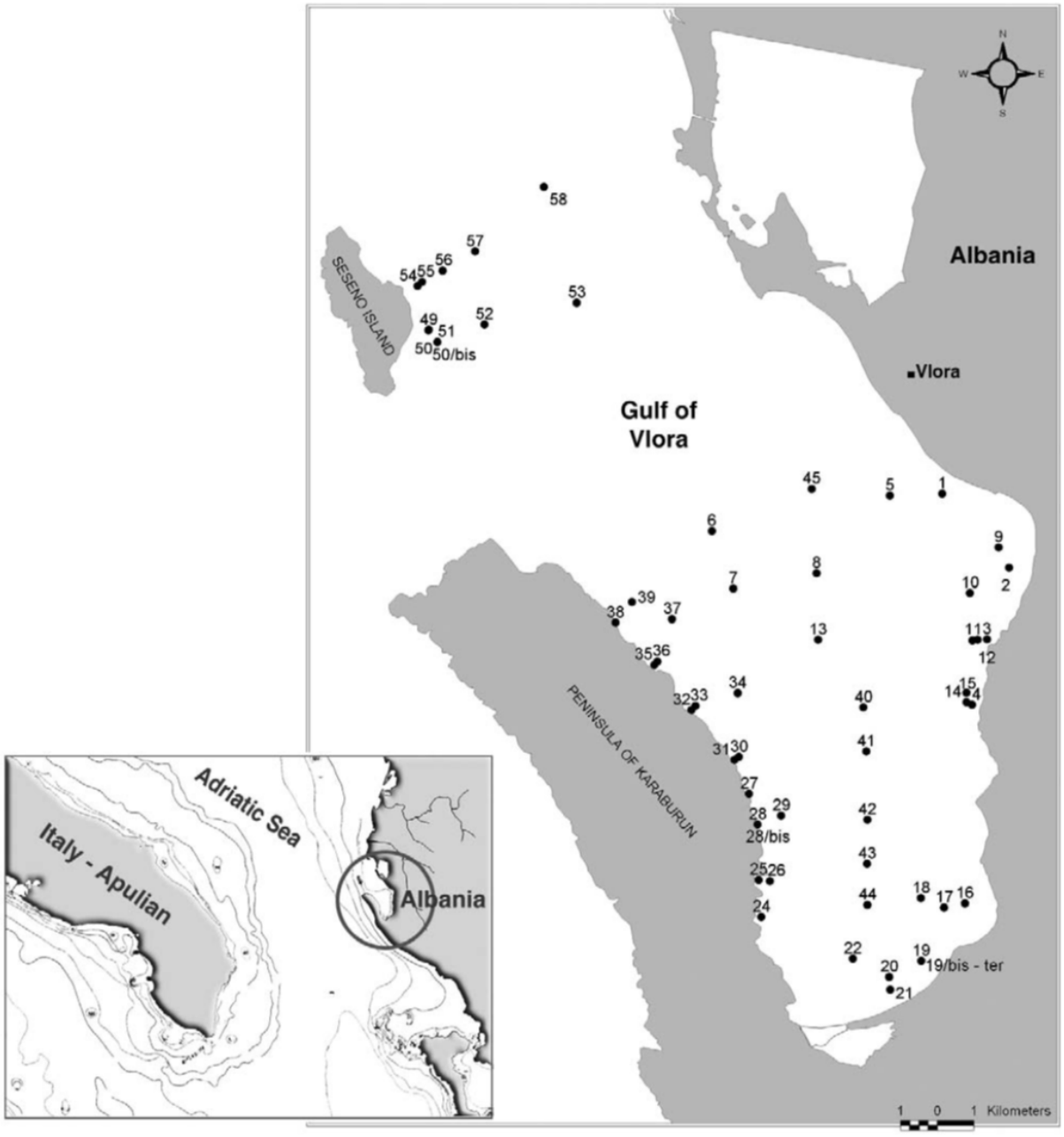


Figure 6: Benthos sampling stations of previous scientific works in Vlora Bay (Maiorano et al., 2011).

3.6.2. BENTHIC COMMUNITIES of submerged rock walls

The seafloor of the National Marine Park of Karaburun-Sazan is mostly made of soft substrates, rocky habitats (sublittoral rocks and coralligenous reefs), caves and seagrass beds (*Posidonia oceanica*, *Zostera noltii*) that are the shelter of several species of ecological interest. The particularity of sublittoral rocks of the **west-coast** of Karaburun is the important colonization by brown algae of genus Sargassum and Cystoseira. Their high abundance is an indicator of good water quality and contributes to the biodiversity observed in the sublittoral waters.

The presence of erected bryozoans assemblages (*Reteporella* sp., *Myriapora truncata*, *Pentapora fascialis*, *Smittina cervicornis*, *Cellaria* sp.) on hard substrates is of particular interest.

Bioconstructors covering of pre-coralligenous and coralligenous reefs alternates with sponges and erected bryozoans that are particularly well developed on certain sites.The diversity of sponges is relatively high, notably when depth increases. A confirmed important data: no gorgonian was observed during all of the prospective dives, and crustaceans were presents, but not numerous. However for all sites, fish diversity and abundance were very low.

Furthermore, evidences of sea urchin **overgrazing** were largely observed above -20 meters on most of the rocky sites. This can be either due to organic pollution that favors the development of *Paracentrotus lividus* or an overfishing of teleostean predators.

Invasive species *Caulerpa cylindracea* and *Womersleyella setacea* have colonized the rocky bottoms above -30 meters and form a thick layer.

The low biological diversity and degraded environmental quality in the area of Vlora Bay, including the MPA Karaburun–Sazan, has also been highlighted from some previous studies, after WAITT Marine Expedition (Beqiraj– personal communication), Beqiraj et al. 2008, Beqiraj et al. 2012, Fraschetti et al. 2011, Kasemi&Beqiraj 2006, Kasemi et al. 2008, , Maiorano et al. 2011.

The National Marine Park of Karaburuni-Sazan includes several habitats and species that must be protected through the implementation of management actions, but after the references mentioned here above, the current degraded situation in this area is a consequence of uncontrolled activities including illegal fishing, overfishing, marine and coastal pollution, coastal erosion, aquaculture, uncontrolled urban and tourism developments, changes of hydrological and sedimentological regimes in Vlora Bay, impacts from Vjosa river etc.

Along all this part of the **west-coast** of Karaburun peninsula presents coralligenous encrustations that are discontinuous and form small cavities of about a few centimeters. The reef community is dominated by red algae *Peyssonnelia* sp. and sponges, but other species from different groups were sparsely observed: Scleractinians (*Madracis pharensis*), encrusting bryozoans (*Schizomavella mamillata*), erected bryozoans (*Smittina cervicornis*, *Reteporella* sp.), ascidians (*Aplidium* sp., *Halocynthiapapillosa*) and echinoderms are presents: sea cucumber (*Holothuriatubulosa*), sea urchins (*Centrostephanus longispinus*) and sea stars (*Echiinaster sepositus*, *Peltaster placenta*, *Coscinasteria stenuispina*). Sponges are abundant and mainly represented by *Clathrina clathrus*, *Chondrosia reniformis*, *Ircinia* sp., *Agela soroides*, *Cliona viridis*, *Phorbas tenacior*.

Are also very abundant some brown algae (*Dictyota* sp., *Zanardiniatypus*), red algae (*Mesophyllum*sp., *Lithophyllum*sp., *Peyssonnelia* sp.), and green algae (*Palmophyllumcrassum*, *Caulerpacylindracea*).

The seascape changes and the coralligenous assemblages give way to sublittoral rocks dominated by photophilic algae. This habitat is characterized by a high algal diversity (green algae: *Codiumbursa, Caulerpa cylindracea*; brown algae: *Dictyota* sp., *Cystoseira corniculata, Cystoseira compressa*, C. *foeniculacea*, *Sargassum* sp., and many others) and a few patches of seagrass (*Posidonia oceanica*) when he seafloor changes from rocky to sandy.

The particularity of sublittoral rocks is the high proportion of their surface colonized by brown algae of genus Cystoseira and Sargassum. Perennial brown algae are dominating the hard substrates of the Sazan's and Karaburuni's **western-coast**. The three Cystoseira observed during previous monitoring campaign were: *Cystoseira compressa*, *Cystoseira corniculata* and *Cystoseira foeniculacea*. Cystoseira communities and seagrass meadows (*Posidonia oceanica*) are hosting a high biodiversity in sublittoral waters.

Kepibay hosts a lot of ascidians (*Rhopalaea neapolitana*), gastropods (*Bursatella leachii*), marine worms (*Hermodice carunculata*) and echinoderms: sea cucumber (*Holothuria*sp), sea star (*Marthasteriasglacialis* and *Echinasterseposito*s), and sea urchins (*Sphaerechinus granularis*). Gastropods *Bursatella leachii* were observed isolated or in groups of individuals, either on soft substrate or on macro-waste or isolated rocks. Another gastropod was found in this part of the bay: *Tylodinaperversa*.In thislittlebay it's possible to see very few fishes, mainly comber fish (*Serranu scabrilla*), marine worms (*Hermodice carunculata*) and echinoderms (*Holothuria* sp.). Numerous archaeological remains and macro-waste were found, here and in other dive sites in the bay.

Here the Posidonia is really rarefied and the meadow has little capacity for spontaneous recovery. It should be mapped accurately and it should be investigated in the way t compare with previous data.

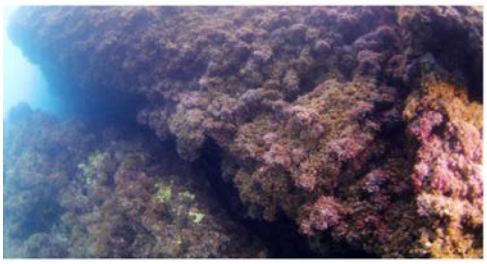
Consideration

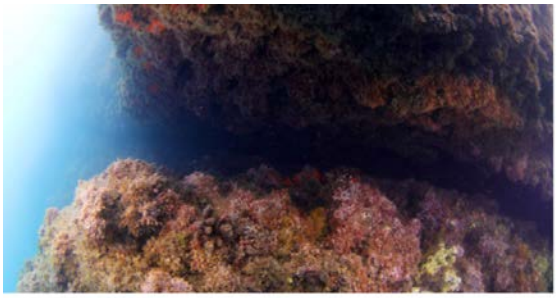
The ecosystem enclosed within the Vlora bay can be represented as a complex mosaic of habitats, many of which are affected by both human pressure both human activities. Along the coasts of the Karaburun-Sazan Marine Protected Area there are environments of high naturalistic value, important sites of submerged archeology and many wrecks of the World Wars.The Marine Protected Area has been active since 2010, but does not possess detailed works that describe underwater flora, fauna and chemical-physical characteristics completely.
Over time, several research jobs have been completed that have been very useful to have a general picture of the environment.

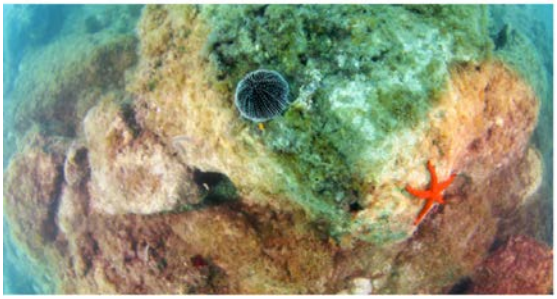
Monitoring and **evaluation plans** are indispensable to know what is being managed and protected and how resources are evolving now on the basis of the touristic pressure growing.
The benefits deriving from the modern management of the Marine Protected Areas, such as, for example, economic income and promotion, both tourist and non-specific, can be achieved once a management of the Marine Protected Area has been established, which has the bases in the scientific monitoring and promotion of tourist activities and eco-friendly teaching methods.

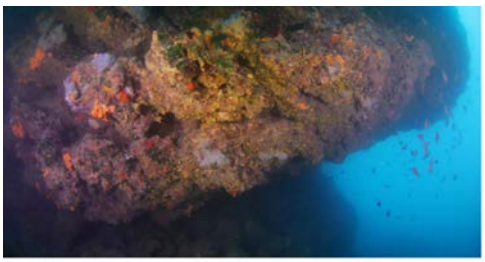
The Protected Marine Area of Karaburuni-Sazan contains a real treasure under the sea level, of equal naturalistic value to the beauty of the emerged lands: managing the area and the MPA better, it will be possible to create an economically and scientifically sustainable system, which we hope will be possible later replicate in future Marine Protected Areas, already identified along the beautiful Albanian coasts.

Figures 7-17: Examples of benthic communities of submerged rock walls of Karaburun-Sazan, inside and outside the bay (pics by dr. S. Modugno, UNDP Mission, March 2019).









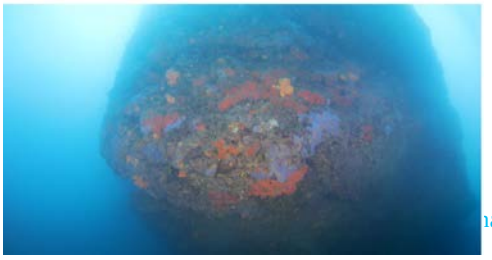


Figure 18-21: Posidonia meadows damaged in Vlora bay near the aquaculture sites (pics by dr. S. Modugno, UNDP Mission, March 2019).

3.7. WATER AND SEDIMENT QUALITY

Vlora Bay is one of the most attractive coastal zones of Albania, defined as a top-priority tourism area. It presents quite suitable conditions to accommodate vessels of various types. Human activities around Vlora Bay and port areas cause significant water pollution. Industrial wastewater and urban water overflow are traditional pollution sources of this area and there's the presence of an industrial plants as TEC and Petrolifera. Two main ports, the Commercial Port and Fishing Ports, that are positioned in the bay, are subjected to various and potential pollutants, i.e. boat and ship anti-foulants, boat hull cleaning, oil and other releases and discharges from boats, wastewater discharges from municipality and industrial facilities etc.

3.7.1. FECAL BACTERIA INDICATORS

The region of Vlora as one of the most visited beaches in Albania and in the same time one of the identified pollution hotspot sites. Data and final results of previous monitoring campaign on the seawater quality, as well as to evaluate the role of seasonal changes of the environmental parameters, give indications about the dynamic of fecal bacteria indicators.
The number and the type of bacterial populations in an aquatic community are determined in part by the physical and chemical properties of the water body. One of the environmental factors that have a strong impact on organisms is temperature. During the investigation period the temperature varied from 11.6C° in March to 23.7C° in summer time. Temperature changes were a result of climatic conditions and season**. Coliform bacteria are widely used as indicators of fecal contamination of both fresh and marine waters.**

In many previous studies two parameters for fecal contamination were used: concentration of total coliform bacteria and the presence of *Streptococcus fecalis*. In the figure below are presented seasonal changes of the total coliform concentrations, measured with MPN method. During 2015 the highest number of total coliform bacteria was registered in June and in July.

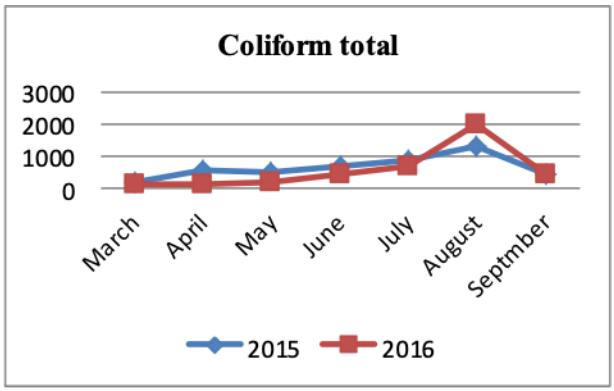


Figure 22: Dynamics of total coliform bacteria over the years 2015 and 2016 (A. Bakai et al., 2017).

This result is common for the season because of the high temperature of water, as well as in some stations a source of seawater pollution, is inflow from untreated wastewater discharges in the sea.

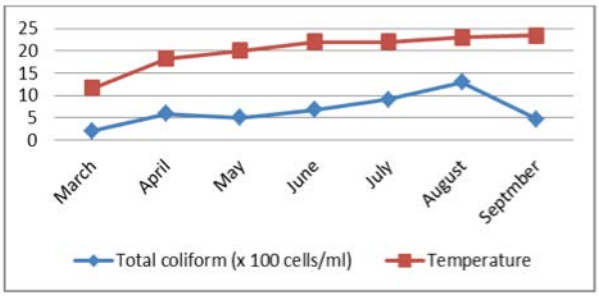


Figure 23: Dynamics of water quality parameters (coliforms and water temperature) during March – September 2015 (A. Bakai et al., 2017).

Data show that in general the number of total coliform bacteria was lower during investigation period of 2016 compared with 2015, except August. This month register the highest values of total coliform bacteria for the two years in most of the sampling stations. This could be due to the high number of people visiting the beaches in this coast line during summer time.

High concentration of fecal bacteria were associated with high temperature. Comparison of these parameters is very important in determination of water quality (Figg.23-24).

The presented data confirm the known ecological phenomena consisting in the cooperation of biotic and abiotic factors of the environment influencing the life, dynamics and distribution of microorganisms in the waters.

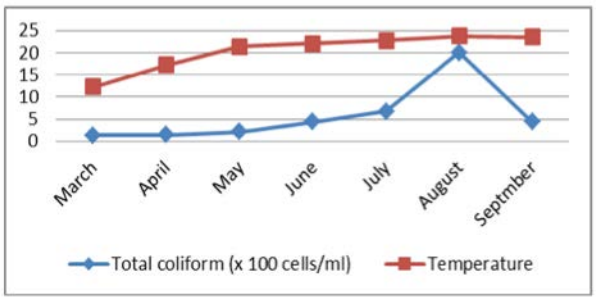


Figure 24: Dynamics of water quality parameters (coliforms and water temperature) during March – September 2016 (A. Bakai et al., 2017).

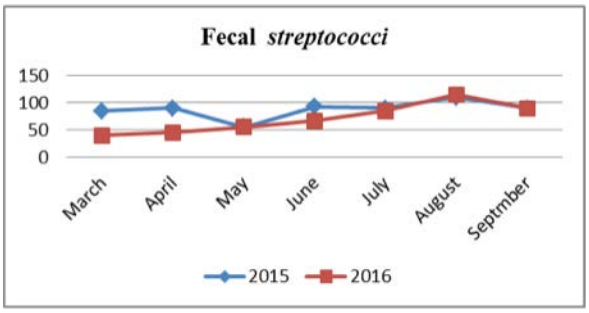


Figure 25: Percentage of sampling stations where fecal streptococci were present in 2015 and 2016. (A. Bakai et al., 2017).

The presence of fecal **streptococci** was another parameter for determination of fecal pollution of seawater.

The presence of these bacteria in water could be of human or animal origin. In our study we made a qualitative estimation and not a quantitative one, for these bacteria in seawater.

Figure 26: Map of the sampling stations in Vlora bay (S. Kane et al., 2016).

During 2016 investigation period, an increase in the number of sampling stations where fecal streptococci were present was observed.

This study indicates that seawater along the Vlora seacoast is under high anthropogenic impact. Wastewater from the settlements located in the watershed, especially on the shore, have distinct human impact on the water quality. Apart from this, it is possible to observe an improvement in the quality of seawater in Vlora. If this is a tendency, is very important for the people that visit this area during summer time. Nevertheless, there is still much work to do in order the water of this area become safe for bathing.

3.7.2. WATER

Vlora, with approx. 100,000 inhabitants, is situated at Vlora Bay that is considered as the frontier between the Adriatic and Ion Sea. The Sazani Island is positioned at the entrance of Vlora Bay causing unfavorable condition of water circulation between the bay and open sea. The distance of Vlora Bay from Italy is 70 nautical miles. The hills around the town are cultivated with olive groves. Vlora Bay presents quite suitable conditions to accommodate vessels of various types. Two of the most important ports of Vlora city are the Commercial Port and Fishing Port (Triport). Harbor activity can cause significant damage to water quality and subsequently to marine life and ecosystems, as well as to human health. The Commercial Port of Vlora is the second port in importance (after port of Durrës), for the severity of capacity, and the largest port of South Albania serving for the transport of goods and passengers. The harbor size is very small (coastal type gate) and the maximum vessel size is up to 500 feet in length. The water depth varies from 4.9 - 6.1 m of cargo pier, 9.4 - 10 m in the channel and oil terminal and 17.1 - 18.2 m in anchorage. For the features it is a straightforward port consisting of two major moths, holding vessels such as cargo ship and ferries. There are no strong currents and fluctuations that may affect navigation tools, so it can ensure a safe mooring beside him, outside the system of quays and a place that protects ships thanks to its geographical position. The Fishing Port known as “Triport” is situated in the north-west of the Commercial port of Vlora. This port is mainly used for the anchor of fishing vessels.

In order to assess the water quality of Vlora Bay, water samples were investigated at fourteen sampling sites (including the Commercial & Fishing Port, Vlora Bay and Narta and Orikumi Lagoon) and physics-chemical parameters of water such as temperature, pH, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), particulate material (TSS and TDS), nutrients (N-NO2 -, N-NO3 -, N-NH4 +, P-PO4 3-) were determined. **Based on the results of physics-chemical parameters and nutrients content in the studied areas it was found that nutrients content was found at higher concentrations in both ports compared to the bay, but they were within the permitted levels of Seawater Quality.**

The physical-chemical parameters of seawater (except TSS) are within the permitted levels. Due to rainy weather condition during sampling time, relatively high TSS content were found in Vlora Bay. The nutrients content were within limits permitted under the EC Directive CEE 78/659. High nutrient content were found in the stations positioned in the Commercial and Fishing Ports. The sources can be urban wastes discharged from the surrounding area, the untreated sewage discharged from the vessels and higher values of temperature. Based on nutrient content, the seawater at both ports and in Vlora Bay were oligotrophic. Small effect of harbor activity to water quality of Vlora Bay related to the small size of both ports. Relatively high nutrient content in ports is an indicator of pollution factors that need a constant monitoring of the physical and chemical parameters to remain in control the water quality of the bay. Due to the continuous anthropogenic activities around the area and the inappropriate discharges of oil wastes or other solid and liquid wastes from the ships anchored in these ports the situation should be worse particularly during the summer period with higher temperature and high tourism activity.

