Strategic Partnership for the Mediterranean Large Marine Ecosystem

MedPartnership

Together for the Mediterranean Sea

GEF UNEP

Integrated Recources Management Plan (IRMP) for Buna/Bojana Area

DRAFT (July 2015)

PAP/RAC

Global Water Partnership Mediterranean

UNESCO United Nations Educational, Scientific and Cultural Organization · International Hydrological Programme

Editors and main authors:
Dimitris Faloutsos, Marina Marković, Brian Shipman

National coordinator for Albania: Zamir Dedej

National focal point for Montenegro: Jelena Knezević

Authors of Part C "Water Resources Management – Situation Analysis":

Dimitris Faloutsos, Nikolaos Skoulikidis, Elias Dimitriou, Konstantinos Gritzalis

Authors of the thematic studies used for preparation of the Plan:

Irakli Beka, Hamdi Besku, Vasilije Bušković, Zamir Dedej, Damiano Delrosso, Thanas Goga, Antonio Guarnieri, Fjoralba Hanxhari, Đuro Karanikić, Jadranka Kaludjerović, Genti Kromidha, Vesna Mačić, Miriam Ndini, Franka Paloka, Darko Pekić, Nadia Pinardi, Dragana Radević, Dragan Radojević, Valbona Smixiu, Jovana Vujačić

Reviews and contribution in the preparation of the Measures: Matthew Lagod, Jelena Knežević, Andrea Merla, Michael Scoullos, Željka Škaričić

Translation: Jelena Pralas, Azra Kosovac (Montenegrin)

List of figures

List of tables

List of boxes

List of Images

Abbreviations

AFS	Adriatic Forecasting System
CAMP	Coastal Area Management Programme
CLC	CORINE Land Cover
CORDA	Coordinated Action
DPSIR	Drivers, Pressures, State, Impacts, Responses
EC	European Commission
EEA	European Environment Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GIZ	
GWP - Med	Global Water Partnership Mediterranean
HP	Hydropower production
IBA	Important Bird Area
ICZM	Integrated Coastal Zone Management
IMF	Integrative Methodological Framework
IPA	Instrument for Pre-Accession Assistance
IWG	Integrative Working Group
IWRM	Integrated Water Resources Management
LSMS	Living Standars Measurement Survey
N	Nitrite
NUTS	Nomenclature of Territorial Units for Statistics (French: *nomenclature d'unités territoriales statistiques)*
P	Phosphorus

PAP/RAC	Priority Action Programme Regional Activity Centre
PE	Public Enterprise
SPA/RAC	Specially protected Areas Regional Activity Centre
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO – IHP	UNESCO – International Hydrological Programme
WFD	Water Framework Directive

Context

The Integrated Management Plan jointly considers impacts of the activities in the upstream of the Buna/Bojanariver basin to the conditions in the downstream coastal zone and the Buna/Bojanabasin itself as well as impacts of the main areas of development -agricultural, tourism and urban- of the broader coastal zone and catchment area, mainly in terms of the availability and quality of water. At the same time, coastal impacts coming from the marine side, being the outcome of the interaction between sea and freshwater, influenced by the marine currents and episodes of extreme meteorological conditions, that can have profound influence to the river delta and coastal aquifers are also taken into consideration. Therefore the Plan demonstrates the integration of established methodologies for Integrated Water Resources Management (IWRM) and Integrated Coastal Zone Management (ICZM) into a single "Integrative Methodological Framework" (IMF). The Plan applies the ecosystems approach for the integrated management of land, water and living resources that promotes conservation and sustainable use of them in an equitable way.

The Plan also seeks the optimal combination of these approaches within the transboundary area of Albania and Montenegro (Figure 1), therefore bringing together the administrative structures of the two states and their relevant localities. The Buna/Bojana[1] River, its catchment, the underlying aquifers and coastal waters provide the common physical thread linking the two countries; a hydrological system underpinning natural and socio-economic processes. Water can be seen as the "bloodstream" of both the nature and economy.

The coastal zone is therefore the space where interaction between the terrestrial and marine areas, land and sea occurs.

Understanding the different components of this system and the interactions between them is central for its sustainable management.

The Legal/Institutional Framework consists of national regulations and relatively recently introduced EU compatible legislation in an effort of both countries which are candidates for accession to the European Union, to approximate to the EU *acquis communautaire.* In this regard the EU Water Framework Directive (WFD) has been incorporated and used as a framework law for the management of the water resources. The Plan uses the WFD methodology regarding water resources management planning; in this regard it is the first effort in both countries for the implementation of this legal requirement.

The Plan therefore applies the IWRM considerations using the WFD requirements alongside ICZM as for inter-sectoral coordination and integration, along with transboundary cooperation in the planning and management of basins and coastal areas. The driver for the ICZM component of the Plan is the ICZM Protocol for the Mediterranean - developed as a supra-state legal instrument to provide a common legal framework for the 21 Mediterranean states and the EU. The entry into force of the Protocol in 2011, and its ratification by Albania and Montenegro demonstrate commitment of the countries towards sustainable coastal development. Furthermore, ratification of the Protocol by the EU, means that the Protocol has now become part of EU law with binding effects on Member States and candidate countries.

In bringing together policy instruments and methodologies from the disciplines of IWRM (including surface water and groundwater management), spatial planning, climate change and ICZM, the Plan is adding value to these individual approaches such that **"*the whole is greater than the sum of the parts*".**

The experiences from preparing the Buna/Bojanaintegrated management plan would be used for the replication of the effort elsewhere in the Mediterranean basin instead of preparing separate IWRM and ICZM plans.

[1] Buna being the Albanian name and Bojana Montenegrin name of the same river

Figure 1: The Buna/Bojana Transboundary Plan area location

The Integrated Plan Making Process

The unique feature of this Plan is the use of an "Integrative Methodological Framework" (IMF), which cuts across the different sectoral interests and the complexities of their administration. In particular, the integrated approach combines the consideration of socio-economic and physical issues and proposes unified measures and responses to them (Box 1).

The benefits of this integrated approach are the potentials for win-win solutions in which dealing with issues in one sector can deliver benefits in others, generating economies of scale through shared responses, along with reducing the likelihood of conflict between sectoral interests, both at the level of natural resources management and the level of economic planning. The integrated approach also facilitates the consideration of "cross-cutting" issues such as climate change and the promotion of economic and social well-being.