Diagrams in (Figure 27, 28) plot the physics-chemical parameters of water in the Commercial & Fishing ports and other areas of Vlora Bay

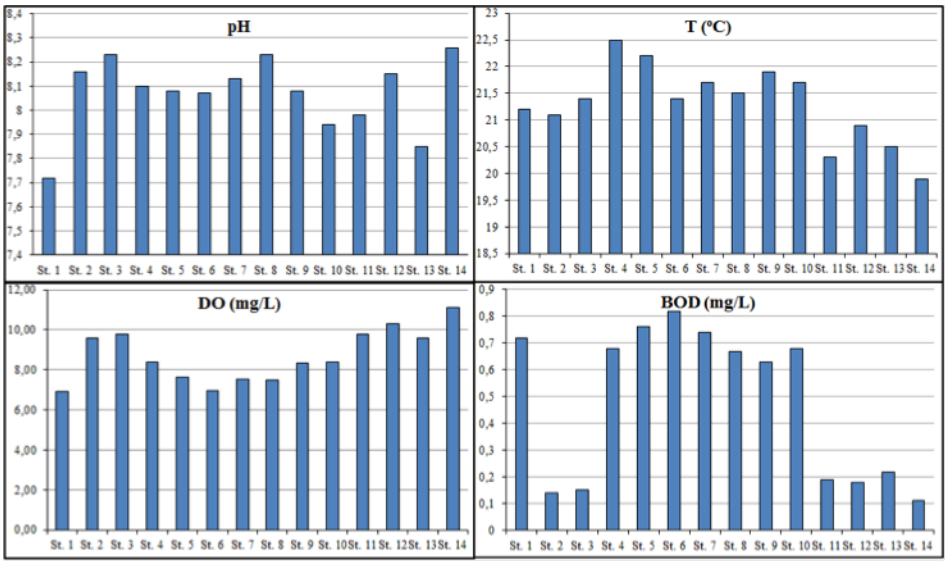


Figure 27: a) pH, b) temperature, c) dissolved oxygen, d) biological oxygen demand content in water of Commercial & Fishing port and other sites of Vlora Bay.

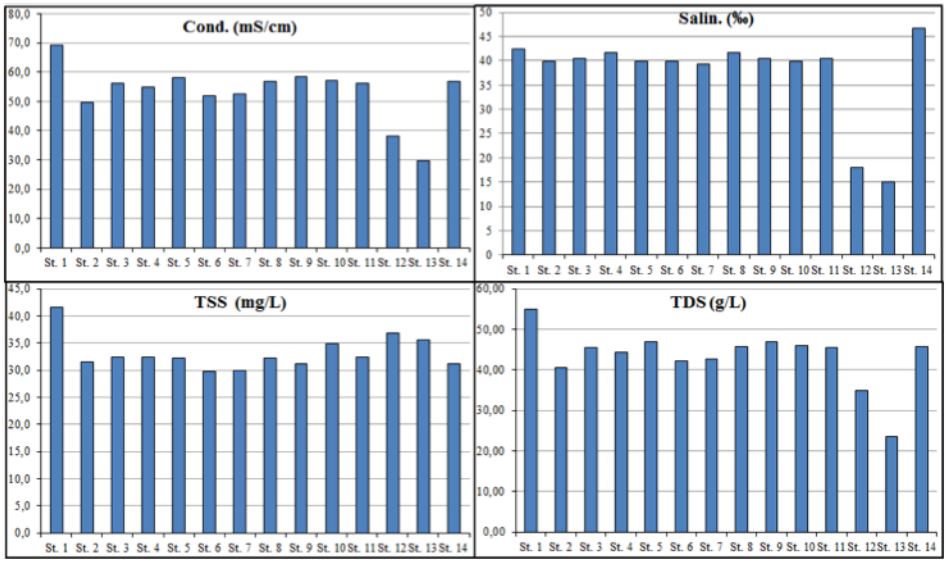


Figure 28: a) Conductivity, b) salinity, c) TSS, c) TDS content in water of Commercial & Fishing port and other sites of Vlora Bay.

pH

pH of aquatic ecosystems depends on the chemical and biological activity of water. Changes in pH can be indicating the presence of industrial pollutants, photosynthesis or the respiration of algae that are feeding with the contaminants. Most ecosystems are sensitive to the changes in pH and the monitoring of pH has been incorporated into the environmental laws of most industrialized countries. As we can see from (Figure 2/a), pH values fluctuated between 7.72 - 8.26 at station St. 1 (Narta Lagoon) and at station St. 14 (reference station, Orikum) respectively. Lower pH values resulted in all water samples compared to the reference sample due to the urban wastes and the limited water circulation.

Temperature

The water temperature is the best index of seasonal fluctuations. It is affected by several factors including weather conditions, removal of shading stream bank vegetation and storm water. As it would be expected, the temperature of surface water of two ports and the other studied areas of Vlora Bay fluctuated between 19.9 to 22.5C° with a mean value of 21.3C° that is normal for the period of sampling process (during May).

Dissolved oxygen

Dissolved Oxygen (DO) is an important environmental parameter needed for a good quality of surface water. In general, it is available as dissolved state at water bodies. The fluctuations in the dissolved oxygen levels in water can be caused by aquatic vegetation and anthropogenic status of the water. It is well known that the temperature and salinity affect the dissolution of oxygen in water. DO in water originate from the air dissolution and the process of photosynthesis that occurs during daylight. At high temperature, which is usually observed in dry season, the solubility of oxygen decreases while at lower temperature (wet season) it increases.

As it can be seen from the (Figure 2c) the quantity of DO in water of two ports and other surrounded areas in Vlora Bay ranged from 6.92-11.10 mg/L, with a mean value of 8.7 mg/L. The DO content in water samples collected within the two ports resulted lower (especially in station 6 positioned in the commercial port of Vlora), compared to the DO content in the samples collected in the other sites of Vlora Bay or the reference sample collected in Orikum.

Biological oxygen demand

The determination of the Biological Oxygen Demand (BOD) revealed that the highest concentration (0.82 mg/1) was found in station 6 (Commercial port) and the lowest was (0.11 mg/l) in station 14 (reference station, Orikum) (Figure 2/d) with an average value 0.48 mg/L. BOD levels serves as an indicator of organic pollution of water; higher the BOD, higher the amount of pollution in the test sample. A marine environment that presents high levels of BOD is not appropriate for the life of species that require oxygen.

Redox Potential

Redox potential is the activity or strength of red/ox processes in solution and its values varied from -82.4 mV to -37.2 mV (Table 1). Negative values of the redox potential in all stations indicate the reducing properties of seawater.

Conductivity, TDS, TSS and salinity

Conductivity, TDS and salinity were found at higher levels in the station 1 (Narta Lagoon) and 14 (reference sample, Orikum). Lower values of these parameters were found in the station 13 situated in the southwestern part of Orikum Lagoon (near Marmiroi church), very close to a spring of fresh water from the bottom of the lagoon. The mixing of the lagoon's water with the fresh water in this station causes the reduction of salinity, electrical conductivity and other physics-chemical parameters. Conductivity varied from 29.7 mS/cm (station 13) to 69.3 mS/ cm (station 1). The fluctuation in electric conductivity dependents on the fluctuations of TDS. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge). As the concentration of salts in the water increases, electrical conductivity is also increased.

Salinity is the measurement of ionic composition of water and it varies depending on mixing of relatively fresher inland waters with saltier marine waters. In water samples of two ports and other sites of Vlora Bay, salinity values fluctuated in a range between 15.1-46.8% with a mean value of

37.54%. The salinity was found to be lower in station 13 (near Marmiroi Church) due to the mixing of fresh water with saline water.

Total Solids (TS) refers to any matter either suspended or dissolved in water. High concentrations of TSS have several negative effects, such as decreasing the amount of light that can penetrate the water, thereby slowing photosynthetic processes, which in turn can lower the production of dissolved oxygen; high absorption of heat from sunlight, thus increasing the temperature which can result to lower oxygen level.TSS content fluctuated between a minimum value of 29.7 mg/L at station 6 and maximum value of 41.6 mg/L at station 1. TSS content in ports water resulted slightly lower compared to other sites in Vlora Bay. TDS concentration resulted in lower level in station 13 (23.6 g/L) and in higher level in station 1 (55.04 g/L).

Nutrient content

The (Figure 4) depicts the nutrient content (nitrites, nitrates and phosphates) in Vlora Bay and two lagoons (Narta and Orikumi Lagoons), as well as in two ports, Commercial and Fishing Port.
Nitrates (N-NO3-) concentrations in all samples collected from the two ports and other sites in Vlora Bay varied from 0.018 to 0.181 mg/l. Due to the untreated urban wastes discharged into the sea. (especially close to the anchor gate of commercial port, where the untreated urban wastes of Skela area are discharged through a collector directly into the sea), the content of nitrates in both ports were higher compared to the water samples collected in the bay and lagoons. High content of nitrates in seawater is not concerning as they are the main nutrient for the aquatic biota and its intensive development causes rapid reduction of nitrates.

Nitrites (N-NO2-) in seawater are found as intermediate compounds obtained from microbial reduction of nitrates and/or ammonium oxidation. Another possible source of nitrites might be phytoplankton and wastewater discharges. The concentration level of nitrites varied from 0.004 to 0.014 mg/l. According to EC Fish Directive 2006/44/EC recommended values for nitrites are <0.03 mg/l (Cyprinid waters) that is higher than the maximum level of nitrites found in Vlora Bay.

Ammonium (N-NH4+) might be considered as a reliable indicator of sewage discharges and livestock liquid wastes. The ammonium content was found in the levels between 0.019-0.132 mg/L. Higher levels were found in station 10 (the commercial port), as close to this station the untreated urban wastes are discharged through a collector directly into the sea.

Phosphates (P-PO43-): Almost all of the Phosphorus (P) present in water is in the form of phosphate (P-PO43-) that is an essential plant nutrient stimulating the plant (algae) growth. Its role for increasing the aquatic productivity is well recognized. High levels of both phosphate and nitrate can lead to eutrophication, which increases algae growth and ultimately reduces dissolved oxygen levels in the water. Phosphates in both ports were found in higher content (0.010 to 0.016 mg/L) compared to other surrounded areas in Vlora Bay. The mean value was 0.009 mg/L (Figure 4), lower than EC guide (≤ 0.4 mg/L for Cyprinid waters).

Comments

Vlora Bay presents quite suitable conditions to accommodate vessels of various types. **The physical-chemical parameters of seawater (except TSS) were found within the permitted levels.** Due to rainy weather condition during sampling time, relatively high TSS content were found in Vlora Bay.

The nutrients content were within limits permitted under the EC Directive CEE 78/659. High nutrient content were found in the stations positioned in the Commercial and Fishing Ports. The sources can be urban wastes discharged from the surrounding area, the untreated sewage discharged from the vessels and higher values of temperature.

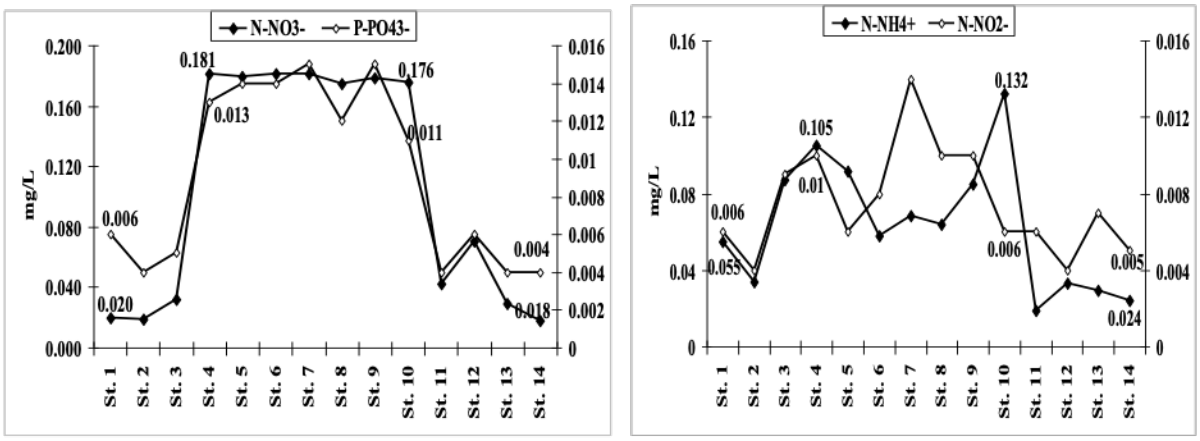
Based on nutrient content, the seawater at both ports and in Vlora Bay were oligotrophic. Small effect of harbor activity to water quality of Vlora Bay related to the small size of both ports.

Relatively high nutrient content in ports is an indicator of pollution factors that need a constant monitoring of the physical and chemical parameters to remain in control the water quality of the bay. Due to the continuous anthropogenic activities around the area and the inappropriate discharges of oil wastes or other solid and liquid wastes from the ships anchored in these ports the situation should be worse particularly during the summer period with higher temperature and high tourism activity.

	pH	E	T	TSS	TDS	DO	BOD	Cond.	Sal.	$N\text{-}NO_3^-$	$N\text{-}NO_2^-$	$N\text{-}NH_4^+$	$P\text{-}PO_4^{3-}$
Mean	8.07	-64.19	21.30	33.13	43.23	8.70	0.48	53.29	37.54	0.106	0.008	0.063	0.009
Median	8.09	-65.35	21.40	32.30	45.41	8.42	0.65	56.30	40.15	0.123	0.007	0.061	0.009
Standard Deviation	0.15	11.46	0.72	3.18	7.13	1.32	0.29	9.47	9.13	0.077	0.003	0.034	0.005
CV%	2	-18	3	10	16	15	60	18	24	73	38	54	52
Kurtosis	0.78	1.56	-0.18	2.99	4.37	-1.09	-2.09	2.70	3.41	-2.25	0.54	-0.50	-2.04
Skewness	-1.01	1.03	-0.36	1.63	-1.57	0.24	-0.27	-1.28	-2.09	-0.08	0.84	0.48	0.09
Range	0.54	45.20	2.60	11.90	31.44	4.18	0.71	39.60	31.70	0.163	0.010	0.113	0.011
Minimum	7.72	-82.40	19.90	29.70	23.60	6.92	0.11	29.70	15.10	0.018	0.004	0.019	0.004
Maximum	8.26	-37.20	22.50	41.60	55.04	11.10	0.82	69.30	46.80	0.181	0.014	0.132	0.015
Count	14	14	14	14	14	14	14	14	14	14	14	14	14

Table 8: Statistical data of physico-chemical parameters and nutrients.

Figure 29: Nutrients content in Commercial & Fishing port and other sites of Vlora Bay.



3.7.3. EUTROPHICATION

Knowledge of the structural and functional properties of microalgae communities is essential for the evaluation of the ecological consequences of human activities for the trophic state of marine ecosystems. Strict relationships have been observed between environmental conditions and phytoplankton communities; for example, phytoplankton communities respond to changes in the physical and chemical properties of their environment by changing their taxonomic composition and size structure (Platt et al., 2005). In coastal areas, these relationships are even more evident because of the extreme variability of physical and chemical parameters, and the effects of human activities such as urbanization and tourism. In areas like the coastal regions ofAlbania, which are subject to drastic socioeconomic changes, and consequently, to an increasing and uncontrolled exploitation of aquatic ecosystems (Munari et al., 2010), the assessment of the structure and productivity of phytoplankton assemblages is a crucial issue. Such assessments, however, regarding the Albanian marine coastal waters are relatively scarce (Mangoni, Saggiomo and Santarpia, 2003; Rubino et al., 2009; Saracino and Rubino, 2006). Vlora Bay, Albania, is a good site to carry out these assessments because it is a semi-enclosed bay with a densely populated industrial city, Vlora (Cullaj, Lazo, and Baraj, 2004; Cullaj et al., 2005). The bay is connected to the open southern Adriatic Sea by a very shallow entrance (,40-m depth), and is south of the mouth of the Vjosa River whose waters flow southerly past the Narta Lagoon and into the bay (Pano et al., 2006) (Figure 1). In addition, the bay is of paramount interest to the Albanian fishing industry since it serves as a natural nursery for many fish species of economic importance. There are no data available regarding the phytoplankton assemblages and the productivity of Vlora Bay, so it was necessary this study carried out as part of the European Project CISM (INTERREG IIIA Italy–Albania), which aims at producing a detailed characterization of the Vlora Bay ecosystem. The aim of the study was to evaluate the structure and productivity of the phytoplankton assemblages in Vlora Bay to assess the trophic characteristics of the bay on small temporal and spatial scales. In particular, size-fractionated biomass, chemo-taxonomic composition, and size-fractionated primary production are discussed in relation to the physical and chemical environmental conditions of the bay.

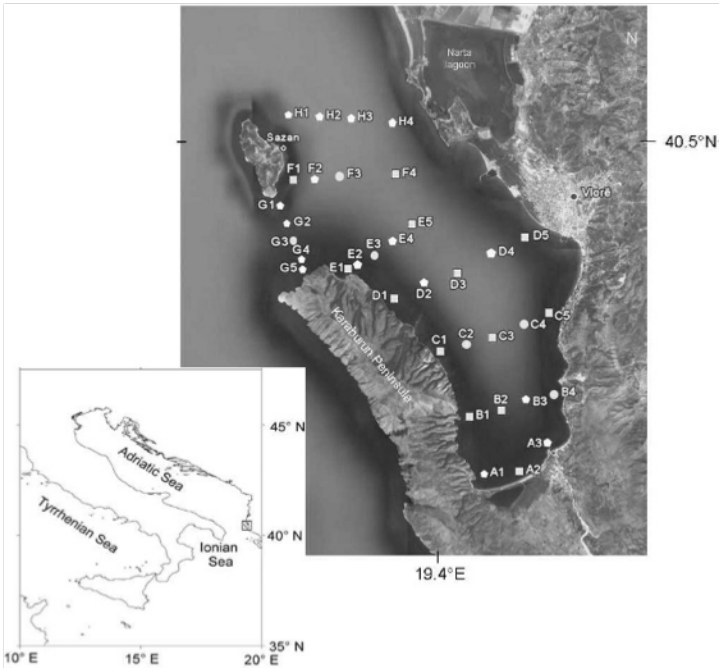


Figure 30: Sampling stations biological stations sampled during CISM_1 (spring 2007) and CISM_2 (winter 2008); circle, biological stations sampled during CISM_1 (spring 2007); pentagon, CTD profiles.

The Vlora Bay, because of its position in the southeastern Adriatic Sea, is influenced from Vjosa river delta and by the waters coming from the eastern Mediterranean, one of the most oligotrophic areas of the world's oceans (Allen, Blackford and Radford, 1998; Relevante and Gilmartin, 1995). The highly variable temperatures and salinity values observed during the spring highlighted the **complexity** of the bay's **hydrology** that is due to the **morphology** of the bottom and to the influence of land runoff. The shallow depths in the channels connecting the open Adriatic sea to the bay reduce the exchange of subsurface waters (<40 m) with the southern Adriatic Sea. This factor has a major impact on the ecology of the coastal ecosystem of the bay. The open South Adriatic waters were primarily important in the surface layer of the western part of the bay, whereas the influence of land runoff was important in the eastern part. As a consequence, an E-W salinity gradient was observed in both seasons. In winter it occurred despite the vertical mixing of the water column.

During the spring, the **phytoplankton biomass** showed a mean value of 0.25 mg m23 (a range that is typical of the oligotrophic areas; e.g., Li et al., 1983; Yacobi et al., 1995), and a DCM at the bottom of the deepest stations (>40 m). The surface spatial distribution of the phytoplankton biomass and the primary production showed a clear E-W gradient, with the highest concentrations along the eastern coast, thus emphasizing the role of terrestrial input from the city of Vlora and from the Narta Lagoon. These distributions were consistent with the temperature and salinity gradients.

In addition, the low **PO4** and **NO3** concentrations, which were often near or below the detection limit, indicated a condition of nutrient depletion. This nutrient depletion could suggest that our spring cruise took place after an algal bloom. This hypothesis is partially confirmed by the relatively high phaeopigment and **NH4** concentrations that are indices of senescence and of grazing activity. However, it cannot be excluded that the NH4 concentrations were due, at least in part, to terrestrial input, as suggested by the relatively high SiO4 concentrations.

In winter, the vertical distribution of **Chl***a* was mainly due to the water column dynamics.

The phytoplankton biomasses were uniformly distributed along the water column because of the column's isopycnal characteristics. This type of distribution is typical of winter phytoplankton distribution in the open sea at temperate latitudes. It is interesting to notice that the primary production rate was lower in winter than in spring even though the chlorophyll concentration was higher in winter. It should be excluded that these low primary production rates were due to nutrient limitation, since (a) the mean NO3 concentration was higher in winter than in spring, and (b) the mean concentrations of PO4 and SiO4 were the same in both seasons. It could be hypothesized that the low winter primary production rates were due to the shorter winter days and to the low irradiance availability. In fact, in winter, the average light available during the incubations was 300 mmol photons m22 s21 at the surface, and decreased rapidly in the deep layers (at 15 m of depth it had already decreased to 50 mmol photons m22 s21).

The data of the this study are **the first data available regarding primary production rates in the Vlora Bay**.

In spring 2007 and in winter 2008, Vlora Bay was characterized by generally oligotrophic conditions and highly variable primary production processes.
The influence of the open southern Adriatic waters on the trophism of the bay was negligible, whereas the influence of terrestrial inputs was very pronounced. The distribution of biomass at

surface clearly showed the role of terrestrial discharges from the eastern coast in driving primary production processes. The bay was divided in two sections along a SE-NW direction: the lowest values of both phytoplankton biomass and production were recorded in the western area.
The trophic state was driven by local hydrodynamic conditions, terrestrial nutrient inputs, and biogeochemical cycles that were all mainly confined within the bay.

Figure 31: vertical profiles of temperature (a, c) and salinity (b, d) in spring and in winter, respectively.

et 2011).

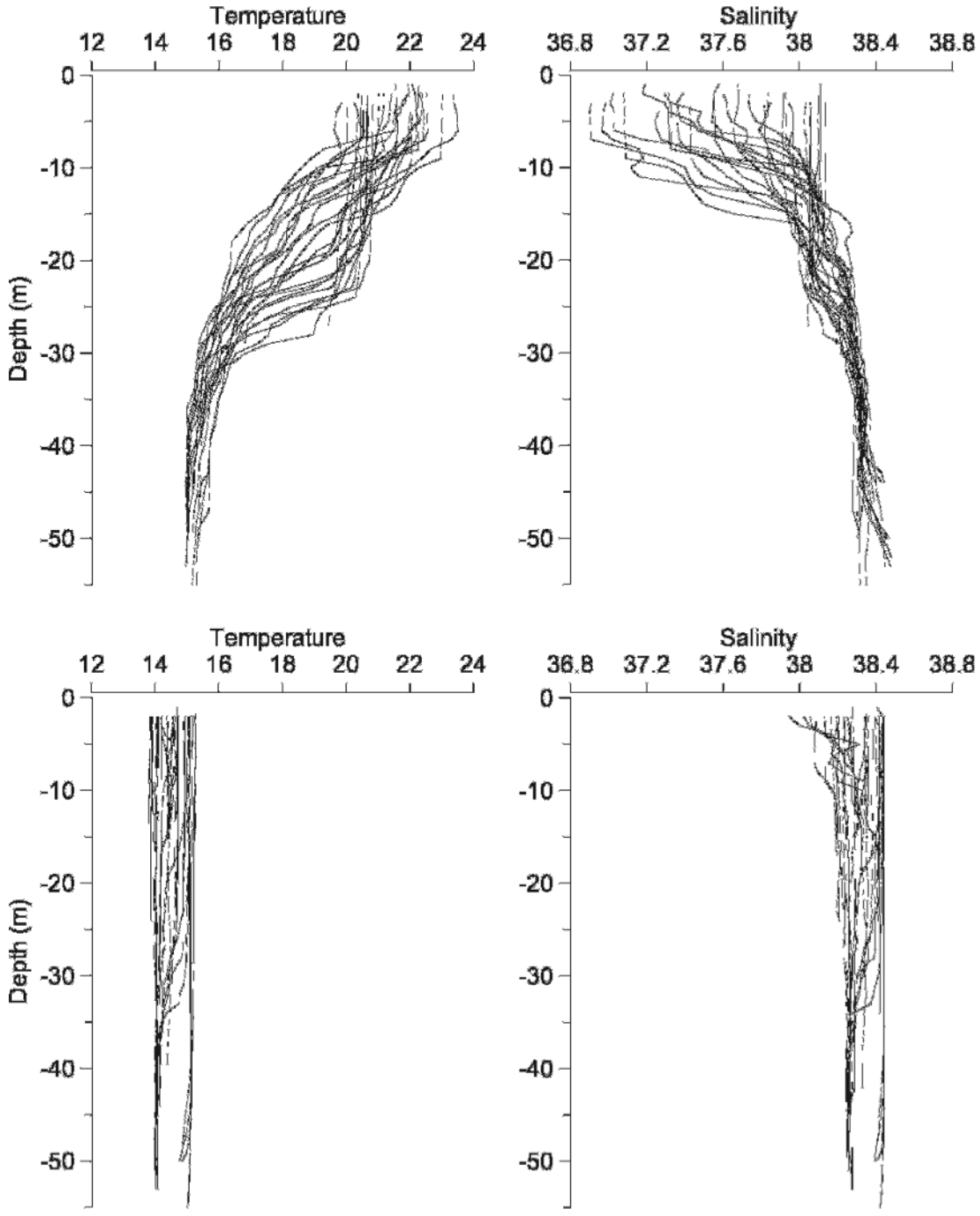


Figure 32: Spatial distribution of chlorophyll a (mg m23) at surface and in the bottom layer in spring (a, b) and in winter (c, d) (O. Mangoni year? T al. 2011?