The Plan is also transboundary, encompassing areas of Albania and Montenegro separated by the Buna/Bojana River but sharing common features and issues. The key shared natural and physical transboundary features include the river, its catchment and the underlying aquifers, along with the associated ecosystem with its high-value habitats and species. The area also shares similar economic

and social challenges of poor and declining agriculture, the rapid but poorly controlled growth of coastal development and tourism, very low incomes, and a lack of investment in infrastructure. Furthermore, the transboundary area shares risks including catastrophic flooding, pollution and the impacts of climate change. It is on these shared issues that the Plan focuses.

Combining the IMF and transboundary approaches provides opportunities to develop a common understanding, to identify issues or mutual interest and, where appropriate, to share priorities and the co-ordination of efforts to deal with them. The transboundary approach is also timely as both countries move towards accession to the EU that promotes and supports stronger cross-border cooperation.

The IMF roadmap consists of five basic stages as set out in the presented diagram (Figure 2). It is designed to guide rather than dictate, and can be adapted to individual local circumstances.

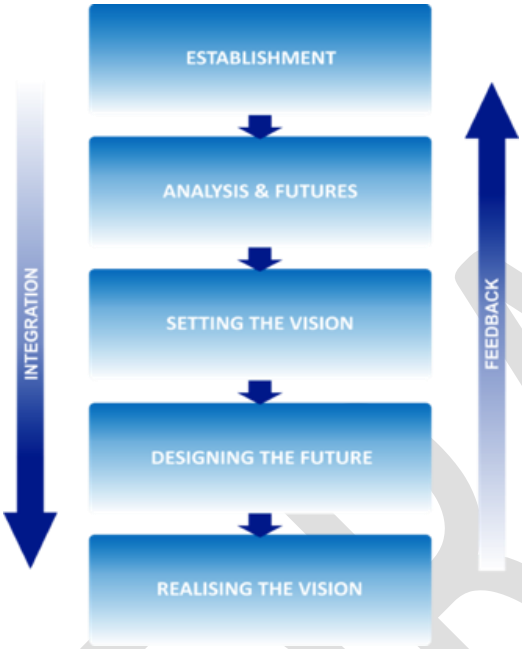


Figure 2: The IMF Planning Process

Box 1: Integrative Methodological Guidelines (

Within a joint initiative, as part of the MedPartnership project, the Priority Actions Programme / Regional Activity Centre (PAP/RAC), the UNESCO - International Hydrological Programme (IHP) and Global Water Partnership – Mediterranean (GWP – Med) proposed a comprehensive Integrative Management Framework (IMF) as an operational methodology for the sustainable management of the ecological continuum constituted by the coastal zone, the river basin and the coastal aquifers. The Framework encourages and facilitates planners, practitioners and interested parties towards a shared, efficient and effective use of the relatively limited resources. The IMF is intended to support better coordination, integration and involvement of all stakeholders in all stages of decision-making process. Also, it integrates climate change as a cross-cutting issue important for planning and implementation processes in the coastal zone.

Source: An Integrative Methodological Framework for coastal, river basin and aquifer management: Towards Converging Management Approaches or Mediterranean Coastal Zones (GWP-Med; PAP/RAC and UNESCO-IHP; 2015)

How to read the document

The following document consists of four main parts:

Part A sets out in summary form the process of Plan formulation, the analysis, through the design of the measures and actions to implement the Plan. The stages are summarised according to the 5-stage framework established by the "Integrative Methodological Framework" (IMF).

Part A also contains the Plan's measures and priority activities.

Part B sets out the detailed background data and information, and the analysis of the relevant sectors and themes for the Plan, along with the key points summarised as bullet points.

Part C "Water Resources Management – Situation Analysis" elaborates on the state of the water resources. **The results of the analysis are summarized in the respective chapters of Part B.** Part C can be read as a "stand alone" document to meet the statutory requirements of the European Water Framework Directive.

Other data and information, such as the Stakeholder Analysis, Institutional and Legal Framework, and the detailed DPSIR tables are set out in annexes.

The Approach

This Buna/Bojana Transboundary Management Plan is a pilot -"real world"- application of the "Integrated Methodological Framework" (IMP).

To structure the analysis of the complex interplay between topic areas and link it with suggested policies and measures integrated to planning the "DPSIR" framework has been used. DPSIR stands for: Driving forces - Pressures - State - Impacts – Responses (more information is provided in chapter 4).

The Plan is also important as a test of working at a transboundary level. Such transboundary work poses important challenges to the collection of the background information as well as to the timeline for the plan. The scoping, that should precede the preparation of the plan, must allow a realistic period for firstly: the need to harmonise data and mapping between two countries including for example socio-economic data and groundwater mapping. Secondly, the need to collect, basic data, for example the necessity to conduct ecological status characterisation as a reference point.

PART A: THE PLAN

1. The foundations of the Plan - Establishing the process

The key tasks at this stage were to establish the practical mechanisms for the Plan process.

1.1 Scoping

Scoping is the preliminary assessment of the key drivers underlying the Plan as well as of the key issues and concerns in the planning area. The first include among others the policy drivers such as the Barcelona Convention and its ICZM Protocol which provide a common legal framework to promote and implement ICZM, including coastal zones stretching accros national boundaries such as the Bojana/Buna.

Both countries aspire to EU membership and have Candidate status; Montenegro is the most advanced, being in formal membership negotiations. Future EU membership is a key policy driver as the process involves the adoption, application and enforcement of EU law, and the implementation of judicial, administrative, economic and other reforms necessary for the countries to meet the conditions for joining the accession criteria. Critically, these include the water, waste and air sectors. In addition, both countries have strong economic development aspirations, to bring their citizens closer to the European norm.

The Plan is a clear indication of the political willingness of the two countries to work together on the transboundary issues. Brief background information analysis and early dialogue with stakeholders was used in order to establish:

- The key issues and concerns
- The practicalities of plan-making
- The preliminary vision for the area.

Key issues and concerns

A preliminary identification of key issues was done during the scoping period; the findings are summarised in a SWOT analysis for the Plan area below (Table 1). The issues are set out in detail in Part B, and are summarized under the broad headings: pressures on natural values, water budget, climate change, hydro-morphological issues, pollution and socio-economic and development challenges.

Table 1: SWOT analysis from the Scoping report for the Buna/Bojana area

Strengths	Weaknesses
Environment ▪ Rich biodiversity; particular importance for migratory wintering waterfowl and water birds Socio-economic factors ▪ Significant economic development potentials in eco-tourism (and related services), agriculture, ▪ Preserved (even though under pressure) cultural identity, traditional ways of living Institutional and legal framework ▪ Harmonisation with the EU legislation for a number of policy areas is on-going ▪ General commitment to sustainable development exists in the policy documents Cross-border cooperation ▪ Scope of cross-border cooperation is growing ▪ Mechanisms for joint management of shared natural resources are becoming accessible ▪ New funding sources are becoming accessible	Environment ▪ Inadequate pollution control, primarily as regards water pollution (from urban development and tourism, navigation) and waste disposal ▪ Biodiversity loss is recorded – destruction of habitats and decline in species ▪ Environment is frequently not prioritised in development and implementation of spatial and other plans ▪ Management of natural hazards (climate change, flooding, earthquakes, weather extremes, erosion) Socio-economic factors ▪ Quality of tourism offer is dissatisfactory – short seasonal peaks in visitation and characteristics of mass tourism exhibited Infrastructure ▪ Underdeveloped transport and environmental infrastructure; some problems with energy supply networks ▪ Capacities to attract funding and management of infrastructure remain limited Institutional and legal framework ▪ Weak implementation and enforcement ▪ Insufficient institutional capacities, including coordination among relevant institutions, sectoral policies and different levels of government Cross-border cooperation ▪ Formal cooperation agreements are not always followed by operational measures ▪ Development planning is not coordinated at all ▪ Poor infrastructure connections
Opportunities	**Threats**
Environment ▪ Alignment with EU standards and strengthened implementation to improve environmental quality are a priority from the EU accession agenda Socio-economic factors ▪ EU and international support available for sustainable development of the area ▪ Support is available for innovation, development of knowledge based economy and competitiveness ▪ Interest from foreign tourist in natural and cultural values of the area Infrastructure ▪ Favourable funding is becoming available from a larger number of sources (e.g. IPA funds) Institutional and legal framework ▪ EU integration (as a vehicle to upgrade legal and institutional system) ▪ Synergetic effects of integrated approaches to management of human activities ▪ Consensus building Cross-border cooperation	Environment ▪ Consequences of natural hazards (flooding in particular) exacerbated due to climate change ▪ Improper waste and wastewater management continues and decreases attractiveness of the are ▪ Lack of investments in natural resource management Socio-economic factors ▪ External economic shocks and potential new crisis affect local prospects ▪ Tourism is an industry highly susceptible to economic contraction ▪ Impacts of climate change on economy Infrastructure ▪ Lack of funding hinders further development Institutional and legal framework ▪ Inability to implement laws and policies is prolonged, discontinuation of institutional reforms ▪ Political priorities change Cross-border cooperation ▪ Implementation of bilateral agreements are implemented in an ineffective way

▪ International donors favouring cross-border cooperation, in particular in the fields of environment and transportation	▪ The countries do not capitalize the outcomes from the internationally supported projects

The practicalities of plan-making

Transboundary working, particularly when that boundary is a river and its estuary dividing communities, cultures and nationalities, adds obvious practical constraints to the plan-making process. At the time of plan-making, the two countries had different legislative and administrative frameworks. Local administrations in Albania in the Plan area consisted of small communities typically of a few hundred inhabitants within the wider county of Shkoder with a population of over 200,000 inhabitants. In Montenegro, the lowest level of administration is the Municipality; the only local administration in the Plan area being Ulcinj with a population of approximately 20,000 inhabitants. As of 2015, new administrative organisation is applied in Albania and it does not include communes as the lowest administrative units. However, this change was not in place during the plan preparation process and therefore it was not reflected in the socio-economic assessment.

The scoping highlighted other practical concerns, not least the lack of, and need to collect and/or produce new data. An important example being required for the Ecological Status Characterisation, a first for Montenegro and Albania, as a reference point. Other needs include the identification of differences in datasets between the two countries and their harmonisation (see for instance lack of ground water mapping, differences in type of socioeconomic data, etc.). To actually overcome these issues, resulted to the significant extension of the timescale of the Plan in its early stages.

1.2 The preliminary vision for the area

The preliminary working versions of the "vision" for the Plan area were presented in the Scoping Report and discussed with stakeholders on the early "harmonisation" meeting i.e a multi-stakeholders participatory meeting to advise the scope and the content of the Plan.

The proposed alternative vision "state works" were the following.

> *"Integrated planning to bring people from both sides of Bojana/ Buna river together, to improve livelihoods and preserve unique ecological values and distinctiveness of the area";*
>
> *"Integrated planning for the European future of the Bojana/ Buna region: connecting people – improving livelihoods – developing capacities – preserving unique ecological values and distinctiveness of the area";*
>
> "*Improve the quality of life of all citizens of the Buna River and costal area through a clear mechanism of planning and tourism development taking into account the protection and valorisation of the biodiversity value*".

Stakeholders present on the meeting, expressed support for such future development of the area that envisages development of such forms of tourism which are based on nature protection, such as eco tourism. These discussions combined with the results of the consultations with the key national experts and the Stakeholder Analysis (2013) resulted to the final version of the Vision stated in chapter 1.3 below.

1.3 Defining the Transboundary Zone's Boundary

This is defined according to the IMF which incorporates the guidelines in the ICZM Protocol; those of the EU WFD and the ecosystem approach. The above consider all the natural characteristics of the area, and the local conditions. A Transboundary zone is made up of the transboundary natural elements i.e. coastal zone, catchment, aquifers, transitional and coastal waters (up to the external limit of territorial sea) and the relevant administrations (Figure 3).

Based on the above, the planning team used the following criteria to define the Planning zone:

- The area should encompass the transboundary and land-sea interactions;
- Following the ecosystem approach, the boundaries of the defined area should take into consideration and coincide where possible with the boundaries of the:
    - inland natural environment systems i.e. watershed, ecosystems etc.
    - marine area that interacts directly with the inland natural and manmade environment i.e. the area adjacent to the land that is directly influenced by the land-based activities or by the surface and underground freshwater flow.
- The boundaries of the defined area should take into consideration and coincide as much as possible with those of the administrative divisions for:
    - municipalities, communes etc.
    - water resources management i.e. watersheds.

Underlying aquifers extend beyond the boundaries of the watershed. The area beyond the boundaries of the watershed was not used for the designation of the Planning zone since any measures defined for this area would fall under the responsibility of different watershed authorities.

Based on the above the Plan is focussed on a zone the boundary of which is shown on Figure 4 below.

In practical terms, the land boundary of the Plan area has been drawn using the local administrative boundaries that broadly conform to the physical boundary of the watershed - thereby facilitating the analysis of the natural and physical environment alongside the available socio-economic information. In Montenegro this includes the municipality of Ulcinj, whilst in Albania this includes four communes within the county of Shkoder (Ana e Malit, Berdice, Dajc and Velipoja). A small part of the municipality of Bar, as well as parts of communes of Balldreni i Ri, Bushat and Rrethine are included as it falls into the Buna/Bojana watershed.