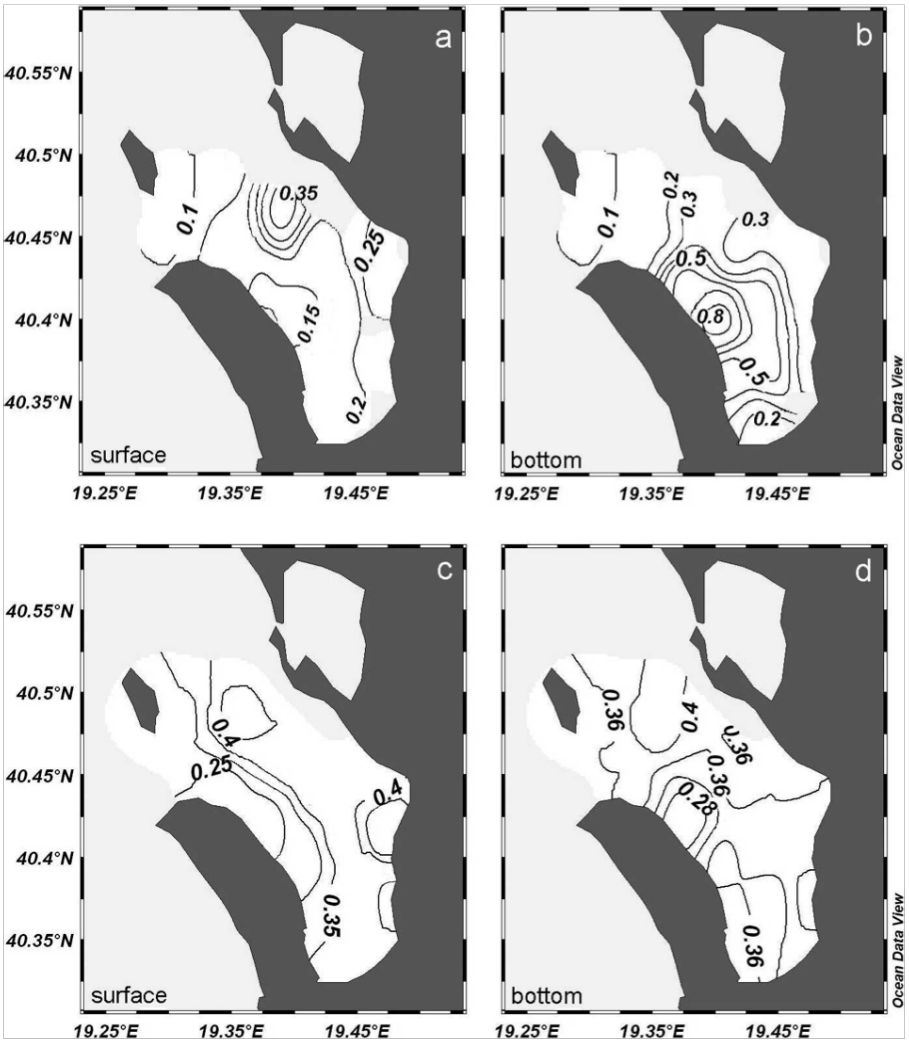
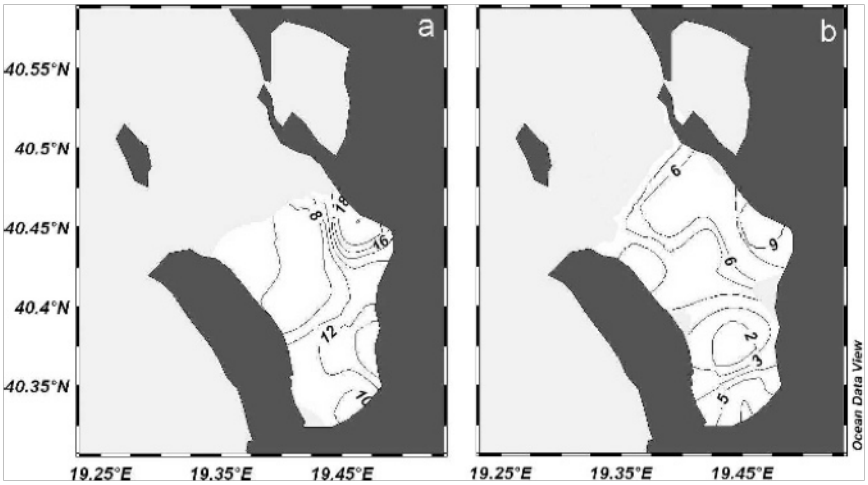


Figure 33: Spatial distributions of mean integrated primary production (mg C m23 d21), (a) in spring and (b)



3.8. ECOTOXICOLOGY

A few integrated eco-toxicological studies, based on bioaccumulation and biomarker responses in sea urchin, mussel, and fish were conducted in Vlora Bay. Despite several past industrial activities and current increase of anthropogenic impact characterizing Vlora Bay, **no eco-toxicological data have been published so far**, underlining the need to investigate the area and to validate the eco-toxicological approach.

Heavy metals, polycyclic aromatic hydrocarbons (PAHs), organo-chlorine pesticides (OC), and polychlorinated biphenyls (PCBs) were measured in native sea urchin (*Arbacia lixula*), Mediterranean mussel (*Mytilus galloprovincialis*), and red mullet (*Mullus barbatus*). Several biomarkers such as expression of heat-shock proteins (HSP-70) in sea urchin (PCR), detoxification enzyme activities and apoptosis in mussels, and acetylcholinesterase (AChE) activity in mussels and red mullet were investigated.

Overall, eco-toxicological data suggest an environmental quality of Vlora Bay resembling a marine protected area except for levels of Cd, Ni, and Hg in mussels and red mullet gonads; these results are in agreement with past industrial activities. OC pesticides were found to be below the detection limit in sea urchin. PCB levels were very low (4.13–13.87 ngg 21 fresh weight) both in mussels and fish, while PAHs were similar to those reported for moderately impacted areas.

No exposure to neurotoxic pesticides (physiological AChE activities) or to cytotoxic contaminants (low apoptosis frequency: 1%) can be inferred both in mussels and fish. Detoxification enzyme activities in mussels were highly similar compared with those reported for low-impact areas. **The results of the eco-toxicological studies on Vlora Bay also support its suitability in environmental quality assessment of marine coastal areas.**

The absence of detectable levels of OC pesticides in sea urchin specimens from Vlora Bay might suggest a low level of contamination in marine coastal waters. PCB values detected in mussels were similar to those reported for low-impact sites in a previous study along the Apulian Adriatic coast (range 2.5–15.8 ngg 21 w.w.) (Corsi et al., 2002). Higher PCB levels have in fact been reported in mussels collected along the Mediterranean coasts in more polluted areas , such as harbors and coastal areas (Bodin et al., 2004; Porte and Albaigés, 1993). Similarly, PCB levels in gonads of red mullet specimens were significantly lower than those reported for other fish species in Mediterranean coastal areas (Mariottini, 2003).
Concerning PAH levels in mussels, from the comparison with other Mediterranean coastal areas, they showed particularly low values, similar to those reported for low-contamination sites. Values from previous studies include: low- impacted sites ,0.5–148 ngg 21 w.w., according to Iosifidou, Kililidis, and Kamarianos (1982), Pancirov and Brown (1977),

Rainio, Linko, and Ruotsiia (1986), and Takatsuki et al. (1985); moderately contaminated sites 295–580 ngg 21 w.w., by Amodio-Cocchieri, Arnese, and Minicucci (1990) and Amodio-Cocchieri et al. (1993); and highly impacted sites 534– 2785 ngg 21 w.w., by Bjorseth, Knutzen, and Skei (1979) and Kveseth, Sortland, and Bokn (1982). Again, those measured in gonad of red mullet were significantly lower than those reported in low-fat tissues such as fillet for red mullet and other fish species along the Adriatic Sea (Corsi et al., 2002; Perugini et al., 2007). Significantly higher levels of heavy metals were observed in mussels from Vlora Bay. The higher levels of selected heavy metals in mussels of V1 might be related to the presence of discharge both of industrial and urban origin where both the town of Vlora and the soda production plant are located. Less clear is the origin of the highest levels of As and Cd in mussels from V2: A possible explanation might be the

presence of agricultural discharges related to the inland activities . Overall, heavy metals data seem to be similar to other low -impact areas, including the Adriatic Sea (Kljakovic´ -Gas´pic´ et al., 2006; Lavilla et al., 2006; Martella, Nelli, and Bargagli, 1997; Orescanin et al., 2006), except for Cr, Ni, and in particular Hg. Cr and Ni might be related to peculiar lithological characteristics inland but also to mining activities, refinery, and other industrial activities along the Vlora Bay coasts. The significant Hg contamination in Vlora Bay has been already reported due to the presence of a soda production industry from 1978 to 1992: Due to the electrolytic method based on Hg, a huge amount of Hg has been discharged in the bay, which is reflected by the high levels detected in marine sediments (Celo et al., 1999; MWH Consulting, 2003). The absence of significant differences in levels of Cr, Ni, and Hg in mussels from the two sites (V1 and V2) suggests an extension of contamination in the bay. Finally, the significantly higher levels of heavy metals recorded in red mullet gonads from site A1m located in the bay, compared to site A2 (Adriatic Sea) resulted in agreement with a moderate to high heavy metals contamination inside the bay.

The absence of bands for the chosen genes Hsp-1, Hsp-2, and Hsp-3 in sea urchin samples suggests that they might not be specific for the species, and further investigations are thus needed. Since the presence of HSP-70s has been demonstrated in coelomocytes of sea urchins, probably the use of all soft tissue in the present study might have diluted the available RNA (Matranga et al., 2000), thus reducing the capability to detect any gene.

The presence of physiologically normal AChE activities both in gill of mussels and in brain of red mullets (Mora, Fournier, and Narbonne, 1999; Mora, Michel, and Narbonne, 1999) suggests low or no exposure to neurotoxic pollutants of aquatic biota from Vlora Bay. In particular, AChE activities measured in red mullet brain are similar to those previously observed for the same species in marine protected areas in the south Adriatic Sea (Corsi et al., 2002; Lionetto et al., 2003).

Regarding detoxifying capabilities of mussels from Vlora Bay, both phase I and II activity results were particularly low compared to those reported for other Mediterranean and Atlantic Bay areas (Livingstone et al., 1995; Livingstone and Farrar, 1984). In particular, only GST activities were highly comparable with those reported by Bebianno et al. (2007) along the Portuguese coasts and Argese et al. (2004) in the Venice lagoon. Finally, the low apoptosis frequency observed in mussel haemocytes suggests a generally good health status of cells and no risk due to exposure to cytotoxic compounds. Similar frequencies have been reported for mussels from Croatian coasts (Bihari et al., 2003) and for unexposed organisms (Matozzo, Tomei, and Marin, 2005).

The ecotoxicological study conducted in biota from Vlora Bay showed that PAHs, PCBs, and heavy metals have accumulated at low to moderate concentrations in organisms throughout the bay, reflecting the situation of a low-pollution area. The absence of significant biological effects (biomarkers) in the three bioindicators species confirms a generally good health status of Vlora Bay marine biota. This integrated approach combining bioaccumulation and biomarker responses has thus a good potential for the evaluation of environ- mental assessment of a marine coastal area and appears to be the most suitable approach for future pollution and environ- mental stress monitoring. This first study on Vlora Bay generated important data that could be used as a baseline for future monitoring programs related to accumulation and effects of both organic and inorganic pollution along the continental coasts of Albania.

Other Ecotoxicological studies conducted on biota from Vlora Bay showed that PAHs, PCBs, and heavy metals have accumulated at low to moderate concentrations in organisms throughout the bay, reflecting the situation of a low-pollution area. The absence of significant biological effects (biomarkers) in the three bioindicator species confirms a generally good health status of Vlora Bay marine biota. This integrated approach combining bioaccumulation and biomarker responses has

thus a good potential for the evaluation of environmental assessment of a marine coastal area and appears to be the most suitable approach for future pollution and environmental stress monitoring. The Ecotox studies on Vlora Bay generated important data that could be used as a baseline for future monitoring programs related to accumulation and effects of both organic and inorganic.

In tables 9 (1,2 and 3) are presented results of analysis for mercury, lead and cadmium in organisms that were used as bioindicators of heavy metals pollution, obtained during the period of time 1990 – 1993 and 2002-2007.

Table 1. Hg content at different zones expressed in µg/kg wet weight.

Kind of products	Durres		Vlore		Sarande	
	1990-1993	2002-2007	1990-1993	2002-2007	1990-1993	2002-2007
Mytilus galloprovincialis	18.3±3.8	17.9±2.6	77.4±5.6	68.3±9.6	43.7±7.2	45.6±6.5
Mullus barbatus	88.8±7.1	86.2±4.2	172.3±4.8	125.2± 5.9	50.5±6.5	48.7±4.6
Sardina pilcardus	78.8±2.9	76.3±6.5	131.4±8.5	132.1±8.8	82.5±11.3	79,2±3.7
Trachurus trachurus	59.8±3.7	61.4±3.8	52.4±6.9	50.3±7.9	54.7±3.5	55.1±4.4

Table 2. Pb content at different zones expressed in µg/kg wet weight.

Kind of products	Vlore		Sarande	
	1990-1993	2002-2007	1990-1993	2002-2007
Mytilus galloprovincialis	502.1±20.3	493.2±16.1	424.8±26.9	454.4±75.6
Mullus barbatus	420±93.5	479±12.2	-	-
Trachurus trachurus	30.5±8.5	33.9±10.4	29.9±8.6	28.5±9.4

Table 3. Cd content at different zones expressed in µg/kg wet weight.

Kind of products	Vlore		Sarande	
	1990-1993	2002-2007	1990-1993	2002-2007
Mytilus galloprovincialis	531.2±20.6	489±18.5	420.4 ± 12.9	415.6 ± 20.8
Mullus barbatus	523.3±14.1	495.8±13.5	-	-
Trachurus trachurus	23.8-3.8	25.4±5.9	24.8 ± 7.5	22.5 ± 5.2

Metal pollution of the sea is less visible and direct than other types of marine pollution but its effects on marine ecosystems and humans are intense and very extensive. The toxic effects of heavy metals, particularly arsenic, mercury, cadmium and lead, have been broadly studied (Inskipand & Piotrowsiki, 1985; Kurieshy and D'siliva, 1993; Narvaes, 2002; Nishihara, Shimamato, Wen & Kondo, 1985).

The significant heavy metal contamination in Vlora Bay has been already reported due to the presence of a soda production industry from 1978 to 1992: Due to the electrolytic method based on

Hg, a huge amount of Hg has been discharged in the bay, which is reflected by the high levels detected in marine sediments (Celo et al., 1999; MWH Consulting, 2003)

Metal contaminations in food, especially in marine products, have been broadly investigated (Catsiki & Strogyloudi, 1999; Enomoto & Uchida, 1973; Liang, Cheung, & Wong, 1999; Uysal, 1980; Uysal, 1990). Tuna, as a predator, is able to concentrate large amount of heavy metals. Some of them are used for biomonitoring of environmental contamination (Schmitt &Brumbaugh, 1990). According to the results obtained, the mercury levels in the samples of fishes and mussels from all sites of collected samples were found below the permissible levels (FAO, 1976; FDA, 2000; FDA, 2001)

The concentrations of mercury, lead and cadmium in *Mytilus galoprovincialis* from the Adriatic and Ionian Coast are of, 11.2 – 77.6, 380.4 – 545.1 and 434.8 – 560.9 µg/kg wet weight, respectively, and are similar to the results given in literature (Voegborlo, El-Methnani, &Abedin, 1999; Maanan 2007, Mol and Alakavuk 2011, Yilmaz 2003, Besada, 2002)

Overall, heavy metals data seem to be similar to other low-impact areas, including the Adriatic Sea (Kljakovic´ - Gas´pic´ et al ., 2006; Lavilla et al., 2006; Martella, Nelli, and Bargagli, 1997; Orescanin et al., 2006)

The mean concentration levels of mercury found in *Mytilus galloprovincialis* ranged from 18.3 in µg/kg wet weight in the Durres area to 77.4 in µg/kg wet weight in Vlora in the period 1990-1993, whereas for the period 2002-2007 the levels were oscillated from 17.9µg/kg to 68.3 µg/kg. Significantly higher levels of heavy metals were observed in mussels from Vlora Bay.

The distribution of metals varies between fish species, depending on age, development status and other physiological factors (Kagi& Schaffer, 1998). Fish accumulate substantial concentrations of mercury in their tissues and thus can represent a major dietary source of this element for humans. Fish are the single largest sources of mercury and arsenic for man. Mercury is a known human toxicant and the primary sources of mercury contamination in man are through eating fish. Biotransformation of mercury and methyl mercury formation constitutes a dangerous problem for human health (Inskip&Piotrowsiki, 1985).

The results obtained for the fish *Mullus barbatus* and *Trachurus trachurus* have shown that the mean mercury concentration have ranged from 88.8 µg/kg in Durres area to 172.3 µg/kg in Vlora area, where was allocated one chlorine soda plant. During the period of time 2002- 2007 the results obtained for *Mullus barbatus* were oscillated from 86.2–125.2 µg/kg whereas for *Trachurus trachurus* the levels of mercury were oscillated between 50.3–61.4 µg/kg wet weight. Statistical analysis of results by ANOVA showed no significant differences among all samples and periods of collected samples. The concentration of lead recorded at all sites ranged from 360.6 to 550.2 µg/kg for *Mullus barbatus* and for *Trachurus trachurus* 19.3-45.2 µg/kg.

The levels of toxic elements in shellfish are related to age, sex, season and place (Kagi& Schaffer, 1998). It is also reported that cooking reduces the amount of some metals (Atta, El-Sebaie, Noaman & Kassab, 1997).

Few comparative data are available from the same areas (Storelli, 2000; Orescanin 2006; but it seems that Albanian waterways are less contaminated than industrialized country waterways.

3.8.1. SEDIMENT

Bay of Vlora, Narta & Orikum lagoons and delta Vjosa river are the sites chosen to be investigated during ecotoxicological monitoring studies on seafloor sediments.

Some of the trace metals are as well as rapidly scavenged by the particulate matter in the water body, which eventually settles down to the bottom sediment. And hence the determination of these elements in sediments can play a key role in detecting the sources of pollution. Although sediment analysis does not represent the extent of intoxication, they may be employed on a semiquantitative basis in comparative studies to trace the sources of pollution such as surreptitious discharges from the nearby industries. Trace elements in seawater can be limiting factors of biological productivity, tracers of ocean circulation and biogeochemical processes, and proxies for pale-oceanography. Surveillance of the coastal tourist area in Vlora, of the marine environment and the assessment based on the precedent study have provided preliminary information about the site on the material to be analyzed in the coast area of Vlora.

Sampling in Vlora bay, in front of the coastline, 100, 300 and 700 m from the shore. Sampling in Narta and Orikum lagoons and in the collecting channels between the lagoons and the sea and in discharged channels, to assess the actual level of toxic heavy metals and the variation of the levels of toxic heavy metals in these areas referring to the precedent study. Sampling in Vjosa Delta River 3 stations, one on the delta and 2 other along the river to see the changes in the presence of heavy metals in diverse positions. The marine sediment samples were collected in two seasons: in the end of the summer season in the area most accessible for the public in the later autumn.

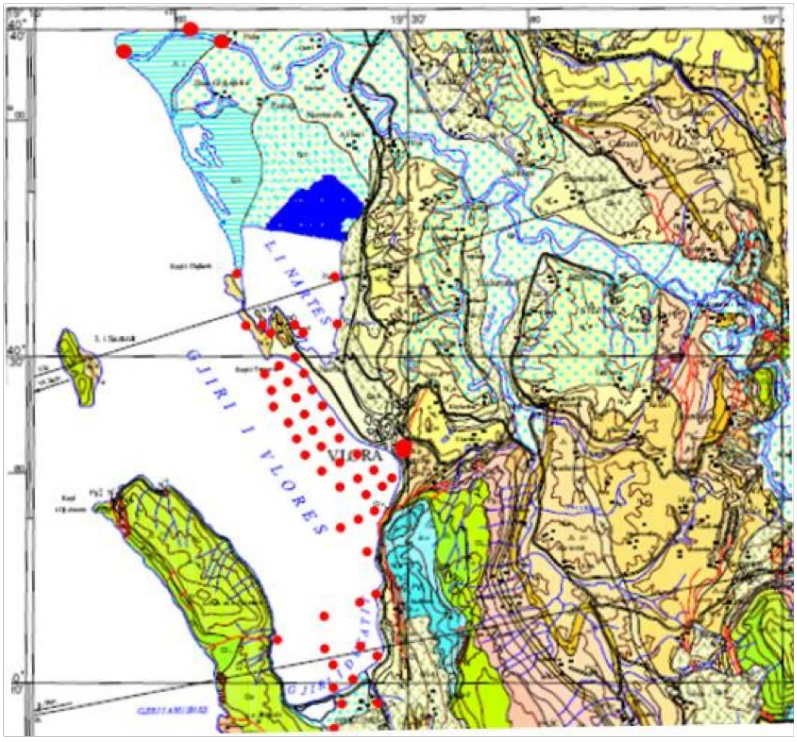


Figure 34: Map of sediment sampling station (I. Sino et al., 2011-2013, Doctoral Thesis).