The marine zone is drawn according to an estimate of the primary influence of the surface water flows on inshore marine waters as indicated by the levels of salinity (Figures 4, 7, 29, 30) and, as a proxy measure of the main influences of land-based activities.

The Plan identifies the management issues related to major challenges as well as the causes of those considered as a priority at national and transboundary levels and proposes measures to address them.

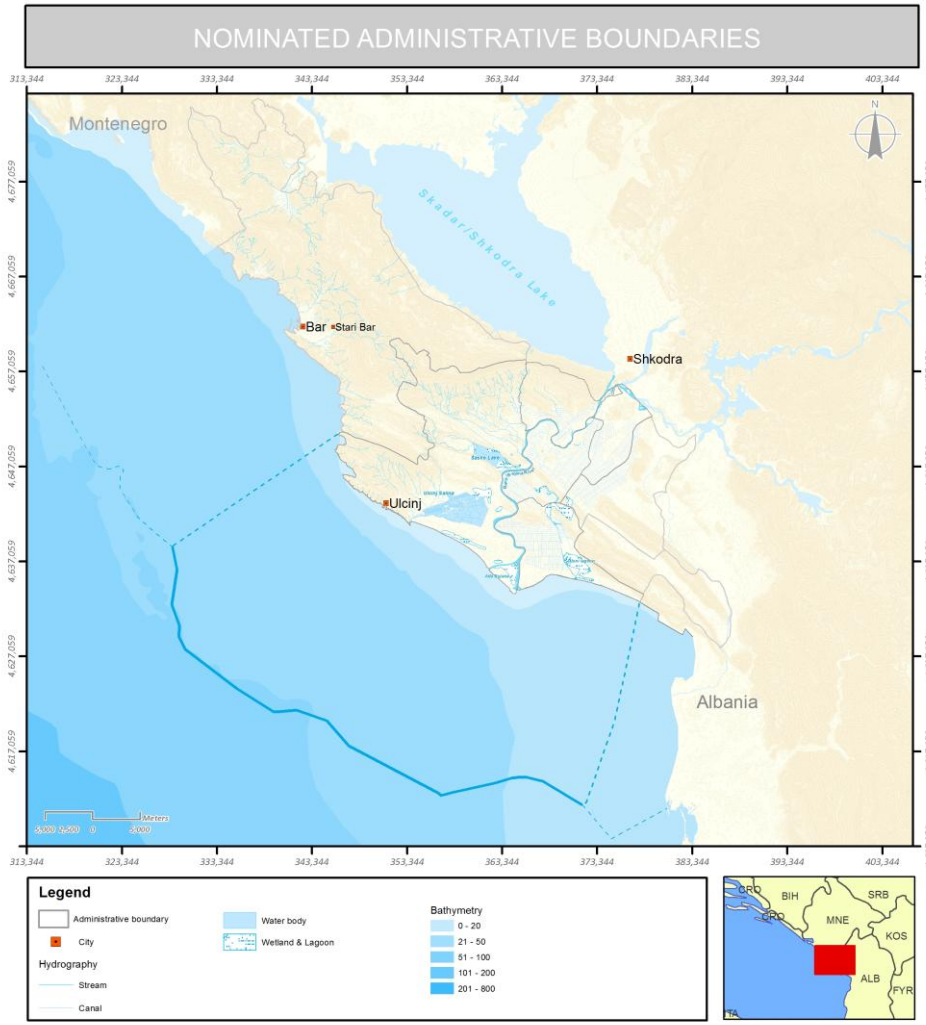


Figure 3: Nominated administrative boundaries

Figure 4: The Plan area

1.4 Governance of the Plan making process

The key tasks of this stage: The coordination and cross-sectoral involvement of stakeholders, technical support to the Process, and communication among partners. For the Buna/Bojana area these mechanisms include the following.

Establishment of the Integrative Working Group (IWG): the mission of which, being broader to the development of the Plan, was tointegrate activities related to methodologies and in particular those related to Integrated Water Resource Management including aquifer management, and Integrated Coastal Zone Management, in order to:

- Analyse respective methodologies, potential convergences and outputs.
- Collaborate in the drafting of the Integrative Methodological Framework (IMF) to be experimentally applied to the Buna/Bojanamanagement Plan.
- Guide and support corresponding partners (UNESCO- IHP, GWP-Med, PAP RAC) in the implementation of the Buna/Bojanamanagement to achieve consolidated results.
- Present the IMF and experience gained.
- Achieve the universal value of the IMF that would enable its replication elsewhere in the Mediterranean and beyond.

1. Establishment of two teams of National (Albanian and Montenegrin) experts, each led by a National Coordinator, to produce the necessary background data and the respective reports.
2. Joint meetings of national and international experts coordinated by the Partner Organizations (PAP/RAC, GWP-Med and UNESCO IHP), in order to:
    - Assess key findings.
    - Identify problematic aspects and emerging issues.
    - Agree on critical aspects.
    - Define future roadmap and modes of operation.

2. Local stakeholder group meetings and consultations were held comprised of technical experts, representatives of local and national administrations, local communities and NGOs. Two stakeholder workshops at transboundary level were organized:

I. In the beginning of the process to:

- Validate the baseline situation with regard to the main common issues identified in the river basin and the coastal zone identified through the scoping report;
- Discuss the shared vision for the management of the area.

II. At the end of the process to:

- Discuss the findings of the management Plan and agree on future measures and priority actions necessary for improving the environmental, ecological and socio-economic state of the area by 2030.
- Agree on best modes of operation for improving transboundary governance and cooperation between the two countries.

A number of focus groups discussions with local communities were also organized in the two countries in between, to map and explore/analyse the perceptions of the stakeholders related to the management issues in the area and the way to address them.

2. Analysis & Futures

The key tasks of this stage: building the evidence for future actions, substantiating the issues and problems through more rigorous analysis and review, and to describe the present "State" and likely future trends.

Combined with the coordination mechanisms set out above, it lays the foundations for future cooperation and implementation.

2.1 Analysis

The detailed analysis of the current state, problems and issues of the area has been structured around topic areas that are elaborated in detail in Part B, the Background. The limitations of this data and information are referred to in the description of scoping above.

2.2 Analysis Summary

In general, there are deficiencies in the level of data and information for virtually all policy areas due to the lack of capacity for monitoring. This situation is compounded by the political geography of the area - spanning two national administrations.

However, there is a number of issues that arise from the analysis that is elaborated in Part B of this document. These fall under the following categories and are summarised further below:

1. Social and Administrative Characteristics
2. Economic potential
3. Natural Environment and Resources (including biodiversity and protected areas, hydrology, hydrogeology, coastal and marine processes and designation of water bodies)
4. Major issues and problems including
    a. Natural and hydro-morphological issues (including climate change)
    b. Pollution and the status of the Water Bodies
5. Socio-economic and development issues
6. Institutional and Legislative Framework

The analysis identified following key area's characteristics, important for its management:

The importance of water

The hydrological system of the area is of key importance to the natural and socio-economic processes and functions. Water can be seen as the "bloodstream" of both the nature and economy, and the

hydrological as the vascular system through which positive and negative effects are “transported” allowing the interaction between the natural - economic - spatial components, including the marine area. In turn the functions and processes in the marine area affect the terrestrial area.

The Buna/Bojana River is short, only 44 km. This short length belies the importance of the River. With a mean annual discharge of approximately 20 km^3/year, the flow is the third greatest river discharge in the European Mediterranean after the Rhone and the Po Rivers.

Understanding the different components of this hydrological system and the interactions between them is central for its sustainable management.

There is a particular issue with the assessment of groundwater hazards and risks as overall assessment of the groundwater bodies is not currently possible because of the almost complete absence of necessary data. However, it seems that there is a decrease in groundwater levels and -probably- deterioration of its quality.

The lack of continuous and systematic monitoring is an impediment for effective planning and management.

In relation to standards required by the European Water Framework Directive the findings can be summarised as follows; it should be underlined that the data used for the characterization of the water bodies were mostly generated by the project, and the data series available are not sufficient to establish quality trends:

- The status of The Buna/Bojana is assessed as poor. The status of Shasko Lake and the Viluni lagoon is assessed as lower than moderate and moderate respectively.
- Heavy metal pollution was recorded in few cases and the mean concentrations of some metals are above Environmental Quality Standards at one or more sampling stations.
- The chemical–physicochemical quality of River deteriorates from its sources to its mouth, ranging from good to moderate.
- Special attention must be given for addressing the issue of invasive species.
- The status of the Coastal Marine Zone is classified as poor.

The relationship the Plan area to its wider catchment and marine zone

The Buna/Bojana River is the outflow of the Lake Skadar/Shkoder- the Balkan’s largest lake - and receives the waters of the Drin Basin with a total area of about 21,000 km^2. The hydrological regime of Drin has been much altered due to the construction of a cascade of dams. As a result during high-water periods and “favourable” meteorological conditions Drin water enters Skadar/Shkoder Lake or restricts the outflow from the lake, often resulting into floods. In addition the disturbed sediment distribution regime and sediment balance -there is a combined effect of sediment retention in the dams and increased erosion phenomena downstream the dams- affect the coastal dynamics in a complex way. Furthermore, the economic activities and the natural processes (e.g. currents) in the coastal waters allow the interaction with marine areas in the north, south and west of the area of focus.

Unsustainable solid and liquid waste management exert pressures to the natural system. Industry and mining seem to -according to the available bibliography- result in pollution of Drin River and Lake Skadar Shkoder watersheds and subsequently affect the Buna/Bojana River watershed.

Climate change and hazard risks

Potential climate change include sea level rise, which will have significant effects particularly to coastal lagoons and estuaries. With increasing salinity, there may be shifts in the nature of the ecosystems. Extreme damaging events are likely to increase. There are increased flood risks. The frequency and

intensity of floods have increased -two flood incidents in 2010 were the most severe recorded in the last 80 years- with significant damage to buildings and agricultural land.

Socio-economic trends impacts

Superficially, the demographic data shows a contrasting pattern between the two countries – namely a decline in Montenegro compared to the growth in Albania. However, the Albanian, voter registration-based statistics, may disguise a trend of outward migration following the national trend of migration to urban areas or overseas in search of better educational and economic opportunities.

The relatively high population density in the plan area reflects a general pattern of decline in inland rural areas. Within the Plan area itself there is a clear trend of movement towards the coastal strip away from the inland rural areas. Unless there is a significant change in economic and educational opportunities these trends are unlikely to reverse.

Out migration combined with reduced industrial activity due, largely to the transition to market economies had resulted in reduced anthropogenic impacts on the environment. However, more recent political and economic stability has led towards the re-opening of many potentially polluting industries upstream including mining, fertilizer production and tanning, and the increase of population in urban centres. Whilst some of these facilities are equipped with wastewater treatment plants, many of these have fallen into disrepair.

A major pressure in Buna/Bojana catchment is the increasing population during summer. Approximately 400,000 tourists visit the Plan area annually with a major peak during summer when the population of the area increases almost 6.5 times.

Urbanisation and Planning

The urbanisation process in the coastal areas has been intensified from the 1960's onwards, in particular after the 1990's. The pattern of urbanisation in the plan area is characterised by the recent rapid development of a narrow strip within 5 kilometres of the coast, and is generally linear in nature along the coast and highways (litorization).

In Montenegro there is a considerable over supply of land designated for building, urban plans allocating enough land to accommodate a population several times the existing population. One of the results of such unsustainable planning is heavily dispersed construction, leading to landscape degradation.

Albanian development has been characterised by the lack of formal plans and informal development in a recent construction boom dating from the 1990's, particularly in the coastal areas and urban centres. The enforcement of building controls, and the slow implementation of adopted spatial plans is inadequate.

In the absence of a strong and effective planning system and the reduction in developable land, the rate of urbanisation can be expected to fluctuate widely according to tourism and speculative market factors rather than demographic trends.

The natural environment/Biodiversity – wildlife

The scarcity of data and information on biodiversity, the low level of research, and lack of continuous and systematic monitoring are significant problems for planning and management. However, the area is of international importance with significant threats. Nearly half of the waterfowl species in the Buna/BojanaDelta are included in the lists of endangered species at local, regional and international level.

The combined Buna/Bojana and Lake Skadar/Shkoder wetlands support 900-1,000 plant species and large populations (about 25,000) wintering waterbirds.

Over 76% of the bird species in the Buna/Bojana Delta are migratory; the area is an important part of European bird migration flyways passing over the Balkans, underlining its international importance.

The mouth of the Buna/Bojanariver represents a rare example of a natural delta on the east Adriatic coast. The combined Buna/Bojana and Drin rivers are of outstanding importance as migration route for fish, linking Lake Skadar/Shkoder with the Adriatic Sea.

Pressures on the wild species of the area include non-sustainable and illegal fishing using destructive methods of fishing and hunting. Wood harvesting, and the expansion of pastures are contributing to continued deforestation. There had been serious deterioration of Skadar Oak forest. As it concerns agricultural biodiversity, due to introduction of new animal and plant species and varieties (cattle, crops, vegetables etc.), traditional local varieties are declining.