3.8.2. PLANKTON

The zooplankton of the Vlora Bay was represented by 94 categories (Tab. II). It was dominated by copepods (43) and tintinnids (16) with Oithona specimens at about the 50% of total numbers. Meroplankton was represented by 24 categories. All the species are here reported for the first time from the area, and they are all already reported from the Southern Adriatic sea, with the only exception of the *Tintinnina Acanthostomella conicoides*. The area resulted well differentiated, because only 22 categories (23%) were ubiquitous (they were found in all the 7 stations). This result is more or less maintained even if the station 7 (the only one external to the Bay) was not considered (the ubiquitous categories, considering only the Bay stations, rise to 30). Among these representative categories, we found 5 Copepoda species (in order of abundance: *Oithonanana*, *Centropageskroyeri*, *Isiasclavipes*, *Euterpinaacutifrons*, *Temorastylifera*), 2 Cladocera (*Evadnespinifera*, *E. nordmanni*), and 2 Tintinnina (*Eutintinnusfraknoi*, *Tintinnopsislindeni*). Exclusive categories (typical of only one station) were 27, with 7 of them in the station 6, which resulted the most characterized. Copepoda Acartiidae (6 categories), *Euterpina acutifrons* (nauplii and copepodids), and *Paracalanus copepodids*, typical components of semi-enclosed, coastal, environments, were completely absent from the outer station 7 (in the Otranto Channel). Eggs and larvae of commercial fish species were well represented, witnessing the possible role of this Gulf as a nursery area. The co-occurrence of the copepod *Centropages kroyeri* with the fish *Engraulis encrasicolus* (eggs and larvae) has been found which could be of some interest: in other Mediterranean sites it seems that the fish searches for the copepod presence, for the choice of the spawning site and/or time, probably because the copepod is at feeding base of the early developmental stages of fishes (MAHJOUB et al., 2005). The Gulf of Vlora could be an ideal site for the study of these ecological interactions. Among the 94 recorded categories, ecological indicators of confinement (species which prefer enclosed areas and/or characterized by smallest size and high abundance) were recognized in stations 1, 2, and 6, which also showed the highest values of population density. In particular, copepods of the species *Paracartia latisetosa* (typical of confined waters) have been found abundant in station 6, which can be for this reason considered the most confined area among those studied. The statistical analysis showed that the Bay stations grouped together and apart from the only external station (the 7) (Fig. xx).

In the Bay, zooplankton of stations studied indicated other three situations which could be interpreted as:

- confined, with sandy coast, position (stations 1,2,3);
- confined, with rocky coast, position (stations 4,6);
- pelagic (station 5).

Even if the statistical comparison is not supported by a sufficient number of replicates per site (either in space and in time), we can consider that the sampling of zooplankton carried out by a net towing was well representative of the situation in each site. For this reason we are sure that the study gave us correct indications to organize, for the future, a sampling plan which will consider the possible (and perhaps evident) space-functional diversity of the Bay.

List of zooplankton is provided in Annexes.

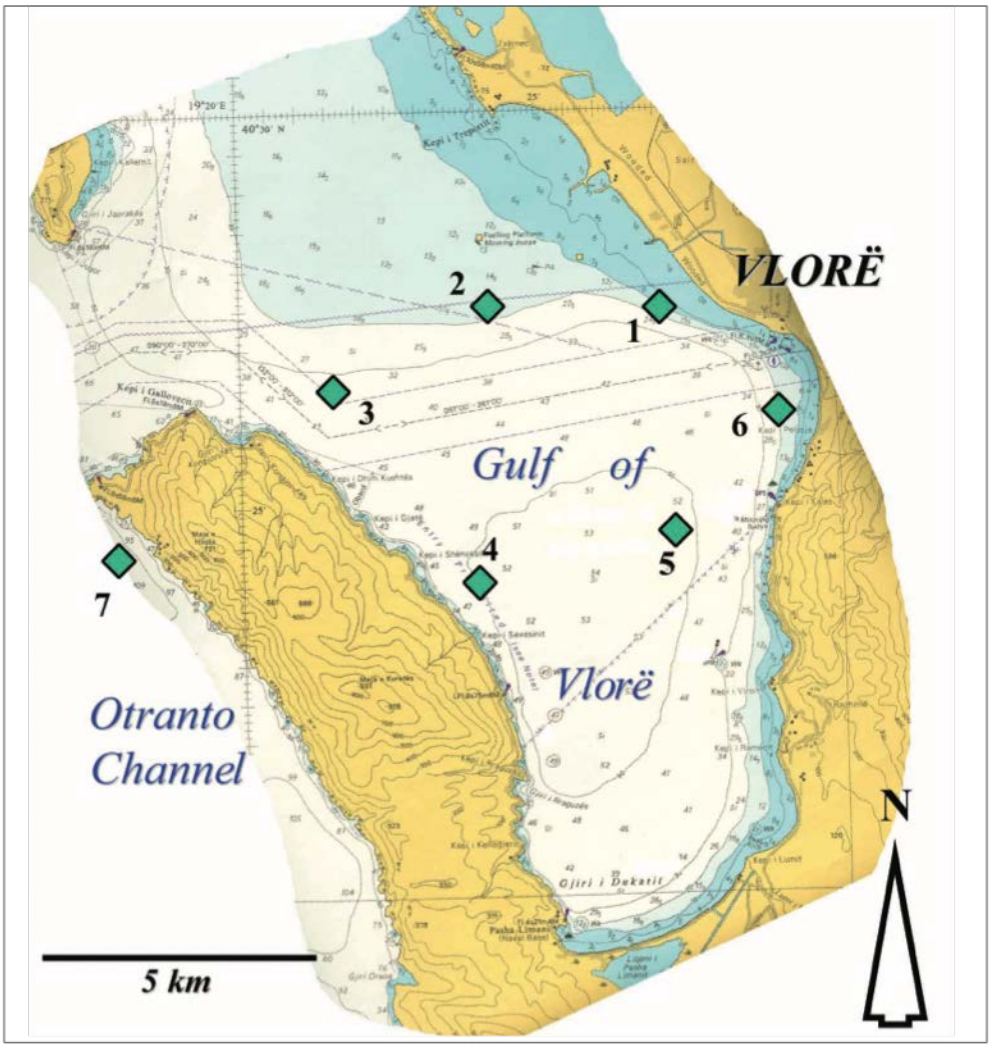


Figure 35: Distribution of sampling stations (indicated with numbers from 1 to 7) in the area studied (Moscatello & Belmonte, 2006).

3.9. ECOSYSTEM QUALITY

Ecosystem quality refers to species and ecosystems of Mediterranean Importance and in reverse to non indigenous introduced or invasive species.

Rare, endangered and threatened species

K-V-MPA is home to a number of globally, regionally as well as nationally rare, endangered and threatened species of fauna. At least 36 marine species, which are of international concern and belong to the lists of endangered and/or protected species of several conventions are present in Sazan-Karaburuni area. They involve seagrasses, seaweeds, sponges, cnidarians, mollusks, crustaceans, echinoderms, fishes, reptiles, pinnipeds and cetaceans.

In national scale, about 75% of endangered species of marine animals, mostly benthic macro invertebrates, which belong to the Red Book of Albanian Fauna (2006) and to the Red List of Albanian Fauna (2007), have been recorded in Sazan-Karaburuni area

The conservation of these threatened species is an international obligation and one of the priorities of the National Biodiversity Strategy and Action Plan. The most important and sensitive species and biocenosis in the area Karaburuni peninsula – Sazan Island are:

- **Monk seal (*Monachus monachus*),**
- **Short-beaked common dolphin (*Delphinus delphis*),**
- **Loggerhead turtle (*Caretta caretta*),**
- **Red coral (*Corallium rubrum*),**
- **Date mussel (*Lithophaga lithophaga*),**
- **Dusky grouper (*Epinephelus marginatus*),**
- **Starfish (*Ophidiaster ophidianus*),**
- **Coralligenous biocenosis,**
- **Biocenosis of *Posidonia oceanica* meadows,**
- **Biocenosis dominated by *Lithophyllum byssoides* (*Lithophyllumbyssoides* rims),**
- **Biocenosis of infralittoral algae- *Cystoseira communities.***

The Monk seal (*Monachus monachus*) is a very rare, occasional visitor to the Albanian coastal waters.

The canyons and caves of the area, often inaccessible, represent an ideal habitat for monk seals which were reported in Karaburun peninsula in 1982 and Sazani island in 1991 (Beudels and Vangeluwe, 1994).

Clear evidence of the presence of the monk seal was found in some caves i .e. impressions in the sand corresponding to a large body and excrement (Antolović J. et al., 2005).

It would seem that the caves along the Albanian coastline, especially those of the western coast of the Karaburuni peninsula, could serve as a bridge for possible future monk seal repopulation of the shores of the Central and Northern Adriatic Sea, rather than important shelters for “local” monk seal breeding populations.

Introduced and invasive species

Alien invasive species is one of the most outstanding issues facing biodiversity today on a global scale. In temperate marine systems, invasive species are well-documented causes of marine community disruption. There is an important harbor in Vlora that regularly receives vessels from regional and international waters. Species introduced to these harbor could conceivably spread into adjacent waters. Alien species of marine fauna are also used in mariculture in various parts of the Mediterranean.

A potential threat to marine biodiversity is that of invasive species *Caulerpa racemosa* var. *cylindracea* that is widely dispersed in the Mediterranean basin, including the Albanian coast of Ionian Sea. The last years it is recorded also in Vlora bay and the eastern side of Karaburuni peninsula (Kashta et al., 2005). As reported by a number of marine biologists, this invasive species is decreasing the biodiversity values of the invaded sea waters.

Recently it has been sighted the American blue crab (*Callinectes sapidus*) is an invasive voracious alien species, with no known predators and with high reproductive and survival rates, which has now spread throughout the Mediterranean.

4. SECTION 4. Conservation areas (natural and cultural)

Conservation areas in the area of Vlora include the following categories: national park, nature reserves, protected landscapes, coastal wetlands and marine protected areas (MPAs).

Narta lagoon
Narta lagoon is a wetland of interest according to the Ramsar Convention and has been classified as an Important Bird Area (IBA) by Birdlife International and as an Important Plant Area (IPA) by IUCN. The area is the largest wetland of the country, covering more than 4000 hectares and part of it is still used for the production of salt. It is part of the delta of the Vjosa River and is separated from the sea by a narrow coastal dune. During the past 15 years, the delta is eroded by the sea and locally the coastline has moved back at a rate of 10m per year, there is a risk of strong entrance of water during storms or small tsunamis as the area is subject to earthquake. The Vjosa river and the Narta lagoon have been declared as a protected landscape at the national level.
The lagoon includes two islands, the largest being covered by a pine forest and hosting the monastery of Zvernec (13th century) which has given its name to the island. The island is connected to the mainland by a bridge and is a site of walk for observation of birds. In winter, according to the year, between 40 and 50,000 birds can be seen in the area.

Orikumilagoon
The Orikumi lagoon is a wetland separated from the sea by a sandy and fine pebble beach located 10km south of Vlora, at the southern end of the Vlora bay.

Llogara National Park
The Llogara National Park is located about 10km of the village of Orikum, at an altitude of about 1000m, with a rich wildlife, including species of importance such as deer, foxes, wild boar.

Oricum
The ancient city of Orikum was founded in 7th or 6th century BC and includes an urban centre, with an amphitheatre of about 400, but part of the city is now under the sediment of the Orikum lagoon.

Pashaliman Harbour
The Pashaliman military base is located west of the lagoon. The harbour is considered as the oldest of Albania and its location makes it a very protected shelter, invisible from the Adriatic.

Byzantine church of Marmiroi
The Byzantine church of Marmiroi, located in 2km west of Orikum, is believed to be built before 8th century AD. The church still contains interesting frescoes, wall paintings, a nartex and presents a unique architectural structure with three entrances, a cross shape with a dome poised over a high cylindrical roof.

KaraburuniSazan national park
Karaburuni Sazan national park and marine protected area established in 2010 covers about covers 125 km2 including the Karaburun Peninisula and the Sazan Island and a great part of the surrounding marine waters. The national park is an important bird area and an important plant area, and after its declaration, has been accepted has a Specially Protected Area of Mediterranean Importance under the umbrella of the Barcelona Convention.

Grama Bay

On the western side of the Karaburuni peninsula, with a difficult access by land and an easier one by sea, the Grama Bay (Gjirii Gramës) and its pebble beach is partly protected by massive calcareous formation that were exploited for construction since the Greek and roman times. Numerous ships were sheltering here during southern storms and the cliffs are carved with inscriptions in multiple languages, including ancient Greek and Latin.

Natural features on land (landscapes) and at sea (seascapes): forest, scrubland, high cliffs, caves and canyons on land and underwater, are numerous in the area, including shipwrecks at sea.

As defined by the CBD, the area of Vlora includes at sea Other effective (area based) Conservation Measures (OECM), where the de facto protection of the marine environment is provided by the exclusion of human activities, such as the military areas with closed access on land and at sea, the legislation of a 2km no fishing zone around river mouths and lagoons entrances or the setback areas around aquaculture site.

Figure 36: Vlora Bay Conservation Area's map.

Figure 37: Vlora Bay proposed location for anchoring buoys map.

5. SECTION 5 - Human activities and related risks or impacts

Relevant sectoral planning and relevant activities include:

- Cross-cutting Strategy for Rural and Agricultural Development 2014-2020; The document establishes the basis of an integrated planning and aims at the development of rural and agricultural sector. The Strategy considers the Urban-Rural Partnership as an integrated approach to achieving a balanced development. Urban agriculture development includes the development of urban agriculture in areas with moderate urbanization and localized generally on the suburbs of residential areas. Agritourism will be one of the tools of tourism promotion and economic development, but also of increasing the sustainability of tourism and the preservation and promotion of local cultural identity.

- Fisheries Strategy 2016–2021 - This strategy presents an overall strategic vision for the medium-term development of the fisheries and aquaculture sectors in Albania. It sets out Albania's objectives and priorities that are compatible with those of the EU Common Fisheries Policy. The strategy contains the following Specific Development Objectives (SDOs) and relevant proposed measures related to artisanal fisheries and Monitoring, Control and Surveillance (MCS) of fishery activities; SDO 6: Well-managed marine environment supporting sustainable artisanal fisheries (Develop Coastal Management Plans for fisheries and environmental protection; Establish Coastal management groups & representative network to develop and implement Coastal Management Plans; Identify critical fisheries areas and natural habitats requiring additional protection); SDO 9: A management and enforcement regime that controls access to fisheries resources in an equitable and sustainable manner (Measures to develop a comprehensive MCS strategy on coastal/inland water-bodies as part of a wider co-management approach, combined with capacity-building/training in MCS techniques;

- Integrated Waste Management Strategy 2018-2033 - The aim of this strategy is to serve as a roadmap to the full approximation of Waste Management sector of the Acquis in Albania and support the integration of Albania into the European Union (EU), the continuation of the process of strengthening economic institutions and regional security, and the Euro-Atlantic cooperation in the economic and security fields.

- Transport Strategy 2016-2020 - From the environmental point of view this document is focused on the development of an environmentally friendly integrated multimodal transport system. The strategy is accompanied by an action plan, based on the pillars: Blue Growth, Regional Connection (Transport and Energy Networks), Environmental Quality and Sustainable Tourism. The achievement of the integrated combined tourism model of coastal dimensions (beach and sun), cultural (archaeology, heritage) and natural (eco-tourism) relies largely on an efficient road network that can connect to every corner of the country. Some destinations are of particular importance and need good quality road links: Coastal Destinations, World Heritage Sites and Eco-Tourism.
- Crosscutting Strategy "Albania's Digital Agenda 2015-2020" - The document aims to increase the efficiency of the manufacturing sector, Agriculture, Tourism and Industry through Information and Communication Technology (ICT) systems. One of the strategic objectives of the document envisages the improvement of ICT infrastructure in public administration for harmonized and integrated development according to international

standards for e-governance in all sectors (health, education, environment, agriculture, tourism, culture, energy, transport,) with the aim of linking 100% of all systems by the end of 2020.

- Business and Investment Development Strategy 2014-2020 - The growth of foreign investment is a key objective for the country's economic development and strategic government priority. The importance of foreign investment lies in many aspects and investment performance affects the country's economic and social progress.

- Integrated Border Management Strategy 2014-2020 - The policy objectives that this strategy sets out are: strengthening measures to combat cross-border crime and illegal trafficking in order to increase border security standards in EU countries, increasing the standards for border control and oversight through application of best practices for its integrated management, creating an appropriate legal framework and harmonized with EU standards and the Schengen Regulation, etc.

- *Others to add eventually when concerning the marine and coastal environment*

5.1. Population and trends, main economic figures and issues

Since the 1960s, both the human population growth, and correspondingly the intensification of socio-economic activities, have steadily increased in the coastal zone and marine areas of Albania. This trend is resulting in increasing pressure on the natural resources, and competition for use of space in the coastal and marine environment. These factors are the key drivers behind loss of marine and coastal biodiversity and ecosystem services in Albania. A proactive and comprehensive spatial planning approach needs to be undertaken before the loss of natural resources and opportunities for sustainable economic development is still a viable possibility. The people of Albania are dependent on the sea and its ecosystems to support the production of goods and services in which their life and livelihoods depend. Whether it is using the sea for transport, fishing, aquaculture, mineral extraction and energy production, or even for recreation, healthy coastal and marine environments are important to the future of Albania. Yet in close observation, from year to year the demands on the coastal and marine resources of Albania continue to grow, as will correspondingly the demand for sea space. However, marine resources and sea space are limited, and soon the demands will outweigh the availability of both, creating conflict amongst uses and users, along with loss of marine biodiversity. And looking forward, it may be difficult from the current vantage point to predict the trends in the use of the coastal and marine environment five, ten, or twenty years into the future. To better understand the need for marine spatial planning, it is important to identify both apparent current trends, and project what future trends might look like in areas such as:

- Increased demands for energy in Albania, the Adriatic and globally and the trends in both non-renewable (oil and gas development) and renewable energy sources found in the marine environment (offshore wind, wave or current energy)
- Increased shipping and marine transport in the Adriatic, both increase in shipping and the size of vessels
- Increased demand for tourism development and recreational uses as Albania is recognized as an emerging tourism destination because of its pristine environment and cultural attractions

- Increased demand for fish and seafood with average per capita increase in consumption predicted globally, a similar trend is likely in the Adriatic
- Increased demand for agriculture which is expanding and becoming increasingly focused on efficiency and output resulting in discharges of phosphorous, nitrogen and other pollutant causing eutrophication of marine ecosystems
- Increased demand for infrastructure development including the building of ports and harbors, bridges and waste water systems – all to meet the growing influx and uses of the coastal and marine environment

As of January 2019, it has a population of 189.311 inhabitants with a very slight increase compared to the previous year. Population movement (emigration and internal migration) is a multifaceted phenomenon: manifested with land abandon because of emigration abroad (Orikumi area); land occupation, sprawl, and abusive construction because of internal migration and lack of control (Novosela commune); increase of human pollution and wastes etc.

A recent UNDP report (2016-2018) provides insights of the fishing activities and their impact in the MPA ecosystem and its surroundings, fishery capacities in the Vlora bay and its impact on the marine environment as well as overviews of the organizational situation of the fishery sector in the Vlora region. It estimates that Vlora is an important contributor to the Albanian economy, whereby, according to the Institute of Statistics (INSTAT) data, in 2016 Vlora county was the 5th largest contributor to the GDP with 5.9%. According to the same source, the structure of the Gross Added Value (GAV) as per economic sector branches of the Vlora County, is the following:

-	Agriculture, Forestry and Fishery	25.5 %
-	Commerce, Transportation, Hotels	19.4 %
-	Extractive & Processing Industry (Energy, Water etc.)	16.5 %
-	Public administration (Health, Education etc.)	10.8 %
-	Construction	10.3 %
-	Real estate	8.4 %
-	Others	9.1 %

It is important to present here some conflicting perceptions between central and local level, conflicting activities and perceptions amongst institutions at the same level, and conflicting activities between local user groups of populations.

- Conflicting interest between central and local level in the resource use expressed in the local population concerns related to their ownership rights and reluctance towards government decision to include project areas under the status of special protected areas.
- Conflicting interests between business / industry and local population: salt plant and fishermen, fishermen organized in associations and individual fishermen, fishermen using the former marshlands and farmers, fishermen and aquaculture companies.
- Conflicting interests between business and central or local government branches: malfunction of the communication canals between the seawater and the lagoon, variation of the hydric cycle of the lagoon, reduction of the drainage capacity and the fresh water influx to the lagoon.
- Conflicting interests amongst various individuals or groups of users: fishermen and hunters, wetland and wood ecosystem reduction to increase the arable land, use of pesticide and fertilizers Vs organic agriculture, urban waists discharges to lagoon, tourist influx, etc.

- Conflicting interests between illegal activities: tree cutting, forest fires, fishing with explosives.

5.2. Saltpans

The Salina of Narta Lagoon is the only salt extraction facility along the Albanian coast. The Northern part of Narta lagoon was transformed into a Salina in the early 1950. The salt production site in Narta is one of the oldest in the Balkans. It is located 10 km to the north of the city. The present-day Salina occupies about 1,500 hectares. It consists of many shallow ponds, islets and dikes that make the area particularly appealing to nesting water-birds. Salt production until 1990 was 140 -150 thousand tn/yr. After 1990 the production was 20-25 thousand tn/yr, of which 20,000 tn were used to meet the country needs, while 5,000 tn were exported to Macedonia.

Nowadays (2019), a significant part of the area of the salt pans is not being used and the annual production varies around 25,000 t. About 20,000 t is sold in the domestic market and the rest is exported to neighbouring countries.Today the facility resembles a “dinosaur of the past”, which needs resizing and modernizing in order to be able to compete in the new reality of the market economy. If economically feasible, the facility should be privatized, and its operations strictly regulated so that it does not conflict with the neighbouring Narta lagoon. The Salina should stop and/or hydro-logically compensate for the about 6.000.000 m3 water extracted by the Narta lagoon during the most critical months of April – July that further aggravate the already stressed la-goon during the summer.

5.3. Fishing activities

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 increasing; aquaculture products are essential to satisfy it. More and more fishers are also proposing tours and leisure fishery for visitors. Regarding pescatourism, 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).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 10kg3(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. 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$. This value can be associated with the indirect contribution of the ecosystems of Karaburun-Sazan to the fish production of the area. Considering these evaluations and the fact and the maximum value of fishing days in the MPA of 3750, we can consider that 37 500kg of fish are produce within the area of the Karaburun-Sazan MPA. This represents for the 55 boats frequenting the zone an annual income of 142560$.

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 have 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 VloraBay(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.