Semi-natural habitats such as coastal dunes and wetlands are subject to considerable erosion and fragmentation respectively. Wetlands in the Albanian side are threatened by over-pumping of surface and ground waters for irrigation.

In general, apart from pressures there is a low level of public awareness about environmental issues.

Tourism

The overall economic impact of tourism in the area although showing growth is, still considered inadequate, primarily due to underutilisation of available accommodation capacity, the dominance of residential type of tourism, and the concentration of tourism activities in two summer months of July and August.

Unsustainable tourism activities, combined with other related coastal developments, have had a number of adverse impacts on the Plan area including:

- Loss, degradation and fragmentation of natural habitats, particularly coastal and wetlands habitats.
- The degradation of the landscape through the construction of new tourism installations and infrastructure.
- The pollution of marine and freshwaters due to increased discharge of polluted and untreated wastewaters.
- The disturbance, particularly in the wilderness areas particularly in the peak of summer season.

Infrastructure

The already inadequate infrastructure throughout the Plan area has not fully matched the rapid spatial transformation. In particularly in Albania, this has resulted in partial or even full absence of infrastructure services.

Roads are in poor condition, due to inadequate maintenance. Severe congestions are frequent during the summer months, notably in Montenegro.

Potable water systems are of particular concern. Potable water sources are insufficient to meet peak demands in summer and are at risk of contamination.

Wastewater management is not sustainable leading to water pollution hence degradation of ecosystems as well as contamination by harmful microorganisms by both the inland and marine environments, with consequent risk to human health.

Solid waste collection and disposal systems are of a similar major concern throughout the Plan area. The ecological as well as the aesthetic quality of riverbanks and water bodies is deteriorated, mainly due to

heavy litter disposals throughout the river systems. Local collection services are inconsistent, ranging from the well organised, notably in Montenegro, to almost non-existent, in Albania where illegal dumping along roads, drainage and irrigation ditches is common. Existing landfill sites are inadequate to meet efficiently the demand and a significant source of pollution in their own right. There is no system for the safe management of hazardous waste not only in the Plan area but throughout Albania.

Lack of investment in recent decades is exacerbated by uncontrolled development, a trend that is likely to continue. In Montenegro, EU accession and compliance with the *acquis communautaire* may drive improvement in solid and waste water systems; Albania is considerably less advanced than Montenegro with EU accession process; nevertheless, it is on the same path that can be considered as an important investment driver in Albania.

The institutional and legal context

In both Albania and Montenegro policies, laws and institutions are changing rapidly, partly in response to the requirements of the EU accession process.

Cross-border high-level coordination mechanisms have been established for the decision-making processes related to management of the Drin basin, including Buna/Bojanaarea; the Drin Coordinated Action (CORDA) is based on the MoU signed by the Drin Riparians -including Albania and Montenegro- in November 2011.

Following the successful implementation of CAMP (Coastal Area Management Programme) Montenegro project, coastal zone management is gaining its political relevance, followed by organisation of governance framework for ICZM (adoption of the ICZM strategy and setting the coordination mechanism). In addition, the coastal area in both countries is covered by the arrangements under the Drin CORDA. Nevertheless, coastal management per se needs to receive extra focus in Albania –in line with the ICZM Protocol- possibly through integrated structures.

There is a need for upgrading capacities at both national and local levels as well as awareness raising campaigns and other initiatives to improve the current law enforcement and implementation rate of the integrated approaches in managing coastal and marine ecosystems.

Local governments stand out as the key part of the institutional framework where strengthening is particularly needed.

3. Setting the Vision

Beyond the Analysis stage above it is necessary to set a widely accepted vision for the Plan area, which will shape the detailed measures that follow.

The Vision below is based on the stakeholder meetings held at the early stage of the Plan, consultations with the key national experts, and the Stakeholder Analysis (2013).

The future challenge for the success of the Plan lies in real and meaningful integration, i.e. in creating synergies and critical linkages between stakeholders, and in transcending administrative barriers to deal with global, regional and local issues, with ultimate aim of achieving a sustainable development path.

The analysis and consultations to date have helped identifying the key goals around which the vision could be formulated. These goals are listed below and together represent that potential vision for a sustainable Buna/Bojana Transboundary area in a 15-years time.

Resources and procedures have been put it place so that:

- **Management of natural resources at the national level becomes more integrated.**
- **The Buna/Bojana area of Montenegro and Albania is an example of successful transboundary cooperation within South East Europe encompassing:**
    - **Effective institutional coordination in the form of mechanism/body for integrated planning and management of the Buna/Bojana area, with adequate support capacities. The issues under its mandate could include all or a part of the following: water and other natural resources management, biodiversity protection, pollution reduction and climate change adaptation.**
    - **Enhanced transboundary cooperation in the field of economy aiming to build coordinated development programs making use of the shared resources.**

These in turn will help to ensure the following:

- **The infrastructure is of the highest appropriate standard to ensure sustainable water supply and waste management to improve ecosystems health and water quality.**
- **The conditions have been created to protect and enhance the area's high biodiversity value.**
- **The competitive advantages of the region -natural and cultural values- are utilised in a sustainable manner to support tourism of high value.**
- **Overall, the economic and social well-being of the area's communities is converging to EU norms.**
- **Development is well-planned and regulated, respecting natural and landscape values.**
- **The area is resilient to the impacts of climate change.**

The measures set out below in this Plan are designed to help set a course for the achievement of the above vision.

4. Developing the Plan – identifying drivers, pressures and impacts

To structure the analysis of the complex interplay between topic areas and the response which is directly linked to the Action Plan, the DPSIR framework has been employed (Figure 5). The DPSIR provides a systemic insight into the way in which, for example: social and economic **Drivers** such as the attractiveness of coastal zone in synergy with the weak institutional capacities lead to the creation of **Pressures** on the environment such as un-planned urbanisation. The **State** is the quantification of that issue e.g. the widely dispersed, unserviced development, number of illegal constructions. This in turn leads to **Impacts** on ecosystems, landscapes and water pollution, or the cost of infrastructure services. The **Response** (or lack of) might include, for example, measures to improve regulation or financial instruments to deter such development. In turn these responses feeds back on the driving forces, on the pressures, or on the state and impacts. In reality, the relationships are not so linear and the drivers, pressures, state and impacts interrelate in complex and overlapping ways

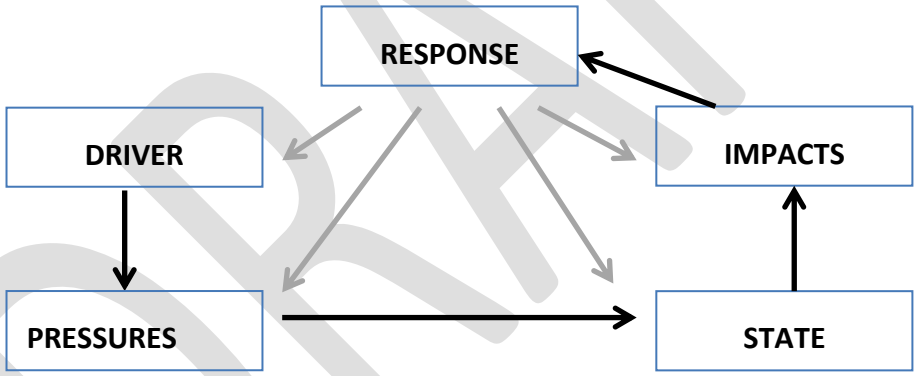


Figure 5: The DPSIR cycle

The broad picture that emerges from this background analysis for the Buna/Bojana Transboundary Area is summarised below. (The DPSIR framework table for the Buna/Bojana is shown in Annex 1).

The Drivers

The key drivers of conditions in the area can be grouped into twelve broad categories. All drivers are met in both Albania and Montenegro, nevertheless, there may be differences regarding the intensity and scale of each driver in the two countries:

1. **The attractiveness of the coast / Growing development**

   The natural capital, in particular its attractiveness, has been a major driver for development. The coastal areas of both Albania and Montenegro have been subject to intense market pressure for residential and tourism development in the past two decades. The development has taken place at

rates that exceed the capacity of administrations to adequately regulate or provide essential services.

2. Climate variability and change

According to all models, the area is among those of high vulnerability to climate variability and change. Sea level rise will have probably significant effects particularly to coastal lagoons and estuaries. With increasing salinity, there may be shifts in the nature of the ecosystems. Extreme precipitation events are likely to increase.

The Buna/Bojana River and the upstream Lower Drin – Shkoder/Skadar Lake watersheds are subject to a high risk of flooding; the risk is subject to increase depending on the level that the climate change affects the area.

3. Structural economic weaknesses and market transition

The area is characterised with some of the lowest incomes in European countries[2]. This functions as disincentive for sustainable use of natural resources. Further, the economies of the area have been undergoing the transition from socialism to free markets. Investment in infrastructure such as roads, sewage networks and treatments, flood protection, waste and water has reduced considerably since the socialist era.

4. Structural issues in the agricultural sector

In Albania the sector is characterized by under-development, with underlying structural issues from field fragmentation to ownership problems and the transition to a market economy, and the irrigation system is in a state of disrepair and lack of investment. In Montenegro the sector is characterized by field abandonment and the change of land use category, from agriculture to development.

5. Demographic changes

Despite the rapid urbanization in the area the predominant demographic trend is one of outward migration to urban areas or overseas for better economic opportunities. Unless there is a significant change in economic and educational opportunities these trends are unlikely to reverse.

6. Developmental planning and prioritisation

Developmental planning does not take into account the inter-linkages present in the natural systems resulting in conflicting choices. Intense requirements for urban and tourism development are not harmonized with the need to preserve natural and landscape values of the area undermining the potential of tourism of high value that would enable sustainability of growth in the area.

7. Upstream drivers

Upstream urbanization and land use management result in a series of pressures.Hydropower production infrastructure operating upstream is focusing on the maximization of electricity production. The dam's operation rules and practices do not take into consideration the risk of downstream flooding incidents in the event of extreme meteorological conditions.

8. Policy and legal framework

[2] Per capita GDP (2011) in the area is low, compared to the EU average (€25,200; Eurostat); namely, in Montenegro was €5,211 and in Shkoder County estimated at €2,175 in 2011, amongst the lowest in Albania.

The curreng policy framework is inadequate to properly address sustainability issues. In particular regarding urbanization, weak policy framework mainly relates to lack of financial (tax) and land policy instruments that would discourage over-urbanisation, conversion of agricultural into buildable land and alike. In addition, there is unclear title of the property in Albania which further disables policy decisions towards regulated urbanisation.

9. Weak institutional and technical capacity

Implementation of legislation is impeded by overlapping competences or even lack of clear delegation and fragmentation of responsibilities among different institutions and agencies responsible for the management of different spatial units (e.g. municipalities, river basins, protected areas) and natural resources (land, water, forests etc.). Ineffective communication and coordination among the different Ministries and bodies is also a major issue.

The capacity of administrations, particularly at the local level, in terms of human, financial and technical resources -for flood warning, hydro-meteorological, water quality and biological monitoring- is low.

In addition, territorial planning is not informed appropriately by science, both because of the lack of data and/or lack of data in an appropriate form as well as the inability of planners to interpret available data and incorporate these into the planning process.

10. Out-dated, or inadequate infrastructures

Basic infrastructure such as the road network, sewage systems, waste disposal are out-dated, badly maintained or absent. Maintenance of the drainage channels and flood prevention structures in Albania and of the embankments in Montenegro is poor. Roads are in poor condition, suffering from inadequate maintenance.

11. Lack of awareness

People in the region lack adequate education and awareness to support development swift towards sustainability.

12. Transboundary nature of the area

Buna/Bojana area is a single natural system that extends in two countries. Transboundary coordination at the moment is *ad-hoc* aiming to address flood related issues.

13. EU Accession

The last, and maybe the most important, driver is the accession process and eventual EU membership that drive considerable change as the countries seek to comply with EU environmental legislation and gain access to support for infrastructure, economic and other EU investment opportunities. Albania has been granted EU "Candidate" status and Montenegro is in the process of EU accession negotiations.

The Pressures

These drivers combine, to create the following pressures:

1. **Unsustainable territorial/spatial development including**:

    a. Insufficiently regulated urban development

The area is characterised by the recent rapid development, particularly in a narrow strip within 5 kilometres of the coast, and is generally linear in nature along the coastline and highways. Construction "boom" dating from the 1990's, was also followed with increased informal (illegal)

development. There is inefficient control and inadequate mechanisms for the sanctioning of illegal buildings. In addition, development is characterised without respect for natural and landscape values.

b. Over-allocation of land for building in Montenegro

In Montenegro there is a considerable "over supply" of land designated for building; urban plans allocating enough land to accommodate a population several times the existing population. Often, this situation results in scattered development, not followed with adequate municipal services (due to over-excessive infrastructural costs).

c. Lack of territorial plans in Albania

Lack of planning for development and construction resulting in "anarchy" in construction and building as urbanization has been taking place spontaneously and with few restrictions.