Professional fishermen use mainly lines and trawling. The fish fauna of commercial interest is made of several demersal species and groups, small and big fishes, crustacean and molluscs, fish species and commercially important crustaceans. Artisanal Fishermen groups fish in front of Vlora, at the tip of Karaburun, along Sazan Island and the coast up to Vjosa River delta with trawls. They catch by trawling at about 84 m deep *Merluccius merluccius*, *Trachurus trachurus*, *Parapenaeus longirostris*. *Mullus surmuletus*. One commercial activity along the Kanali area is professional fishing (lines, trawling around 230 m to catch *Merlucciusmerluccius*, *Trachurustrachurus*, *Parapenaeus longirostris*, *Mullus surmuletus*) and occasionally illegal spearfishing with bottles by tourists. The main commercial activity along Sazan Island is professional fishing (trawling at about 84 m to catch *Merluccius merluccius*, *Trachurus trachurus*, *Parapenaeus longirostris*, *Mullus surmuletus*. Some fishermen catch groupers and rock fish by lines. Recently, the island was declared a touristic site and visitors are allowed to access the site with touristic boats coming from different starting points located along the Vlora Bay.

Artisanal fisheries

Artisanal fishing exists along the coasts of Rreza and Kanal-Karaburuni and Sazan. Artisanal fishery covers all forms of fishing activity using fixed and selective gear such as hooks, fixed nets, trammel nets, and gill nets.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. 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 theKaraburun 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 pescatourism. Between 35 and 40 fishers sell their products to the centre on approximately 60 fishers fishing in the Bay. During the summer, the fishery management centre sells 1.5 tons per day from artisanal fisheries and 5 tons including aquaculture products. 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. The main species sold are: shrimps, red mullet, sea bream, sea bass, hake, sardine and Atlantic horse mackerel.

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 threats to the MPA and its fish stocks. The intensity of fishing effort and its effect on local population of species are unknown today.

Collection of marine invertebrates

The trade and selling of marine curios, such as shells, can be the reason for the decline of some species and of the explosion of other populations. Illegal and destructive harvesting has caused the depletion of rocky shore as in the harvesting of the date-mussel *Lithophaga lithophaga* around the

Karaburuni peninsula, from the superficies to 6-10 m depth. Strong measures need to be undertaken to ensure that such practices do not cause desertification of marine life along the rocky areas of the coast. Regulations can reduce this activity.

Impact, risks from fishing activities

- Illegal fishery practices (date mussel fishery, trawling, and use of explosives) contribute to depict a scenario of fragmentation and loss of shallow species-rich assemblages;
- Illegal trawling system contribute in loss of over 50% of seagrass cover (*Posidonia oceanica* meadows) on the sea floor inside the bay;
- Illegal fishing on rocky shore produce a decline in macroalgae cover such as *Cystoseira* spp., which are structurally and functionally crucial habitats that provide essential goods and services for local human communities and recreation.
- Urgent need for ecosystem-based management to ensure sustainable development while conserving and managing natural biodiversity and resources.

5.4. Aquaculture activities

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 (Euro fish). 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 9). 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 other activities and the pressures increase 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.

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.

Figure 38: Graphical presentation of the production of gilthead seabream and European seabass, respectively in Saranda and Himara, from 2015 till 2017 (on the left) and pie chart presentation of the general production of these two species from 2015 till 2017 (on the right), (histogramme and figures of Bakiu et al. 2019).

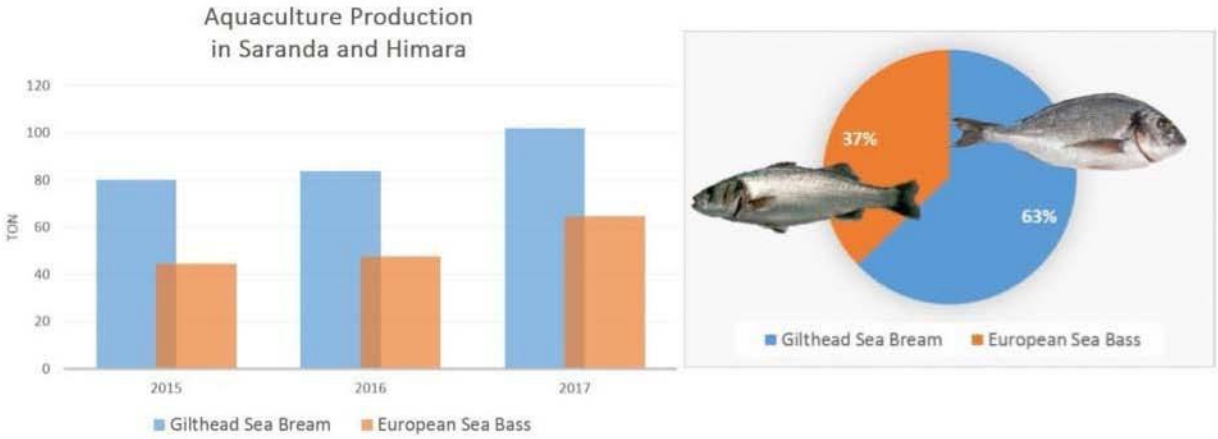
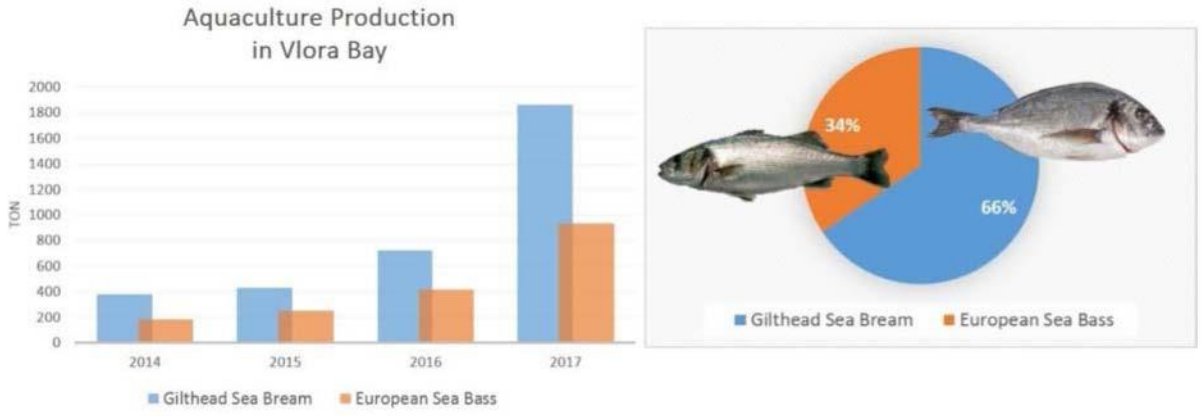


Figure 39: Graphical presentation of the production of gilthead seabream and European seabass, respectively in Vlora Bay, from 2014 till 2017 (on the left) and pie chart presentation of the general production of these two species from 2014 till 2017 (on the right) (histogramme and figures of Bakiu et al. 2019)..



During the past decade, Albania's aquaculture production has expanded, because of an upsurge in all types of aquaculture activities. About ten species are cultured, of which the main ones are rainbow trout, mussels, cyprinids, sea bass and sea bream. These are grown in all type of water

environments such as water reservoirs, artificial and natural lakes, as well as in coastal lagoons and in marine cages. Fish farmers use **intensive**, **semi-intensive**, and **extensive** cultivation techniques to grow primarily trout, mussels, and carp. In 2017, the total aquaculture production was 4 430 tons, 430 of which was mussel production.

Marine cage culture activities are concentrated in the Ionian Sea and Vlora region where gilthead sea bream (*Sparus aurata*) and European sea bass (*Dicentrarchus labrax*) are cultured. Mussels (*Mytilus galloprovincialis*) cultivation is concentrated in the Butrinti lagoon with some activity also in the open sea at Shengjini Bay (around 100 ha with floating lines).

Impacts and risks from Aquaculture activities

- Impact of organic load on the environment;
- Introduction of pathogens and viruses;
- Possible introduction of non-indigenous species;
- Impact on water and sediment quality without monitoring programs.

Mariculture on land is not recorded in the Vlora Area, even if the country is well known for this activity in lakes and rivers.

5.5 Industrial harbor and Northern Vlora Petroleum Area

La Petrolifera Italo Albanese Sh.A. (PIA) manages a coastal deposit for GPL, Oil and its derivatives (Diesel, Petrol, Jet fuel) in Vlora. It stands on an area of 27 hectares, with large free areas to accommodate installations development, for liquid and solid goods. PIA is controlled by La PetroliferaItaloRumenaS.p.A., founded in 1920, at the head of the PIR Group, Italian leader in port logistics (with terminals in Ravenna, Genoa and Zarz is in southern Tunisia). The PIA terminal is active, so close to Vlora city, since June 2009 and is used by leading oil companies that serve the Albanian and other neighbouring countries (Kosovo, Macedonia) and the main oil producers in the country for their export. The PIA Terminal has a railway connection and has a dedicated and exclusive concession port; it boasts the favorable geographical position of the Vlora bay situated at the entrance of the Adriatic Sea and close to the main Italian and Greek refineries.

TOTAL STORAGE CAPACITY	75,100 cbm (tanks) 4,800 cbm (spheres)
NUMBER OF TANKS	11 tanks 2 spheres
RANGE OF TANK CAPACITY	3,300 - 14,500 cbm (tanks) 2,400 cbm (spheres)
PRODUCTS HANDLED	Petroleum products (clean and dirty) LPG, other liquid
SERVICES AVAILABLE	Storage hire, in and out via vessels, tanktrucks, tankcontainers, railcars, dedicated loading/unloading system, electronic system for daily stock inventory reporting.
ADDITIONAL SERVICES	Blending, bunkering and product heating.
SEA-TANKERS ACCOMMODATION	Jetty LOA 190 m BEAM no restriction Depth 10 m (32,8 ft) Draft according to Harbour Master

Table 11: Petrolifera Italo Albanese Sh.A. (PIA).

Impacts and risks from Petroleum Harbour

- Accidental pollution from oil and chemicals, in relation to maritime and land transport, processing and distributing oil products.
- Impact from the exclusive port and from traffic of commercial and private vessels.
- Possible effect from port docks position on the marine currents circulation in the bay.
- Effect of port's docks on the silting process along the bay (and marine plants loss).

5.6. Coastal development and infrastructures (existing zoning and planning, jetties, roads, accessibility, desalination units, pumping and discharge, others)

Flat zones represent sea, river and mountainous water stream terraces, especially in Ionian Sea. The Western Lowland, inits complexity, has resulted in expanding its territories in the direction of the sea, excluding only some zones where the reverse phenomenon is observed, thus the erosion of the sea territory. From 1918 until 1978, the area that is gained from falling tides is approximately 3500 hectares. Worthy of mentioning, not only for its production capabilities but also for the interesting geographical position in the Albanian territories, is the Myzeqe a field. This field can be considered as a triangle that extends from Durres to Elbasan, in the eastern part and up to Vlora in the southern part. Other important, highly fertile fields include: Kakariqi field in the north, the fields around the Butrinti lake area in the south, Xara field and Bistrica valley.Many of these zones are flooded by the overflow of waters in days of heavy rain, such as: a) water coming from the Montenegrin border up to Rrjollvillage; b) from Shengj in up to Ishem; c) from Lalzi Bay to BishtPalle; d) from Durres to Karpen; e) from Spille village to Vlora; f) from Orikumi bay to the small terraces of Orikumi streams, up to the border with Greece.

Migratory changes in Albania have mainly been oriented from the eastern to the western part of the country, being that the coasts are places that offer better living opportunities in the major part of it and have a better coverage with services as compared with the eastern zones inside the territory. During the last two decades there was an increase of urban population and intensification of construction in this area. This has brought an important concentration of the population in the coasts with the numbers going up to 1million residents. Nevertheless, a big part of this space continues to remain rural and to be utilized either for agricultural functions or for natural ones. Coastlines are spread in 12 local government units, as a result of implementing the territorial and administrative reform and the population in these units is 437 634 residents, based on the information published byINSTAT. These amounts make up 13.2% ofa population of 2 800 138 residents (based on the same source). The population in the main coastal cities such as Durres (113249 residents), Vlora (79 513 residents) andSaranda (17 233 residents) make up to 49.1% (209 995) of the whole population residing in these 12 units (427 634). The population projection of local units taken in this study, going along the coastline from north to the south (Velipoja-Xarra) is showed in Graph 2.2.Durresi is distinguished for its high population density, 496.99 residents/km2, whereas the zone of Shkodra district has the lowest density,55.97 residents/km2. From the projection showed in Graph 2.2, we can highlight the changes in the northern part of the coastline, where we have a combination of high-density centers and low-density ones. This can be seen in the graph that has the most noted high sand lows (Shenkoll- Katundi Ri). The lowest density is part of the southern zones of the coastline (Kote-Lukova), which is distinguished for the uniformity of population spread in relation with the territory.

The population capable to work represents and age group from 15–64 years old which makes up to 67.7% of the resident population. The highest percentage capable to work is found in Durres, Fier and Vlora hitting the68% mark. Whereas Tirana has the lowest percentage, 65%. Nevertheless we can say that the population found in the coastlines is relatively young.Dwelling in 35 national government and administrative units in the Coastal Belt makeup 15% (106 577) of buildings nationally (598267). Number of buildings (non-collective) in the shores is 205 174, from 1 012 062 building found nationally, that make up to 17% of all buildings. The random uninhabited number of buildings in the coastline area is 23% of the total number of buildings in the whole nation, whereas the buildings that are constructed for seasonal tourism or as part of second residences make up 34% of the total number. From the total number of random buildings in 35 governmental and

administrative units, the uninhabited buildings make up 45%,from which 32% are buildings destined for second purposes or seasonal buildings. The projections along the coastline of the aforementioned information are shown in the following graphs. It is understood that the uninhabited stock of buildings is high in Shengjin, Durres, Levan, Qender Vlore, Vlora, Orikum, Himara, Saranda, Aliko and Livadhja. Golem has a high range of uninhabited buildings, but that are destined for seasonal purposes (Census 2011 - INSTAT); The construction density for the coastline zones indicates an urbanization tendency noticed in Shengjin, Shenkoll, Thuman Hill, Sukth and Rashbull, because the habitability density is relatively high as compared with the construction density of residential buildings. There are clearly identified the main residential centers: Durres, Vlora and Saranda.

Based on thorough analysis, with the aim of getting information about the above-mentioned territory and its strategic planning, there have been identified four spatial belt areas that have distinct traits from one-another. We want to highlight that the territorial extent and broadness of each belt, is determined from the broadness of physical identifiable characteristics in that zone as stated below. These are generalizing characteristics that serve the purpose of this study.

- First belt is characterized from the urban development and the tourism infrastructure in the space known as “sun-sea belt”. In this zone there are included every development that is related with the coastline tourism such as: cities of the coastline and their infrastructure, hotels, holiday houses or residences that are rented in the tourist season, bars, restaurants, discos, etc. The cities composing this zone are Durres, Vlora, Lezha, Saranda, Velipoja, Himara, Ksamili and Divjaka. This zone is the first line of contact with the coastline and the urban developments are characterized from rapid pace based on the market demand. As a consequence of the construction pressure in many coastal areas and because of the lack of control over the territory for a relatively long period after the 90s, the lack of proper investment in infrastructure has had a negative impact in this zone and not only. Thus, investment prioritization in infrastructure and planned development is one of the priorities of ICSP of the Coast.

- The second belt can be defined as the agricultural belt, where there are included vast field areas and low hills, and is composed of cities of secondary importance regarding the coastline (such as Shkodra, Fushe-Kruja, Tirana, Kavaja, Lushnja, Fieri and other smallerareas). In this zone we can detect a high agricultural production. Such areas include the field of Kakariq, Milot, Gjonem, Myzeqe, Novosela, Narta, Hoshtima and Shushica Valley, Dukat, Vurg and Konispol. In the meantime, some cities in this zone have direct connection with the dwellings of the first zone, relating to food products distribution.Some examples include: Velipoja-Shkodra, Divjaka-Lushnja, Fushe-Kruja-Hamallaj (Lalzi Bay). Whereas some other cities of the secondzone, which based on the geographical position and the lack of connecting infrastructure have no strong communication links with the main coastline, have created an economic independence from the tourism development.Part of soft terrain hills and rocky ones inWestern Albania is known for farming, thus creating diverse varieties for the coastline tourism. So, interconnecting this zone with the first coastal zone is another priority of ICSP for the Shore.

- Third belt includes cities and residences that are more in depth of the territory, that have important cultural, heritage, folkloric, polyphonic, music, arts values, etc. Cities of this zone are Kruja, Elbasan, Berat, Tepelena, Permet and Gjirokastra. The geological and territorial composure have created a significant distance between them and the “tourism gates”. This belt is almost disconnected with the other two and the connectivity between them is relatively long in terms of time and difficulty (referring to the scale of the country). This characteristic creates disconnection with the other zones included in ICSP for the Shore, but in the same time creates

an opportunity to enjoy the various landscapes and monumental values that have an impact in diversifying the tourism package. Thus, creating effective ways of having a more efficient interconnection of this belt with the first coastline belt, during the whole year, makes up the third priority of the proposals of ICSP of the Coast.

- Fourth belt is the maritime space enriched with flora and fauna, underwater heritage found in the bottom of the sea and in the underground as well, including beaches, ports, berthing place and the land territories, lagoons, river estuaries, the lake parts that access the sea.Coastline length is 316 km. The territorial waters go up to 12 nautical miles, including waters of different depths and substrate. ICSP priority is to throw the first steps in strategic planning of the coastline area, where values and options provided from this zone have to be interlinked.

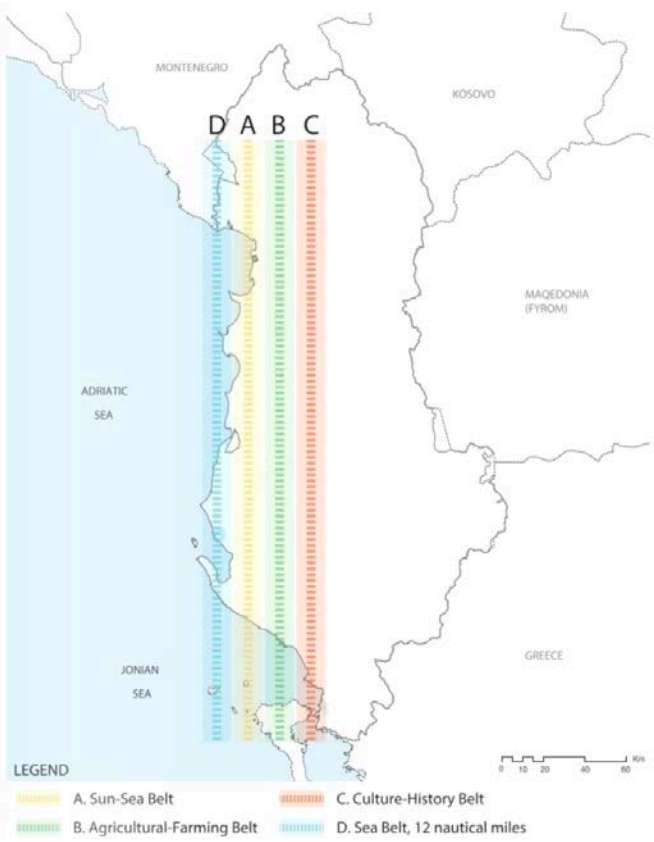


Figure 40: Coastal zones map (Integrated Cross Sectorial Plan for the Coastal belt, 2030).

The main infrastructures erected so far in the vlora bay are summarized below:

- Vlore port with a capacity of 150.000 tons general, cargo and daily passengers Ro- Ro ships traffic. The data ships and cargo handled in Vlore port for 2013 are as following: Ro-Ro Passengers ship 425 calling, Oil tankers 126, LPG/NLG 5, Cargo ships 27, Yachts and small pleasure boats 387, Fishing boats from abroad 53;

- Oil terminal Vlora-1 (Petrolifera) with actual handled capacity of 1.300.000-ton crude oil and other hydrocarbons including NLG/LPG in previous year. The number of tankers calling this terminal for 2013 was 126, the maximum ship's capacity 53.000 DWT. The prospect of this terminal is to increase the handling;

- capacity ship's size in the near future;

- Marina Orikum, with an annual capacity 230 yachts and other small pleasure boat during the 2013. The total accommodation capacity is 625 yachts.

- Fishing port Zverncec, with a capacity 300 medium and small fishing boats. The daily activity of this port is very intensive and employed a considerable number job in the region.

- Pashaliman Naval Base and Ship yard, the main activity is ship is ship building and repairing.

- Vlore Power Station buoy field and PLEM capable for discharging tankers up to 15.000 DWT. For the time being the power station is not working because of the failure of cooling system taking salt water from the sea;

- ARMO buoy field, capable handling tankers up to 25.000 DWT, which is built in years 1982 and pipeline from shore is unsafe and has a heavy pollution history in 2011. This site might be the worst scenario for potential oil pollution because the system in rotted due to the lack of maintenance and time but apart of that, the standards of building of this system has been not according the new requirements.

- Karaburuni fish farming, a big investment with a bright future due to the water cleanness, temperature and natural conditions of area, very sensitive even toward the slightest pollution;

- Touristic resorts and hotels in seaside of the Vlora's bay, which compound the main resource of the employment and local revenue. The impacts for this industry are significant.

5.7 Tourism development, (existing and planned, strategy, …)

Vlora bay is well known in the country as a very attractive destination for recreation. Nowadays, a lot of houses in Orikumi town are offering accommodation (bed and breakfast) for visitors, especially during summer holidays. Many hotels and restaurants have been built in the recent years (legally and illegally) along the whole eastern coast of Vlora bay, including Vlora town and the traditional tourist villages of Jonufra, Radhima and Orikumi. They are offering accommodation and food, but also other services associated to leisure and recreational activities. In many cases the

tourism developments were unplanned and tourist activities were uncontrolled, causing serious damages to natural habitats and biodiversity.

Due to the lack of road access, tourist pressure in Sazani island and Karaburuni peninsula, especially in its western side, has been relatively low. The access is provided by boat only, but it has not been practiced very much, because suitable beaches are far away from Vlora and Orikumi, thus the boat transport (by small motor boats or yachts) is expensive. However, during the peak tourist season, July – August, the small beaches in the eastern coast of Karaburuni (Raguza, ShenVasili, Shen Jani) are regularly frequented, including by few excursion boats. Beaches in the western side of Karaburuni (Bristani, Dafina, Grama), despite being clean, quiet and very attractive are very little frequented, due to the lack of road access. The most frequented activities in this part, often associated with damages of habitats, are diving and spear gun fishing.

Figure 41: Business Tourism Hydrography's map.

Considering the whole area in general, the number of visitors is highly increasing every year. About 70% of visitors are Albanian, while the remaining are foreigners, mainly from Kosovo and North Macedonia. It is expected that tourism would be one of the most important uses of the MPA because of its natural and cultural resources. It could be a reliable source of sustainable and substantial economic growth, if properly established and managed.

In addition to creating economic opportunities and jobs for the private sector and generating benefits for the local community to enhance their standard of life, it is an important source of revenue for the park administration to invest into its management. The facilitation and management of tourism and promotion of ecotourism in the area is therefore one of the key management issues for the park administration. Karaburun-Sazan has excellent potential for ecotourism development given its unique natural and cultural heritage resources.

5.8. Coastal pollution

Vlora Bay is a quasi-enclosed water area which collect the pollution coming from open sea. The moderate West and North-West winds drive the pollution factors at the end of the bay serving as dumping pocket. In addition of that, the small bays along the coast line serve as pollution collectors for the above-mentioned reasons. That is why building up a watching and monitoring network is very useful to prevent the pollution especially oil slick to enter in the bay.

There are about 7 shipwrecks, since WW II and later, which compound an historical sites and biodiversity for created during the years. They are: “Rosandra3”, “Regina Margherita”, “Interpido”, “Rovigno”, “Lucian”, “Stampella”, “Andromeda”, “Po”; Also, these historical relicts are subject of continuous looting and pillage by metallic and treasure hunters which during their activity causing pollution as well. It is important to highlight these cultural and touristic patrimonies be under certain custodia and /or protection to allow for wise use of their touristic and historical values.

To point out is the fact that Vlora Bay and all pristine ecosystems hosted in that area, are in focus of attention from many stakeholders, public opinion, media, environmentalists as well as central and local governance. The natural beauties, ecosystems and investments for tourism and fish farming make this area more sensitive toward pollution and human activity.

Positioned in the entrance of Otranto strait when pass all the traffic in Adriatic, whereby just in a year, pass over 6.000 ships over 300 GT and takers over 150 GT, not mentioning other non-mandatory reporting ships. In addition of that, building of several oil industry sites and terminals, ports and shipyards create an obvious impact with other green or blue activities. This situation requires much more awareness, information and education efforts in the relevant topics, namely on marine pollution from maritime traffic, oil spills etc.

Sun and beach dominance, unorganized visitation, no diving offer, no access to the area, etc. are all activities that are linked to the unused potential of tourism. On the other hand, littering, discharges, pollution, construction and overuse (overcrowded beaches) are linked to negative effects of the tourist activities. Impacts associated with the activities that tourists undertake during a visit, such as swimming, sailing, snorkeling and SCUBA diving can be a chronic source of disturbance to marine organisms and could result in localized physical destruction of seagrasses, algae or coralligenous formations, even under low levels of use.

A range of nature-based tourism activities can be envisaged taking place in the MPA, including wildlife watching, diving, snorkeling or nautical tours as this area has a high potential for leisure, recreation, adventure, beach tourism, and cultural heritage tourism. Park administration must take into consideration the planned tourism development in the region that is expected to grow exponentially in the next five to ten years. It is expected that the MPA would become a leading attraction for tourism as the region becomes better known, so it is very important to ensure sustainable development of tourism, which benefits local communities.

The separation of waste (mainly plastics, paper and organics), from the legal context, has become mandatory in major cities since 2016, in smaller ones in 2018- while only recently started to be implemented in Tirana. However, appropriate implementation instruments are not yet in place. At local level, the authorities are in charge with competencies and capacities that enable development and implementation of the local waste management actions, solid waste separation, improved

recycling and support to reduce negative environmental and climate impacts, involvement of the population, improved environmental education and know-how with special attention to the target groups of women and young people, environmental awareness and information campaigns /activities

The KfW feasibility study for integrated waste management system for the Vlora region (2015-2016), based on available statistics data, reports that there is a waste generation forecasted increase from 54166 tones /a in 2017 to 71095 tones/ a in 2036 with more than 90% share coming from Vlore municipality and tourism activities, and, out of this, the recyclable fraction (paper, plastic, glass and metal), makes up at about 36%, while the quantities of the recyclable materials (dry matter) is reported to be as follows: paper 19% (or 1040 Mg/a), plastics 11% (or 602 Mg/a), metal 1% (or 55 Mg/a) and glass 5 % (or 274 Mg/a);The actual waste collection rate is 56%, and consequently, non-collected and scattered waste pollutes soil and water and has a negative impact on the area's attractiveness, MPA status and tourism and overall hygienic situation.

Figure 42: Settlements, infrastructures, historical and cultural features in the Vlora area.

In the meantime, the study estimates that hazardous waste generated in Vlora Region (county) is at appr. 350-400 tons/a (out of appr. 17233 tons/a of overall amount of industrial waste); the population is forecasted to increase from 146686 in 2017 to 163367 in 2036 (this include Vlore, Selenica and Orikum) whereas almost 60 % of the population lives in Vlora city.

Regarding used oil (as part of overall amount of hazardous waste), NEA (National Environment Agency) waste monitoring report 2015-2016, indicates an amount of 4000 liter of used oil generated during 2016 and almost no operators or licensed subjects to handle recycling of this waste stream.

When it comes to evaluating the state of the waste-waters, indisputably the lack of appropriate sewerage infrastructure and adequate wastewater treatment along the coastline, is the issue of major concern, not only for the urban centers and surroundings of the Vlorë region, but also for developing other vital sectors such as touristic, economic, and environment protection sector.Therefore the issue requires a prompt response in terms of providing immediately operational, effective, and sustainable technical solutions underpinned by the gradual, integrated and environmentally-sound urbanization. It is important to emphasize that during the past few years, significant effort has

been induced into design, construct and put into operation the 2 Waste Water Treatment Plants (herein after WWTPs) of substantial importance to the entire Vlorëbay:WWTP for the Municipality of Vlorë, andWWTP for the Administrative Unit of Orikuml; Even though both of the aforesaid WWTPs were built in 2016, only WWTP in Vlorë is operational to the certain extent (primary and secondary treatment), whereas the one in Orikum, urban center with the major impact to the target area investigated within this report, is completely out of function.

5.9. Marine traffic

5.9.1. General navigational information about the Vlora Bay

The Bay of Vlora is the largest, deepest and most protected in the region from the Corfu Canal to the Gulf of Drin. It is located between the Karaburun peninsula and the Cape of Treports. Before its entrance which is 5.3 miles wide, is the island of Sazan, between Gallovec's Cape and Treports. The bay enters the land to begin about 5 miles southeast, and then turns south, ending at the lower Ducati coast. The west coast of the bay and the southern part of the east coast are high and mountainous.
The west coastline of the Vlora bay is rocky and slightly fractured, forming several capes and gorges. The bay of Congjorufa or St. Jan is located between the St. Jan's Cape on the east and the coast that forms the southeastern extension of the Gallovec Cape. The coast of this bay is rocky, especially the western side, which descends into the sea while the eastern side is low rock. Just at the bottom (south), the coast has a sector that descends softly into the sea, beach-like. This sector has been developed lately as a touristic destination and daily cruisers (small passenger vessels) visit this bay during summertime. In the southern part of the bay there is the Pasha-LimaniNaval base. Approach, cruise and fishing activity is prohibited in the area bounded by the line joining the Pasha-liman Cape and the launch of Orikum Beach (Pashaliman Naval Base checkpoint), for all fishing and commercial vessels of the Republic of Albania. as well as foreign. From Pashalimani to Cape Ramec (3.4 miles east-northeast of Pashalimani Cape).

The Port of Vlora is located south of the city of Vlora, 2 miles north of the Cape Fort. It consists of two peers: the eastern one and the western one (peer zero). The eastern peer is 362 m long but 225 m usable. The wide of the peer this 16 m wide and extends up to 90 m from the head. Starting from 90 m until it ends at the shoreline, the width is 10-12 m. The depths at the top of the peer are: 7.3 m, between 6 m and where the 225 m of usable portion ends, the depth is 2 m. The peer is usable on both sides. The western peer has the shape of a breakwater and is used only at its inner side, 110 m in length. The depths are: at the top 8 m, between 6.4 m and at the end of the usable section 5.3 m. The port of Vlora is open to all kinds of winds and seas. With the construction of the western peer in the form of a waveguide, it can stay in the harbor to protect it from undulating north and northwest directions, and partly from the western one. The southern direction is completely open and, when the wind is of great force, it becomes impossible for the ships to remain in port. Both peers can be supplied with potable water and electricity as needed.

The new PIA petrol terminal is built 2.3 miles NW of ofVlora port. The Petrolifera port is equipped with two breakwater and one central peer. The northern breakwater is 1080 m long with an arch shape. The southern breakwater is 750 m long. The 190m-long middle peer, 10 m deep, serves for unloading and loading fuel. Initially, in the north, there is a 110 m long jetty used for small vessels..
Orientation Marks at Fishing Port Left Entrance Lantern (latitude 40 ° 29 '01' 'V, longitude 19 ° 26' 00 " L), is a 1 m red plastic plinth over a 6 m concrete circular tower. Light altitude 8 m above sea level and nominal 6mile viewing distance. The right entrance lantern (latitude 40 ° 28 '56.3' V, length 19 ° 26 '00.8' L) is a 1 m green plastic plinth over a 6 m concrete circular tower. The altitude of light above sea level is 8 m and the nominal viewing distance is 6 miles.

The **maritime traffic control** in Vlora is observed from the Harbor Master office as well as the Inter institutional Operational Center (IMOC). All vessels and boats that enter/leave Port of Vlora and are bound to international voyages, are obligated to perform free practice procedures at the port of Vlora. Free practice is carried out from governmental agencies such as Harbor master inspector, Border police, Customs office and Sanitary inspector. All ships are obliged to communicate with

Harbor Master office in order to communicate for maritime traffic safety reasons. Fishing vessels inform harbor master office and border control on their movements. Ships with a tonnage more than 300Gt must be equipped with AIS (Automatic Identification System) which provides authorities and other vessels sailing nearby with detailed information on the vessel.

On the other side, border police monitor all small boats sailings. Prior to their sailings, they have to inform border police for their intended voyages and destinations.

IMOC, which is an inter institutional governmental center, has the responsibility of coastal surveillance. It has the radar monitoring capacity to control all operations at Albanian maritime space. IMOC, monitors the traffic, SAR operations and pollution prevention and reaction operations. Every navigable unit is monitored from this center.

Vlore bay is a busy one regarding maritime traffic. The main categories of traffic identified in this bay are:

a. Ferry boat traffic
b. Cargo vessels
c. Tanker ships
d. Touristic vessels/cruisers
e. Fishing boats
f. Pleasure boats

The data used in this report are collected mainly from Vlora Harbor Master Office, General maritime Directorate and from the Institute of Transport.

Figure 43: Vlora bay maritime traffic 2019.

a. Ferry Boat traffic

Following table 12 shows the number of calls for Ro/Ro Ferry boats that navigate between Vlore and Brindisi, Italy. As it can be easily observed from the table, this is an all year regular service.

Table 12. Ferry traffic of Port of Vlore for the period 2014 - 2019.

No	Month	Year					
		2014	2015	2016	2017	2018	2019
1	January	21	20	23	47	24	26
2	February	19	19	20	35	21	19
3	March	19	22	23	22	22	26
4	April	20	22	24	22	24	22
5	May	16	33	25	10	27	24
6	June	21	27	23	21	37	
7	July	26	59	31	32	36	
8	August	33	77	36	49	53	
9	September	24	51	42	28	32	
10	October	19	49	58	25	23	
11	November	20	24	53	24	23	
12	December	22	26	59	27	27	

Following graph shows the distribution of the traffic throughout the year. During summertime and December there is a significant traffic increase comparing to the other months of the year.August remains the most congested moth where the number of ferry calls per month is higher with a record in 2015 where the number of callas was 77.

b. Cargo vessels

Vlore port is composed of two peers and their infrastructure to handle cargo vessels is very limited. There is no quay area and the depth of the water does not allow bigger vessels to be berthed at these peers. Another factor that has influenced cardo handling apart of the poor conditions of the cargo peer has been the ever-ending construction works that have been there from more than two decades and have not been completed yet. For these reasons, Vlore Port today represent about 2% of the seaborn cargoes in Albanian Port sector. The number of calls of cargo vessels have been significantly reduced during the two last years. Following table 2shows the number of cargo vessels that called Vlore Port for the period 2014-2018

c. Tanker ships

The new por named “Vlora-1” port or “Petrolifera” is situated 2,5 miles north of the existing port. This port is dedicated to bulk oil or crude oil that comes from Fieri oil field. This terminal was initially constructed in 2009 and during its ten year activity in oil and crude oil loading/unloading this port has increased its activity. The traffic of the oil tankers calling this port is shown in table 13 below:

Table 13: oil tankers traffic in Port Vlore-1 for the period 2014-2019.

No	month	Year					
		2014	2015	2016	2017	2018	2019
1	January	7	5	4	6	3	11
2	February	4	7	5	4	8	7
3	March	6	4	7	8	9	5
4	April	7	6	6	5	4	4
5	May	4	3	4	4	9	5
6	June	3	7	3	5	4	
7	July	4	5	5	4	7	
8	August	5	4	5	6	6	
9	September	7	5	7	3	5	
10	October	6	5	5	4	7	
11	November	3	4	3	2	5	
12	December	6	6	5	9	4	
	Total	**62**	**61**	**59**	**60**	**71**	**32**

Regarding the distribution of the frequency of the calls during the year, there is no significance. This means that the volume of the cargo handled, and the number of the calls is directly triggered by market demand.

d. Touristic vessels/ cruisers

Touristic traffic has increased significantly during the recent years in the bay of Vlora. due to the lack of data, we could collect data only for the years 2017 and 2018 and the first five months of 2019. the data shows that the touristic traffic growth in 2018 compared to 2017 was about 52%. in the peak months like July, august and September this growth was very significant. the following table 14 shows the touristic traffic for the period 2017-2019.

Table 14: Touristic boat and yachts traffic in Vlora bay for period 2017-2019.

No	month	Year					
		2014	2015	2016	2017	2018	2019
1	January				2	2	1
2	February				3		2
3	March				5	10	9
4	April				18	12	17
5	May				63	48	41
6	June				94	125	
7	July				145	224	
8	August				183	317	
9	September				40	110	
10	October				10	10	
11	November				2	1	
12	December				5	5	
	Total	**0**	**0**	**0**	**570**	**864**	**70**

This traffic represents the touristic boats and yachts coming to Vlore bay, as well as daily cruisers that depart from Vlore port to “Karaburun” peninsula destinations such as St. Vasili, St. Jan, and

other “Sazani” island and others. This traffic represents the more than 50% of the movements of this traffic category. Big cruisers visit sporadically port of Vlore.

Following chart shows the all year distribution of the traffic and it is very obvious that the traffic during the months June – September notes a significant growth. August remains the most congested month and represents almost 32% of yearly traffic in 2017 and 37% of yearly traffic in 2018.
Chart 3: yearly traffic of the touristic vessels in Vlore Bay.

e. Fishing boats

There is a fishing fleet in Vlore Bay, and this fleet is located at the fishing port (Tre port), NNW of the existing commercial port. There are about 100 fishing vessels, and the yearly voyages of this fleet is shown in the following table. The main traffic flow from this fishing port is toward northern or southern part of “Sazani” island toward Adriatic Sea where they go for fishing. There were no official records for this traffic from Harbour master office but the data were obtained through interviews with shipowners. There are no significant distributions of the traffic throughout the year. The number of fishing voyages was weather dependent and according to the fishing seasons.

Table 15: Fishing vessels traffic for period 2014-2018.

No	Month	Year					
		2014	2015	2016	2017	2018	2019
1	January	65	34	90	60	35	40
2	February	74	60	33	54	60	37
3	March	70	66	65	71	55	51
4	April	97	75	86	90	74	62
5	May	55	90	96	104	90	66
6	June	80	87	70	111	120	
7	July	90	69	87	101	95	
8	August	63	85	79	92	97	
9	September	85	96	115	98	140	
10	October	114	99	120	110	137	
11	November	67	84	70	100	91	
12	December	70	79	68	81	62	
	Total	**930**	**924**	**979**	**1072**	**1056**	**256**

f. Pleasure boats traffic

According to the records of the General maritime directorate there are more than 400 small pleasure boats registered in the registration office of the GMD belonging to the owners from Vlore region. These boats represent the majority of the coastal navigation activity and their navigation distance is usually not more than 2-3 miles from the coast. There are no recordings of this traffic.

g. Traffic Summary

The following table represents a summary of the overall traffic in Vlore Bay, based on the above information. The traffic has been increased significantly from year 2014 (from 1251 calls to

2356calls). This growth is due to the increasement of the calls from touristic boats and yachts specially during years 2017 and 2018. The number of commercial vessels has been reduced due to the reasons mentioned in this report.

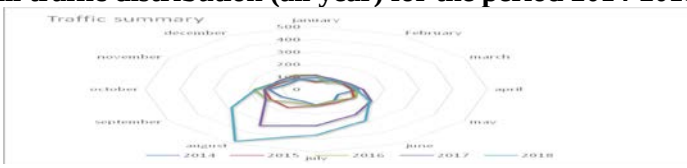
Table 16: traffic summary in Vlora Bay per month for the years 2014-2018.

No	month	Year					
		2014	2015	2016	2017	2018	
1	January	93	59	117	115	67	
2	February	97	86	60	97	90	
3	March	95	92	97	107	97	
4	April	124	103	117	138	116	
5	May	75	126	129	183	178	
6	June	104	121	101	232	286	
7	July	120	133	126	284	363	
8	August	101	166	124	331	474	
9	September	116	152	166	169	287	
10	October	139	153	184	150	178	
11	November	90	112	127	130	121	
12	December	98	111	133	124	99	
	Total calls	**1252**	**1414**	**1481**	**2060**	**2356**	

Regarding the distribution of the traffic, again the most congested period remains summertime where the number of touristic calls is significantly increased. August remains the busiest month of the year regarding maritime traffic.

Following chart 4, shows the distribution of the overall traffic in Vlore Bay and from this chart we can observe that during years 2017 and 2018 we have a significantly traffic growth. This significance is obvious for the two recent years because we lacked the data for the previous period.

Chart of overall traffic distribution (all year) for the period 2014-2018 in Vlore Bay.



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5.10. Military installations and activities

On land

Limited information is available on this topic. The two harbors of Pasha Limani near Orikum and of Sazan Island are under the responsibility of the Navy.Taking into account the position of the island of Sazan, it has always been a strategic point and military has been present there for a long time. Both Karaburuni peninsula and Sazan island have military bases, and also a number of defence bunkers, tunnels and trenches. This value deals with military bunkers that have extensively been built on Karaburuni peninsula and Sazan island. Although they are present in whole Albania, they could be included in guided tours on cultural and historical values of the area.

At sea

Ministry of Defence is using part of the area as a military base (base of Pasha Liman and base of Sazani) and it is also using marine waters of Karaburuni and Sazani for military operations. Through Maritime District of Vlora they are entitled to give permission for allowing any activity within or nearby military areas, as well as for allowing shepherds or other interested parties to do any maintenance work.

5.11. Other nautical activities

Vlora Bay is a quasi-enclosed water area which collect the pollution coming from open sea. The moderate West and North-West winds drive the pollution factors at the end of the bay serving as dumping pocket. In addition of that, the small bays during the coast line serve as pollution collectors for the above-mentioned reasons. That is why building up a watching and monitoring network is very useful to prevent the pollution especially oil slick to enter in the bay. The depth in the bay reaches 54 meters in SE of Rogozhe (Raguza) bay. The 50 m isobathic line comes 0.5 cables near to cape of Kala and starts going seaward reaching 6.5 cables in western quay of Vlore's port.
There are about 7 shipwrecks, since WW II and later, which compound an historical sites and biodiversity for created during the years. They are: "Rosandra3", "Regina Margherita", "Interpido", "Rovigno", "Lucian", "Stampella", "Andromeda", "Po"; Also, these historical relicts are subject of continuous looting and pillage by metallic and treasure hunters which during their activity causing pollution as well. It is important to highlight these cultural and touristic patrimonies be under certain custodia and /or protection to allow for wise use of their touristic and historical values.

To point out is the fact that Vlora Bay and all pristine ecosystems hosted in that area, are in focus of attention from many stakeholders, public opinion, media, environmentalists as well as central and local governance. The natural beauties, ecosystems and investments for tourism and fish farming make this area more sensitive toward pollution and human activity.

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other non-mandatory reporting ships. In addition of that, building of several oil industry sites and terminals, ports and shipyards create an obvious impact with other green or blue activities. This situation requires much more awareness, information and education efforts in the relevant topics, namely on marine pollution from maritime traffic and oil spills..

Nautical activities (sailing, swimming, diving, sport fishing, legal and illegal)

Sun and beach dominance, unorganized visitation, no diving offer, no access to the area, etc. are all activities that are linked to the unused potential of tourism. On the other hand, littering, discharges, pollution, construction and overuse (overcrowded beaches) are linked to negative effects of the tourist activities. Impacts associated with the activities that tourists undertake during a visit, such as swimming, sailing, snorkeling and SCUBA diving can be a chronic source of disturbance to marine organisms and could result in localized physical destruction of seagrasses, algae or coralligenous formations, even under low levels of use.

A range of nature-based tourism activities can be envisaged taking place in the MPA, including wildlife watching, diving, snorkeling or nautical tours as this area has a high potential for leisure, recreation, adventure, beach tourism, and cultural heritage tourism. Park administration must take into consideration the planned tourism development in the region that is expected to grow exponentially in the next five to ten years. It is expected that the MPA would become a leading attraction for tourism as the region becomes better known, so it is very important to ensure sustainable development of tourism, which benefits local communities.

5.12. Other activities, such as sand extraction (coastal and marine), sea filling, dumping at sea, energy production, wind mill, pipelines and cables, etc.)

No data or limited data available on these topics, under investigation.

6. SECTION 6 – Preliminary remarks on changes, impacts and risks

To better understand the need for marine spatial planning, it is important to identify both apparent current trends, and project what future trends might look like in areas such as:

• Increased demand in fresh water for local population, tourism, agriculture, industry, etc.
• Increased demands for energy in Albania, the Adriatic and globally and the trends in both non-renewable (oil and gas development) and renewable energy sources found in the marine environment (offshore wind, wave or current energy)
• Increased shipping and marine transport in the Adriatic, both increase in shipping and the size of vessels
• Increased demand for tourism development and recreational uses as Albania is recognized as an emerging tourism destination because of its pristine environment and cultural attractions
• Increased demand for fish and seafood with average per capita increase in consumption predicted globally, a similar trend is likely in the Adriatic
• Increased demand for agriculture which is expanding and becoming increasingly focused on efficiency and output resulting in discharges of phosphorous, nitrogen and other pollutant causing eutrophication of marine ecosystems
• Increased demand for infrastructure development including the building of ports and harbours, bridges and roads, solid waste and waste water systems, for both resident and tourists – all to meet the growing influx and uses of the coastal and marine environment

Population movement (emigration and internal migration) is a multifaceted phenomenon: manifested with land abandon because of emigration abroad (Orikumi area); land occupation, sprawl, and abusive construction because of internal migration and lack of control (*Novesela commune*); increase of human pollution and wastes etc.

It is important to present here some conflicting perceptions between central and local level, conflicting activities and perceptions amongst institutions at the same level, and conflicting activities between local user groups of populations. In particular:

- Conflicting interest between central and local level in the resource use expressed in the local population concerns related to their ownership rights and reluctance towards government decision to include project areas under the status of special protected areas.
- Conflicting interests between business / industry and local population: salt plant and fishermen, fishermen organized in associations and individual fishermen, fishermen using the former marshlands and farmers.
- Conflicting interests between business and central or local government branches: malfunction of the communication canals between the seawater and the lagoon, variation of the hydric cycle of the lagoon, reduction of the drainage capacity and the fresh water influx to the lagoon.
- Conflicting interests amongst various individuals or groups of users: fishermen and hunters, wetland and wood ecosystem reduction to increase the arable land, use of pesticide and fertilizers versus organic agriculture, urban waists discharges to

lagoon, tourist influx, etc. Conflicting interests between illegal activities: tree cutting, forest fires, fishing with explosives,

In addition to natural changes, human induced changes have to be taken into account, the first being often a reaction to the impacts of the second, being interlinked.

It is possible to identify impacts or risks coming from one sector of activity, but very difficult to reach a consensus on the cumulative impacts of all the sectors together. Considering the marine environment and the coastline, it is nevertheless possible to identify, for each activity, most of the related impacts and risks, as shown in the following table.

Table 17: Activities related to the marine environment and associated risks for the marine and coastal environment.

Activity	**Associated risks or impacts**
Industrial fishing activities and Artisanal fishing activities	Lack of control Overfishing Pollution, oil, plastics, lost and discarded nets Bottom trawling impact on ecosystems and species
Date mussels collection	Lack of control and quotas, habitats destruction
Aquaculture activities	Impact of organic load on the environment, sediment Introduction of pathogens and viruses; Possible introduction of non-indigenous species; Impact on water and sediment quality without monitoring programs.
Sport fishing	Lack of control, illegal fishing
Recreational and subsistence fishing	Lack of control, no data
Navigation scheme, maritime traffic	Risks of collisions and accidental pollution Daily pollution from navigation, plastics, others
Karaburun-Sazan National Park (marine and coastal) protected area)	Risks form ship accidents and pollution, old and recent sources Marine debris Frequentation by land and by sea to be controlled (garbage, habitat destruction, animal derangement, illegal fishing, …)
Southern Vlora development zone for tourism	Increased water demand Coastal pollution Coastal erosion Earthquake/tsunami
Military activities	Pollution, oil, noise Collision Risks from dumped military material on land and at sea
Narta saltpans	Water demand for saltpans Coastal erosion Land use changes
Harbours and jetties Fisheries, Petroleum, Fret and passengers, military and tourim jetties	Accidental pollution from oil and chemicals, in relation to maritime and land transport, processing and distributing oil products. Impact from the exclusive port and from traffic of commercial and private vessels. Possible effect from port docks position on the marine currents circulation in the bay. Effect of port's docks on the silting process along the bay (and marine plants loss) Plastic and oil pollution …

Others to be investigated, such as sand extraction (coastal, river and marine), sea filling, dumping at sea, energy production, wind mill, pipelines and cables, etc.)	

Focus of the MSP process

At the present stage, with an incomplete set of data for evaluating properly the status of the Vlora area, and limited information on the vision and orientations for the future of the country and the southern region, it is only possible to give orientations for the future planning and management of the marine environment. The validation Meeting of 23 January was focused on the MSP process and dedicated to the definition of the vision and of the strategic approach for the Vlora area.

Considering the existing pressures and demands for this coastal region, its development will increase these pressures, and in particular concerning the needs for fresh water, energy, infrastructures (in particular for transport, industry and tourism) and food supply (from agriculture, fisheries and aquaculture).

On the marine side, the MSP process will need to focus in particular on five main domains of activities that can generate impacts, risks or reduction of the equality of the marine environment:

- Fisheries
- Aquaculture
- Maritime transport and ports
- Tourism and recreation
- Conservation areas, cultural and historical sites

For fisheries, there is a need for a physical delineation of the different types of fishing : industrial or semi-industrial, artisanal and recreational, taking into account all the existing legislation, the restriction of fishing in specific areas (military areas, harbors, navigation channels, near the mouth of rivers of lagoons outlets, set back fo specific activities such as aquaculture sites, cultural and historical remains underwater, obstructions, dumping sites, etc.) and allocating the remaining areas for the agreed activities (fisheries management plan), with new legislation if necessary and adequate penalty and strict enforcement.

For aquaculture, the existing zones allocated to this activity in the south western part of the Vlora bay needs to be evaluated and an adapted aquaculture management plan has to be set-up with the professional and approved, defining precisely the area, the rules of procedures, the species, the food quality, the level of production and the emergency measures in case of disease, accident or mass mortality, and a independent monitoring program financed by all the aquaculture companies operating in the area. A s for fisheries, new legislation could be enacted, with adequate penalties and strict enforcement, considering the closure of operation in case of breach of the agreed rules of procedures.

For maritime transport and ports, a specific management plan is needed, as the petroleum harbor, the fisheries harbor, the ferry harbor, the to military harbor and the multiple jetties in front of hotel or restaurant for tourism transport are operating all together in a very small area, where accident could occur, entailing the quality of the bay and the attractiveness of the area for tourism. At this stage, it is recommended to request that all the boats related to petroleum products, transport of goods and passengers, and industrial fisheries will use for access to the bay the northern entrance,

wider and less risky than the channel between Karaburun and Sazan ferries. This Sazan Karaburuni channel will be only use for nautical tourism and recreational activities and by the control boats of the Navy and other services.

For the tourism and recreation activities at sea, it is also necessary to prepare a management plan, with sites selected for swimming (usually coastal area), for diving (specific sites), for small sailing boats (sailing schools in the coastal area) and that all the mortised activities are excluded from the bay and proposed in an offshore area. For the transport of tourists for recreational activities by motorized boats for different activities (tours, transport to the marine protected area, pescatourism, etc.) it is recommended to concentrate the departures in two or three points along the coast in order to be able to control the movement and ensure the security and safety of the passengers. Among these sites a departure could be in the fishing harbor, one in the ferry harbor and another one along the coast south of Vlora. By reducing the number of operators and setting a restricted number of transport to the karaburun peninsula or tho the Sazan island, this will allow to reduce the pressure on the national park and to reduce the risk of fire, the amount of garbage and the damage to the terrestrial environment. For the access by provate boat to the marine protected area, a system has to be set up, mooring installed and a reservation system in place, by half or full day, remaining on site at night being forbidden, including a fee for the maintenance of the moorings.

Next steps for MSP

During the process, some elements have been identified as missing or needing more data or information. It will be necessary to complete a survey and to gather information on these elements or to develop research and monitoring plan for following them or selected indicators for the environmental, social and economic quality of the area.

In particular, the following needs and gaps have been identified :

- Develop a research plan for identified knowledge gaps
- Develop a monitoring plan for following changes in ecosystems and species (present and expected), the environment, the climate
- Identify suitable indicators (in line with MSFD and UNEP MAP – IMAP-ECAP for environmental, social and economic aspects
- Realize a summary of all the sources of pollution, and the associated risks, precautionary measures and emergency plans
- Evaluate the potential climate changes impacts at the local level
- Review and map the list all dumping sites sewage water, dumping areas at sea, rain/storm water outfalls

7. SECTION 7 - STATUS of EO of the Barcelona Convention

7.1. EO1 marine habitat

The composite environmental system of the Albanian coast was generally preserved in its natural and pristine state until a few years ago, and it could represent one of the last hot- spots of biodiversity within the Mediterranean marine ecosystems (Anonymous, 2002). In recent years, complex natural processes and uncontrolled human activities have occurred in this area (mainly related to urban and tourism developments) and are exposing the Albanian coast, and in particular theVlora Gulf, to a strongly increasing impact, as summarized above and reported in more specific previous studies. On this basis, a loss of relevant coastal habitats and a resulting extensive decrease in the ecological value of the coastal zone and marine habitats are expected. Habitat loss is particularly severe in coastal marine ecosystems, where human activities have historically been concentrated (Airoldi and Beck, 2007; Martin et al., 2005). These processes are already acting in some areas as described in the few reports on the Albanian coast (Anonymous, 2002) and as well documented along other European coastlines (Airoldi and Beck, 2007), although vast gaps still remain in our knowledge of habitat loss on temperate coastlines. This is particularly worrying because these coastal areas contain some of the most productive and varied, but also degraded, ecosystems in world (Edgar et al., 2000; Suchanek, 1994).

Therefore, knowledge of coastal habitats and detailed information on the structure of the benthic communities are essential points for defining a baseline for future research and for directing sustainable conservation and management of the Albanian coasts.

Karaburun-Sazan National Marine Park (Albanian: Parku Kombëtar Detar "Karaburun-Sazan") proclaimed Marine Protected Area in 2010 is nowadays the only National Marine Park of Albania. The park covers a marine area stretching 1.9 km along the coastlines of Karaburun Peninsula and Sazan Island, near the Bay of Vlora. The marine park is quite 16 kilometers long with a width varying from 3 to 4.5 kilometers, and covering in total 12,428 ha of surface. Karaburun Peninsula itself is a Managed Nature Reserve while Sazan Island is a military zone in Albania.

Vlora bay 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. Sazan 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 Sazan 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. The coastal area of the Karaburun-Sazan MPA in 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. Caves, canyons and small bays can be found in those coastal zones.

Table 18: Marine habitat types identified in NMP Karaburun-Sazan

Coastal littoral zones	Subdivision of zones	Biocenoses
Mediolittoral	Mediolittoral hard beds and rocks	Biocenosis of the lower mediolittoral rocks
		Biocenosis of mediolittoral caves
Infralittoral	*Posidonia oceanica* meadows	Biocenosis of the *Posidonia oceanica* meadows (=Association with *Posidonia oceanica*)
	Infralittoral hard beds and rocks	Biocenosis of infralittoral algae
Circalittoral	Circalittoral hard beds and rocks	Coralligenous biocenosis
		Biocenosis of semi-dark caves

▪ *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 macro-fauna (sponges, mollusks 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. Hence, Posidonia beds ensure numerous ecological functions and can be qualified as very productive habitats in terms of ecosystem services. Posidonia meadows are mostly located at the East of the Karaburun Peninsula, within the bay, where it is more protected from the swell.In the Bay of Vlora 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 *Halophila stipulacea* also contribute to the regression of Posidonia beds. The 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.

▪ Coralligenous and Pre Coralligenous formations

Coralligenous and Pre Coralligenous formations are also an important ecosystem of the MPA. There are mostly present along the Sazan Island coastline and particularly in the circa-littoral zone, which corresponds the continental shelf area that lies below the zone periodic tidal exposure. It can also develop in the infralittoral zone if the light provided is sufficient to allow coralline algae to grow. Coralligenous and Pre 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 and Pre 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 below will hence be considered:

Ecosystems	area (ha)
Posidonia	194,03
Coraligenous formations	276,18
Reefs	498,88
Open waters zone	11601,73

Total of the area 12 570,82 ha

7.1.1. BENTHIC COMMUNITIES of soft sediments

The northernmost zone of this biocoenosis was characterized by the presence of a particular facies of gastropod *Turritella communis* extended northward off the Sazan Island. A wide, dead, muddy matte of P. oceanica was recorded along the eastern and southern coasts of the Gulf, where it replaced the previous living P. oceanica meadow in the past few years, with a surface area of 9.47 km2 (about 8% of the mapped area). A wide bed of non-indigenous green alga *Caulerpa racemosa* var. *cylindracea* covered part of the muddy mattes inside the Vlora Bay. The narrow residual areas covered by P. oceanica meadow (total surface of 9.47 km2; about 5% of the mapped area) were restricted to the southeastern coast of the Gulf, from PlazhiVjeter to Kepi Lumit and near Orikum, between 4 and 14 m in depth, and to the small area of Punta Linguetta along the Karaburun Peninsula. Moreover, a large Posidonia bed was recorded off the Sazan Island (Figure below). A *Cymodocea nodosa* bed is present as a facies on the shallowest sandy bottoms closed to theVlora beach. It could be clearly recognized as the particular facies of Mediterranean infralittoral zone known as ‘‘Biocoenosis of the superficial muddy sands in sheltered areas (SVMC; sensu Pere`s, 1967; Pere`s and Picard, 1964) with eel-grass C. nodosa.’’; Finally, the muddy detritic bottom (DE; sensu Pere`s, 1967) was also identified as a narrow belt along the Vlora town coast, slightly deeper than Caulerpa colonization belt. These last communities were only identified by underwater videos, ROV, and scuba dives.

The hypothetical map of the benthic biocoenosis of the Vlora Gulf (FIGURE 5) shows a total of 151 taxa identified on the soft Botton of the Vlora gulf, a and 54 species recorded for the first time in the Albanian waters, also enhancing the importance of new studies at national (Albanian) scale. In addition, for species found that were not included on the Italian checklist for the Adriatic Sea (Relini, 2008), representing a contribution on regional scale that fills in some of the knowledge gaps about macrobenthos of southeast Adriatic Sea.

The species assemblages and the community structure on the soft bottom of the Vlora Gulf seem to be severely affected by the relevant environmental forcing from both natural and anthropogenic activities, particularly those related to continuous and massive terrigenous transfer. The species assemblages were characterized by few broadly tolerant native species adapted to the environmental instability, and the identified biocoenosis seemed to be progressively mud-covered by excess

sedimentation. Thus, because of the strong sedimentation process, habitat losses seem to have been produced in the past few years and are causing replacement of the native biocoenosis, as previously documented through- out Mediterranean from the Rhone Delta (Meinesz, Lefevre, and Astier, 1991) to the Venice Lagoon (Rismondo, Guidetti, and Curiel, 1997) and Taranto seas (Matarrese et al., 2004).

The integrated contributions of both qualitative and quantitative analyses by means of different methodological devices could put in evidence the presence of benthic communities variously distributed on the soft bottom of the Vlora Gulf. The biocoenosis of VTC terrigenous mud was widely extended throughout the Vlora Gulf from around 20 m to the maximum depth of 50 m and was mostly characterized by the dominance of limicolous species. such as the sea cucumber *Labidoplax digitata*, the gastropod *Turritella communis* and the annelids *Maldane glebiifex* and *Sterna spisscutata* that can also justify the low biodiversity detected in this biocoenosis. All species are reported in the annexes with this report.

On the shallower coastal belt, a muddy Posidonia matte seems to have replaced the previous Posidonia meadow, which is now restricted to narrow residual patches of seagrass along the eastern side of the Vlora Gulf. The increasing sedimentation due to uncontrolled discharges and wastes of inert materials together with the intense solid transport from the coast, have produced strongly negative consequences on Posidonia, because their leaves were covered by sediment and were severely damaged, with a consequent quick degradation of the entire meadow. Also, in other areas of Vlora Bay, this condition of severe suffering for Posidonia was also highlighted during many underwater explorations.Although there is no organized, comprehensive inventory of the distribution and extent of seagrasses in Albania, a rapid, local regression and fragmented pattern of Posidonia meadows were already detected along the coast, particularly in those areas heavily affected by huge human impacts and uncontrolled tourism activities (Beqiraj et al., 2008; Pittito et al., 2009).

Although, in all the studies analyzed, the highest biodiversity indices were detected inside the Posidonia meadow, a fragmented seagrass with a relatively poor species richness and abundance of benthic fauna was previously documented in the Vlora Gulf (eastern coast of Karaburuni Peninsula), compared with those seagrass areas distributed along the southern Albanian coast, where fewer impacts (Beqiraj et al., 2008; Pittito et al., 2009) and less-modified water movements and sedimentation have occurred. The comparison between the Posidonia meadow and the muddy matte shows that the biodiversity was much lower in the muddy matte communities, which was mostly represented by the annelids *Glycera unicornis*, *Pseudoleio capitella fauveli*, and the brittle sea stars *Amphiura chiajei* and *A. filiformis*, and had few micro filter feeders, such as bryozoans and sponges.Habitat conversion also occurs when more structurally complex natural habitats are converted to less-complex habitats, which usually have lower diversity and productivity (e.g., Beck et al., 2001; Heck and Crowder, 1991). Moreover, in this degraded condition, the settlement of opportunistic alien species (Galil, 2000; Occhipinti-Ambrogi, 2000) is common, and that also has occurred in the Vlore area, with species such as the green algae *Caulerpa racemosa* var. *cylindracea*, which has covered part of the muddy matte inside the Vlora Gulf. The mud deposition causes a condition of continuous instability on the bottom, which do not allow the settlement of well-structured biocoenosis, but only seem to favour species with a wide ecological tolerance (Currie and Parry, 1999; Leppäkoski et al ., 1999; Nicolaidou, Pancucci, and Zenetos, 1989). All these considerations indicate a progressive decay in the benthic biocoenosis of the Vlora Gulf, especially when compared with the findings of the few previous studies. The loss of patches of seagrass within a larger bed of *P. oceanica* and its replacement with a wide, muddy matte are a clear example of fragmentation and habitat degradation that, together with the consequent decrease in biodiversity, represents a severe warning for future conservation policy. In fact, habitat

degradation is a serious issue that has ecosystem implications and often leads to definitive loss of natural habitats (Airoldi and Beck, 2007). Both natural and human impacts operate on the fragile coastal ecosystem of the Vlora Gulf where two strong environmental forcing are recognized as most responsible for the habitat degradation:

- the copious sedimentary inputs coming from the Vjosa River;
- the pollution from the urban sewer from the town of Vlora and the relative
- hinterland that are continuously associating in the degradation of the water quality and the relative decay of the ecosystem.

These impacts have been increasing in the past few years, and a higher level of development is expected in the future, which could cause the loss in the global value of the ecosystem services, estimated to be 10 times higher than any terrestrial ecosystem (Costanza et al., 1997). Thus, the health and the equilibrium of the soft bottom benthic communities of the Vlora Gulf as well as their future evolution are in danger from the future plans for human activities and the eventual control system on the most impacted natural processes, such as the natural solid sediment transport. Further uncontrolled building activities along the coast could again modify water movements and sedimentation with irremediable consequences on the described ecosystems.

7.1.2. BENTHIC COMMUNITIES of submerged rock walls

The seafloor of the National Marine Park of Karaburun-Sazan is mostly made of soft substrates, rocky habitats (sublittoral rocks and coralligenous reefs), caves and seagrass beds (*Posidonia oceanica*, *Zostera noltii*) that are the shelter of several species of ecological interest. The particularity of sublittoral rocks of the west coast of Karaburun is the important colonization by brown algae of genus Sargassum and Cystoseira. Their high abundance is an indicator of good water quality and contributes to the biodiversity observed in the sublittoral waters.The presence of erected bryozoans assemblages (*Reteporella* sp., *Myriapora truncata*, *Pentapora fascialis*, *Smittina cervicornis*, *Cellaria* sp., ...) on hard substrates is of particular interest.Bioconstructors covering of pre-coralligenous and coralligenous reefs alternates with sponges and erected bryozoans that are particularly well developed on certain sites. The diversity of sponges is relatively high, notably when depth increases. A confirmed important data: no gorgonian was observed during all of the prospective dives, and crustaceans were presents, but not numerous. However, for all sites, fish diversity and abundance were very low.
Furthermore, evidences of sea urchin overgrazing were largely observed above -20 meters on most of the rocky sites. This can be either due to organic pollution that favors the development of *Paracentrotus lividus* or an overfishing of teleostean predators.
Invasive species *Caulerpa cylindracea* and *Womersleyella setacea* have colonized the rocky bottoms above -30 meters and form a thick layer. The low biological diversity and degraded environmental quality in the area of Vlora Bay, including the MPA Karaburun–Sazan, has also been highlighted from some previous studies, after WAITT Marine Expedition (Beqiraj – personal communication), Beqiraj et al. 2008, Beqiraj et al. 2012, Fraschetti et al. 2011, Kasemi& Beqiraj 2006, Kasemi et al. 2008, Kashta& Beqiraj 2009, Maiorano et al. 2011.

The National Marine Park of Karaburun-Sazan includes several habitats and species that must be protected through the implementation of management actions, but after the references mentioned here above, the current degraded situation in this area is a consequence of uncontrolled activities including illegal fishing, overfishing, marine and coastal pollution, coastal erosion, aquaculture,

uncontrolled urban and tourism developments, changes of hydrological and sedimentological regimes in Vlora Bay, impacts from Vjosa river etc.

Along all this part of the west coast of Karaburun peninsula presents coralligenous encrustations that are discontinuous and form small cavities of about a few centimeters.

The reef community is dominated by red algae *Peyssonnelia* sp. and sponges, but other species from different groups were sparsely observed: Scleractinians (*Madracis pharensis*), encrusting bryozoans (*Schizomavella mamillata*), erected bryozoans (*Smittina cervicornis*, *Reteporella* sp.), ascidians (*Aplidium* sp., *Halocynthia papillosa*) and echinoderms are presents: sea cucumber (*Holothuria tubulosa*), sea urchins (*Centrostephanus longispinus*) and sea stars (*Echiinaster sepositus*, *Peltaster placenta*, *Coscinasteria stenuispina*). Sponges are abundant and mainly represented by *Clathrina clathrus*, *Chondrosia reniformis*, *Ircinia* sp., *Agelas oroides*, *Cliona viridis*, *Phorbas tenacior*. Are also very abundant some brown algae (*Dictyota* sp., *Zanardinia typus*), red algae (*Mesophyllum* sp., *Lithophyllum* sp., *Peyssonnelia* sp.), and green algae (*Palmophyllum crassum*, *Caulerpa cylindracea*).

The seascape changes and the coralligenous assemblages give way to sublittoral rocks dominated by photophilic algae. This habitat is characterized by a high algal diversity (green algae: *Codium bursa*, *Caulerpa cylindracea*; brown algae: *Dictyota* sp., *Cystoseira corniculata*, *Cystoseira compressa*, *C. foeniculacea*, *Sargassum* sp., and many others) and a few patches of seagrass (*Posidonia oceanica*) when he seafloor changes from rocky to sandy.

The particularity of sublittoral rocks is the high proportion of their surface colonized by brown algae of genus Cystoseira and Sargassum. Perennial brown algae are dominating the hard substrates of the Sazan's and Karaburun's western coast. The three Cystoseira observed during previous monitoring campaign were: *Cystoseira compressa*, *Cystoseira corniculata* and *Cystoseira foeniculacea*. Cystoseira communities and seagrass meadows (*Posidonia oceanica*) are hosting a high biodiversity in sublittoral waters.

Kepi bay hosts a lot of ascidians (*Rhopalaea neapolitana*), gastropods (*Bursatella leachii*), marine worms (*Hermodice carunculata*) and echinoderms: sea cucumber (*Holothuria* sp), sea star (*Marthasterias glacialis* and *Echinaster sepositus*), and sea urchins (*Sphaerechinus granularis*). Gastropods *Bursatella leachii* were observed isolated or in groups of individuals, either on soft substrate or on macro-waste or isolated rocks. Another gastropod was found in this part of the bay: *Tylodina perversa*. In this little bay it's possible to see very few fishes, mainly comber fish (*Serranus cabrilla*), marine worms (*Hermodice carunculata*) and echinoderms (*Holothuria* sp.). Numerous archaeological remains and macro-waste were found, here and in other dive sites in the bay. Here the Posidonia is really rarefied and the meadow has little capacity for spontaneous recovery. It should be mapped accurately, and it should be investigated in the way to compare with previous data.

7.2. EO2 non indigenous species (alien species)

Alien invasive species is one of the most outstanding issues facing biodiversity today on a global scale. In temperate marine systems, invasive species are well-documented causes of marine community disruption. There is an important harbor in Vlora that regularly receives vessels from regional and international waters. Species introduced to these harbor could conceivably spread into adjacent waters. Alien species of marine fauna are also used in mariculture in various parts of the Mediterranean.

A potential threat to marine biodiversity is that of invasive species *Caulerpa racemosa* var. *cylindracea* that is widely dispersed in the Mediterranean basin, including the Albanian coast of Ionian Sea. The last years it is recorded also in Vlora bay and the eastern side of Karaburuni peninsula (Kashta et al., 2005). As reported by a number of marine biologists, this invasive species is decreasing the biodiversity values of the invaded sea waters.

Recently it has been sighted the American blue crab (*Callinectes* sapidus) is an invasive voracious alien species, with no known predators and with high reproductive and survival rates, which has now spread throughout the Mediterranean.

7.3. EO3 fisheries

The fisheries sector in Albania is relatively small, however it is important from a socio-economic point of view, as it is a significant source of jobs in coastal and remote areas. Fisheries were once central to the economy of the southern coast of Albania. On the Adriatic coast the most used gears are trammel nets, gill-nets, and entangling nets, while on the Ionian Sea coast long lines and gill-nets are the primary gears.

Fishing regulations include some restriction concerning the fishing activities, related to the conservation and protection. Based on the Law on Fisheries, fishing with trawl nets, dredges, purse seines, boat seines, shore seines or similar nets above sea grass beds of, in particular, *Posidonia oceanica* or other seagrasses, is prohibited. Also, based on Regulation concerning management measures for the sustainable exploitation of fishery resources in the Sea, the use of towed gears is prohibited within 3 nautical miles of the coast or within the 50 m isobaths where that depth is reached at a shorter distance from the coast. Based on Regulation for application of the legislation on fishery and aquaculture, fishing is prohibited in and around the river mouths and in the sea-lagoon communication channels. The same Regulation also prohibits every fishing & aquaculture activity in the outer part of Karaburuni shore from Kepi I Gjuhezes until Rruget e Bardha (Palase) in the distance of 1 marine mile shoreline or 50 m isobath in the case when this depth is reached at a shorter distance. It is prohibited to fish with trail net (trawl or pelagic) in the Vlora Bay (limited on the north from the basic line of the Bay of Karaburun up to Treport) (INCA, 2013).

Individual and commercial fishermen fish in the broader area using a variety of methods. The intensity of fishing effort and their effect on local populations of target and by-catch species remains unknown. However, fishermen report that local fisheries resources are limited, and that their revenue is decreasing. Population of a very sensitive species, the dusky grouper *Epinephelus marginatus*, distributed along all the Karaburuni peninsula and Sazani island coast shows strong declines because of overexploitation. As part of the Socio-economic study of MCPA Karaburun-Sazan (Puka, 2012) fishermen completed a questionnaire and the results are presented here.In 2012, there were 71 commercial fishing vessels registered in the Vlora Port, which is a decrease compared to 2006 and 86 vessels. There are 2-4 crew members per vessel or in total around 200 fishermen.The number of active fleets is around 50 vessels and they are not spending the same working hours per year. The most active fishermen used to spend at maximum 2300 hours. The total number of trips recorded during 2010 was 130 trips and around 110 trips in 2012. The other fishermen used to spend less time, from 900 to 1200 working hours per year. In majority of cases, 80% of the trips are within Karaburun-Sazan area.The data of fishermen interviews indicate that they are offsetting high fuel costs and diminishing income by deferring maintenance of vessels and gear. The high fuel cost has caused the reduction of trips in the area and the majority of them are mainly catching in Karaburun-Sazan area.

In terms of both landings and revenue from fishing in the region and in particular Karaburun-Sazan area, recently the most economically important species have been shrimp, red mullet and codfish. The annual quantity for a vessel whose landings is normally up to 1800-2000 hours per year in Karaburun-Sazan area, per each species varies from 1500 to 3000 KV, meanwhile shrimp is top-caught species quantity and red mullet has the top- selling price. With regard to the sale of seafood, fishermen mainly sell directly to the distribution centre and various buyers.In addition, small fishing boats in Karaburun-Sazan are quite usual due to the necessity to reduce the fuel coast. There are around 10 boats that are catching fish with angle. The main species caught are: wild seam bream

(*Sparus aurata*), sea bass, dentex (Sparidae). These fishermen sell their products directly to the public and/or restaurant at the coast area.

Fishing activity is practiced in the western and north-western part of Karaburuni, outside the Vlora bay (fishing within the bay and at depths less than 40 m is prohibited). The area from Sazani island to Vjosa river mouth is one of the most frequented areas by fishing boats, mainly trawlers. The most common species caught in marine waters are hake *Merlucius merlucius*, red mullet *Mullus barbatus*, striped red mullet *Mullus surmuletus*, sole *Solea* sp., sea bass *Dicentrarchus labrax*, sea bream *Sparus aurata*, European eel *Anguilla anguilla*, mackerel *Scombers comber*, Atlantic horse mackerel *Trachurus trachurus*, *leerfish Lichiaamia*, cuttlefish *Sepia officinalis*, squids *Loligo* sp. and shrimp *Marsupenaeus japonicus*.

Pelagic fishing in surface waters for sardines (*Sardina pilchardus*), anchovy (*Engraulis enchrasicolus*), and herring (*Clupea harengus*) has been common until early 1990, but it was almost abandoned nowadays and most of former pelagic fishing boats were adapted to trawlers for fishing benthic and *demersal* species.

Infrequent collection of benthic invertebrates has been rarely practiced by specialized boats in marine waters, also illegally in the soft bottoms within the bay, mostly for bivalve mollusks of Donax, Tellina, Venus and Tapes. In the recent years there are very rare evidences of this activity.Majority of the fishermen community that use large fishing boats (mainly trawlers) are inhabitant of Vlora town, while the fishermen from the villages (Radhima, Orikumi, Dukati) are mostly using small boats for fishing in the Orikum lagoon or shallow waters. There are illegal fishing activities in the rocky areas of both sides of Karaburuni peninsula and sometimes in the western side of Sazani island. This illegal activity is mainly practiced for the collection of date mussel *Lithophaga lithophaga*, and lobsters (*Palinurus elephas*, *Homarus gammarus*) that are protected species in the Mediterranean. Diving and illegal fishing with lights and spear guns is also practiced, such as for fishing the dusky grouper *Epinephelus* sp.

Aquaculture is also practiced in the area, mainly through fish farming. The increasing tourist demand for marine fish in Vlora area has caused the recent increase in aquaculture production. It has been developed in the littoral water along the Karaburuni peninsula. In two locations along eastern edge of Karaburuni peninsula (Raguza) there are sea cages cultivating sea bream (*Sparus* sp.) and sea bass (Dicentrarchus sp.). Currently there are five investors and their yearly production for the time being is relatively small (50-70 kv/year per each sea cage aquaculture firm), but trend is increasing, because the number of visitors to the coastal area of Vlora bay, especially during summer season, is steadily increasing. Today, aquaculture is playing an important role on fish market (Bequiraj et al., 2010 and Puka, 2012).

7.4. EO5 eutrophication

Knowledge of the structural and functional properties of microalgae communities is essential for the evaluation of the ecological consequences of human activities for the trophic state of marine ecosystems. Strict relationships have been observed between environmental conditions and phytoplankton communities; for example, phytoplankton communities respond to changes in the physical and chemical properties of their environment by changing their taxonomic composition and size structure (Platt et al., 2005).

In coastal areas, these relationships are even more evident because of the extreme variability of physical and chemical parameters, and the effects of human activities such as urbanization and tourism. In areas like the coastal regions of Albania, which are subject to drastic socioeconomic changes, and consequently, to an increasing and uncontrolled exploitation of aquatic ecosystems (Munari et al., 2010), the assessment of the structure and productivity of phytoplankton assemblages is a crucial issue. Such assessments, however, regarding the Albanian marine coastal waters are relatively scarce (Mangoni, Saggiomo and Santarpia, 2003; Rubino et al., 2009; Saracino and Rubino, 2006).

Vlora Bay, Albania, is a good site to carry out these assessments because it is a semi-enclosed bay with a densely populated industrial city, Vlora (Cullaj, Lazo, and Baraj, 2004; Cullaj et al., 2005). The bay is connected to the open southern Adriatic Sea by a very shallow entrance (,40-m depth), and is south of the mouth of the Vjosa River whose waters flow southerly past the Narta Lagoon and into the bay (Pano et al., 2006) (Figure 1). In addition, the bay is of paramount interest to the Albanian fishing industry since it serves as a natural nursery for many fish species of economic importance.

There are no data available regarding the phytoplankton assemblages and the productivity of Vlora Bay, so it was necessary this study carried out as part of the European Project CISM (INTERREG IIIA Italy–Albania), which aims at producing a detailed characterization of the Vlora Bay ecosystem. The aim of the study was to evaluate the structure and productivity of the phytoplankton assemblages in Vlora Bay to assess the trophic characteristics of the bay on small temporal and spatial scales. In particular, size-fractionated biomass, chemo taxonomic composition, and size-fractionated primary production are discussed in relation to the physical and chemical environmental conditions of the bay.

7.5. EO7 hydrography

The coast of Karaburun peninsula has steep cliffs, with depths near the shore and some caves with open or underwater access. In this sea space are the bays of Vlora and Saranda, which are very open bays. The greatest depths in the coastal area are those of the erosion or abrasion zone that includes the southern part of the coastline (from Vlora to Saranda); In this area, geomorphology, lithological composition and structural construction of carbonate formations, which build the coastline, create spectacular landscapes and landscapes, combined with the Ionian Sea. As a result of these phenomena, there are some sea bays in this area, where the most prominent ones are: Bay of Biscay, Gramë, Himara, Porto-Palermo, Borsh, Kakome, and Saranda.
The coastal area is covered by swirling rivers, streams and streams of which the most important are: Dukati, Kudhës and Borsh in the northern part of the study area, and Bistrica, Kalasa and Pavllo in the southern part. The Butrint Lagoon is the most important and unique hydrographic unit. In addition, there are also some small and small rocks that swirl the area. The northern part is considered to be the poorest hydrological sub-sector in Albania.

The limestone formations in the area are characterized by a porous structure and often percolating waters run underground without any obstruction. Groundwaters are rich as displayed by the karstic springs flushing freshwater into the lagoons, e.g. Orikumi lagoon. Along Karaburuni peninsula, freshwater springs can be seen along the coastline, discharging colder water from the sea bottom to the surface. However, the inner part of the peninsula is desolate and waterless.

The area encompasses two geomorphological units, terrigen formations which can be heavily eroded (flysh, e.g. and quaternary deposits of molas) and carbonate rocks (limestone and limestone-dolomite, with rudists or globotruncana, of upper-Cretacea, e.g. karstic mountains of Rreza e Kanalit-Karaburuni) (UNDP/GEF and Ministry of Environment, 2005b). Rreza e Kanalit-Karaburuni is characterized by a narrow and steep platform. Cliffs plunge vertically reaching rapidly great depths, with 20 m and more at 200 m from the shoreline. The eastern side of Karaburuni peninsula is a succession of rocks of different ages, from Jurassic and Neogene (Aquitanian, Helvetian, Tortonian and Pliocene) eras. The southern part is mainly constituted of Pliocene rocks and recent sediments. The eastern coast is from the upper cretaceous era, essentially composed of limestones. The western part of Sazani island is composed of Upper Cretaceous rocks (massive limestones or udists and globotruncana) and the eastern part is composed of rocks of Burdigalian age (lithographic limestones).

7.6. EO9 Contaminants

When it comes to evaluating the state of the waste-waters, indisputably the lack of appropriate sewerage infrastructure and adequate wastewater treatment along the coastline, is the issue of major concern, not only for the urban centers and surroundings of the Vlora region, but also for developing other vital sectors such as touristic, economic, and environment protection sector. Therefore, the issue requires a prompt response in terms of providing immediately operational, effective, and sustainable technical solutions underpinned by the gradual, integrated and environmentally-sound urbanization. It is important to emphasize that during the past few years, significant effort has been induced into design, construct and put into operation the 2 Waste Water Treatment Plants (herein after WWTPs) of substantial importance to the entire Vlora bay: WWTP for the Municipality of Vlora, and WWTP for the Administrative Unit of Orikum; Even though both of the aforesaid WWTPs were built in 2016, only WWTP in Vlora is operational to the certain extent (primary and secondary treatment), whereas the one in Orikum, urban center with the major impact to the target area investigated within this report, is completely out of function.

Figure 44: Waste Water Treatment Plant in Vlora.

The causes below, clearly emphasize the serious gaps and bottlenecks related to the effective operation, management and wastewater treatment services in the target area.:

- The Laboratory for the control and monitoring of drinking water is missing;
- The level of NRW is 78% and there is no Action Plan how to reduce the same;
- Total operational costs are not completely covered by the WU;

- WU does not have license for the waste water treatment;
- WWTP Vlora is reconstructed; Currently, the constructor is providing training for selected staff of WU Vlora and currently it is a phase of Defect Notification Period;
- O&M manuals and As-built drawings are not available at WWTP Vlora;
- Design parameters are much lower than the quantity/quality parameters of the inlet wastewater on WWTP Vlora;

It becomes obvious all these drawbacks of the wastewater facilities, operation, and treatment services in the target area, cause that the wastewater solutions provided so far in the target area are just not enough to provide the adequate quality of wastewater to be discharged to the sea with no adverse impact on the marine environment. Problems concerning quality of water in Vlora coastal water, more apparently in the northern coastline (Narta Lagoon, and Vjosa outlet), relate to sewerage inflows from Zvernec and part of Vlora (mostly from areas with illegal constructions) discharged through drainage canals.

In addition, during 1994 was reported that at the southern part of the lagoon there was a basin receiving the effluents of the former Soda PVC factory (Chlorine alkali and PVC factory) and consequently the sediments were heavily loaded with mercury. This facility is situated four kilometers north of Vlora, as the site of a former chemical manufacturing complex consisting of a chlorine alkali factory, a unit for the production of vinyl chloride monomer (VCM) and a unit for the production of polyvinyl-chloride (PVC). The factory closed in 1992 and was substantially destroyed during civil disturbances in 1997. The plant is today posing an unacceptable threat to the health of some 180 families living on and around the site, calling for urgent measures for human and environment protection, and prevent further contamination of the environment.

Recently a Shoe production factory is established near Narta site. They say that there is a survey/monitoring carried out recently by a third party and still NAPA Vlore has not information on the results. NAPA Vlore promised that once the result obtained they will be published. However this is identified as an issue to be resolved in the next period.

7.7. EO10 marine litter

When estimating the current situation of the marine litter in Vlora Bay and in the Vicinity of the MPA, it is important to highlight that there are no reliable and consistent data with regards to the current situation of the marine litter and the extent to which the plastic debris is present in Vlora bay. The reason for this is strongly incorporated in the generally poor management of both, waste and wastewater emissions.

Marine Litter and Plastic Debris in the Vlora bay have been mostly identified and investigated on a project bases (UNDP September 2018) through the Marine Litter Monitoring Pre-Survey, as a pioneering initiative in the target area; The most affected marine sites (subject to selective marine matrices investigated [beaches, seafloor, sea surface, marine sediment, but no marine biota]) are highly frequented beaches situated on the east side of the Karaburuni island; One sea floor monitoring site (shallow waters < 5m) has been identified on Shën Vasil beach due to the highest visible presence of the sea floor litter in shallow coastal waters; Sea surface macro-litter monitoring has been excluded from this survey cycle due to the fact that almost no floating litter has been identified. Thus, sea surface has been defined as environmental compartment of lower priority; The total of 8 beach litter monitoring sites have been identified as the result of marine litter pre-survey on Karaburuni peninsula. Among these beach litter monitoring sites, 3 have been identified as the potential “Hotspots”; Beach litter monitoring sites and potential “Hotspots” identified during the marine litter pre-survey on Karaburuni peninsula:

- Shën Jan (close to the mole), 40 25 51 N 19 19 48 E, about 60 kg of waste, HOTSPOT 1
- Dhimëkushtë 1, 40 25 28 N 19 21 08 E, about 20 kg of waste, HOTSPOT 2
- Dhimëkushtë 3, 40 24 59N 19 21 13 E, about 20 kg of waste;
- Dhimëkushtë 4, 40 24 50 N 19 21 54 E, about 8 kg of waste;
- Dhimëkushtë 5, 40 24 39 N 19 22 25 E, about 40 kg of waste,
- Dhimëkushtë 6, 40 24 25 N 19 22 25 E, about 40 kg of waste;
- Shën Vasil, 40 24 04 N 19 22 50 E, about 30 kg of waste, HOTSPOT 3

8.Proposal of a draft Marine Spatial Planning for the Vlora Bay, Albania

8.1. Marine Spatial Plan of Vlora bay

The current trend of increased pressure from tourism development and other economies (such as aquaculture ,etc) calls for a Marine Spatial Plan (MSP) to protect and revive rich marine biodiversity and cultural heritage of Vlora bay.

The proposed draft MSP for Vlora Bay in Albania considers as priority the following types of human activities like conservation, different types of fisheries, different type of recreational and cultural activities , maritime transport & services(anchorage etc) and military, as well as to precise the option for the final zoning of the area based on the report of MSP Guidelines for Albania.

The following table-matrix presents the proposed type of activities, responsible authority with a mandate on the activity and basic regulations to implement.

Type of activity	**Responsible authority with a mandate**	**Basic regulations**
Military activities	Military Authority to define and delineate the areas and their accessibility	Surface: navigation to be restricted Water column: no tourism activity Sea bottom: no fishing, no tourism activities No
Conservation activities: natural and cultural	Environment and Cultural authorities to define and delineate the areas, their accessibility, the types of activities and the number of visitors on land and at sea	Refer to the management plan of each area: National Park, Marine Protected area, wetlands or cultural sites on land and at sea. For example, exclusion of fisheries, definition ofsites open for visits, adoption of a chart for tour operators (land and sea, trekking and diving, etc.), definition of entry fee, …
Exclusion zones for fisheries (any type)	Fisheries authority in connection with all other authorities.	Exclusion zones: - military areas - marine protected areas - buffer zones (500m) around cultural sites or wrecks - buffer zones (500m) around aquaculture sites - 2km around lagoons or river mouths (Narta, Orikum, and river at the north according to legislation) - 250m buffer zone for tourism activities along the coast during the touristic season - inside harbours - in mooring zones - in all navigation channels for petroleum, ferries, and industrial fisheries - in polluted or dumping areas - 500m buffer zones for sewage outlets or rainwater discharges - …

Professional industrial fisheries	Fisheries Authority, excluding the zones allocated to Military, Environment and Maritime transport, and defining precisely the areas and the technics to be used	Develop a management plan for fisheries (model GFCM) for each species of economic importance, define the areas and the depths allowed (80m and below), improve control, define dissuasive penalties, register catch and develop a monitoring plan…
Professional artisanal fisheries	Fisheries Authority, excluding the zones allocated to Military, Environment and Maritime transport, and defining precisely the areas and the technics to be used	Develop a management plan for artisanal fisheries précising the areas, the technics, water column or sea bottom according to species and ecosystems, identify the areas and depths, improve control, register catches and develop a monitoring plan,
Aquaculture sites	Already identified by fisheries authority To be delineate with a buffer zones of at least 500m around the installations	No tourism, No fisheries No diving Monitoring by environmental authorities
Recreational fisheries	Environment, fisheries and tourism authorities Areas to be define precisely and controlled	Exclusion of recreational fisheries of the zones allocated to other fisheries activities and aquaculture and define the techniques and catch limit per day per boat or person
Maritime transport activities	Maritime transport authorities to define the most safer channels for petroleum, trade, ferries and passengers ships, while respecting the areas under the responsibility of Military and Environment authorities and the sensitivity of species and ecosystems	Redefine the entry and departure routes for petroleum products, trade, passengers and professional industrial fisheries, better through the bay northern entrance than in the pass between Karaburun and Sazan
Maritime transport for tourism activities	Maritime transport authorities to define the most safer channels for tourism activities, separating the tour operators for diving, dolphin watching and long sailing tours of transport of tourist to Karaburun and Sazan	A management plan has to be prepared, reducing the number of departure points, for example using the passengers harbour for all tour operators (signing a code of conduct) and reducing the number of departure points from the south-eastern area of the bay (in front of hotels and facilities to two or three with for each control of safety measures and information on and respect of the area regulations

The following map is the first ever effort to organize the maritime space of Vlora bay and could be considered as the Vlora Marine Spacial Planning draft No1 (Vlora MSP1)

Layers :

1. Marine protected areas
2. Military areas - polygon
3. Sewage outlets
4. Lagoons, river mouths - 2km buffers zones
5. Aquaculture sites
6. Cultural heritages include:
   - cultural sites
   - wrecks
   - under water trails
7. Tourism activities include:
   - Business Tourism (hotels)
   - Beaches
   - Diving
8. Existing anchoring & Proposed signal buoys
9. Sustainable and Industrial Development Zone which include
10. Marine Trails
11. Boat Itinerary
12. Sea traffic (leisure boats + commercial boat)
13. Proposed sea traffic (leisure boats + commercial boat)

8.2.Sazani Strait PSSA or Vlora bay PSSA

Important to emphasize in the proposed Vlora MSP1 are the proposed maritime traffic lines that goes around and north of Sazani island (for big ships, oil tankers,etc) and allowing the passage into the strait of only the small and leisure boats.

Taking into consideration the rich marine biodiversity (including the presence of monk seal) and a great number of cultural heritage areas located in both marine sides of the strait we suggest to ***apply for Sazani Strait PSSA or Vlora PSSA.***

Actually this proposal is born during the ***SPA/RAC*** "**ADRIATIC REGION WORKSHOP ON PSSAs"** organized in Tirana on 10-13 December which was was a perfect opportunity to intensify this communication and to discuss marine planning issues with high relevance to this study

Figure 45:MSP of Vlora bay

8.3. Proposal for a Committee for the implementation of MSP in Albania

To foster the MSP process the Consultant suggests the creation of a committee focused on MSP:

Chair
A representative of the National Territory Council (representing the Prime Minister)

Members (to be discussed)
Representatives of the following administrations:

- Ministry of Tourism and Environment (MoTE) with 4 seats
  - one for the National Coastal Agency
  - one for the National Agency for Protected Areas
  - one for the National Environment Agency
  - one for the National Tourism Agency
- Ministry of Instrastructure and Energy (for maritime sector)
- Ministry of Defense (Navy)
- Inter-Institutional Maritime Operational Centre (IMOC)
- Coast Guard Flotilla
- Border police and Emigration
- Ministry of Agriculture (for Fisheries)
- Ministry of Health and Social Protection

According to the region, could be invited: (to be discussed)

- The president of the relevant region, representing the main coastal municipalities cities
- Representatives of the professionals (like chambers of commerce) of specific sectors with activities at sea or on the coast, such as tourism, fisheries and aquaculture, maritime transport.
- Representatives of research institutes, NGOs and experts's associations.

9.ANNEXES (located in the Annexes folder)

Annex 1 - Project Implementing Schedule

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Annex 2.1. - Introduction Workshop of 26 November

Annex 2.2 - Introduction Workshop of 26 November

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Annex 3 - Maps

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Annex 4 - Shapefiles

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Annex 5 – References

Annex 6 Table of Taxonomic List of benthic species in the bay of Vlora

Annex 5 :REFERENCES CITED and EVALUATED (A complete set of the documents collected during the study)

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