2. Unsustainable solid waste management

Solid waste collection and disposal systems are inadequate, ranging from relatively organized in Montenegro to problematic in Albania. In Montenegro wastes from urban centres are disposed in a sanitary landfill. In Albania illegal dumping of solid waste is common along roads, drainage and irrigation ditches; these could have an impact on river, groundwater and seawater quality. Unsustainable solid waste management in upstream areas impacts also the Buna/Bojana area.

3. Unsustainable wastewater management

Significant loads of N and P is deriving from wastewaters - from the municipalities in the Buna/Bojana area and from Shkodra city. The input of Drin in terms of nutrients seem to be comparable or higher than these generated in the Buna/Bojana area; additional research in this regard is necessary though. Also, potential source of nutrients in groundwater is infiltration from leaky septic systems.

4. Unsustainable agricultural practices

There is indication of unsustainable use of fertilizers and pesticides. Furthermore, there is unsustainable use and disposal of material utilised in agricultural production, such as plastic in greenhouse-related cultivations. There are indications for over-pumping of water for irrigation and based on expert assessment agriculture ranks first among the pollution sources examined in Buna/Bojana watershed in terms of total P loads. Water from small lakes and wetlands are used for irrigation in the Albanian side.

5. Stockbreeding

There are indications that a main source of total N in the Buna/Bojana watershed is free grazing/ non-farmed stockbreeding, predominantly in Albanian part.

6. Water flow regime in the Drin.

The hydrology of the Bojana/Buna is affected by the Drin's water flow regime that is regulated by the cascade of dams for hydropower production (HP) that are operated in way to ensure maximum electricity production.

7. Over-extraction of groundwater resources

There is no systematic monitoring of groundwater levels or extractions in the Plan area. However, it is likely that some of the coastal aquifers (alluvial and karstic) are being overexploited, as indicated by anecdotal evidence in coastal aquifers from observations of abandoned wells; further there is evidence of presence of saline water in springs discharging from karstic aquifers (example of the Gac

spring) and also in groundwater extracted for irrigation in Ulcinj and Bar. In line with the latter, as the geophysical structure of the Buna/Bojana River favors salinization phenomena, increased groundwater extraction may have severe adverse effects in the coastal aquifers.

Furthermore, projections of future water needs for irrigation and drinking water in the coastal zone indicate that groundwater resources will be increasingly exploited in the coming years.

In addition, such development increases need for water use needs during summer months that exert pressure on potable water sources (primarily groundwater) that are insufficient to meet these "peak" demands. In Albania potable water is used for irrigation in some cases.

8. High sediment input

Increased sediment loads are entering the Buna/Bojana system through the tributaries of Drin downstream the dams due to erosion caused by gravel extraction and loss of plant coverage.

9. Bad maintenance of the flood/drainage infrastructure

The natural secondary channels of the Buna/Bojana River that existed in the past in the delta area have been blocked and as a result the peak flows exceeds the capacity of the main (existing) channel. Furthermore the drainage channels and flood prevention constructions in the Albanian side and of the embankments in the Montenegrin side are poorly maintained.

10. Unsustainable forests management

Illegal and abusive logging, extensive collection of firewood, uncontrolled grazing coupled with poor forest management in Albania, has resulted in the deterioration of forests. Alterations in land use also affect directly forests; the natural forests along the seashore are threatened or already damaged by constructions.

11. Unsustainable fisheries management

Inadequate enforcement and regulation has led to Illegal fishing and the use of fishing practices that are destructive for the ecosystems; furthermore, these practices impede fish migrating routes in the Buna/Bojana River.

11. Unsustainable legal as well as illegal hunting

Unsustainable legal as well as illegal hunting is an issue; the latter is mainly due to the low enforcement capacity. There are violations with regard to the:

- Protection status of certain areas i.e. hunting ban areas, such as the Ulcinj salina that is a site of utmost importance for migrating species;
- Permitted species to hunt e.g. hunting of rare and endangered breeding birds like the oyster catcher during the breeding season, the pygmy cormorant, the common redshank, the avocet etc.;
- Hunting ban period[3].

Key statistics – the Current State:

In general, the lack of capacity for monitoring has resulted in deficiencies in the level of data and information for virtually all policy areas. However, the following indicators provide an outline of the current state of the area:

[3] An important step taken by Albania was the complete ban of hunting effective during the period March 2014 – March 2016.

- Significant areas degraded with unplanned (in particular in Albania), informal (illegal), low aesthetic and construction qualities development. In Albania, at least 60 % of all buildings are illegal (80% in Velipoja). In Montenegro 12.7% of all illegal buildings in the country are in Ulcinj.
- Dispersed urbanisation, over arable and land with high nature values.
- 7.5% of land within 1 km of the coastline of the Ulcinj coastal zone and 10% of the Albanian coastaline zone is built.
- 12% of the coastline frontage is urbanized in Montenegro.
- Communal infrastructures are insufficient: Potable water distribution systems are insufficient to meet peak needs in summer and are at risk of contamination; sanitation infrastructure is problematic; solid waste infrastructure is insufficient. There is insufficient transportation and poor quality and badly maintained road system.
- The natural sediment flow regime had been disturbed. There is 13 fold reduction in sediment loads; at the same time there is periodically high sediment input through the tributaries of Drin downstream the cascade of dams and upstream the Buna/Bojana.
- The regime of coastal dynamics has altered. There is erosion in some parts of the Buna/Bojana Delta while there is sand deposition in other parts; the coastline has receded along some parts of the coast at the Buna/Bojana mouth by up to about 500 m since 1936 and about 50 m in the past 20 years.
- There is also erosion of the land adjacent to the river.
- The natural water flow regime of the Buna/Bojana has been disturbed.
- The biological status of surface water bodies in all stations for which data has been available was assessed as “poor” (according to analysis of samples from three sampling periods using bio-indicators) except Villuni laggon that was assessed as “moderate”.
- The physicochemical quality of Buna/Bojana River -in accordance to the WFD- deteriorates from its sources to its mouth ranging from good to moderate, due to elevated ammonium, nitrite and BOD concentrations.
- Buna / Bojana river chemical status -in accordance to the WFD- is assessed as “moderate”. There is heavy metal pollution (according to analysis of samples from three sampling periods - data series are not enough to establish trends); different elements were above limits set by the EU legislation in different sampling stations[4].
- There are elevated mercury concentrations in Lake Šasko in Montenegro. Mercury concentration is above limits also in Viluni lagoon in Albania.
- The overall status -in accordance to the WFD- of the Buna/Bojana is assessed as poor. The status of Shasko Lake and the Viluni lagoon is assessed as lower than moderate and moderate respectively.
- Eutrophication is present in transitional and coastal waters within the plum.
- The ecological status -in accordance to the WFD- of the coastal zone waters is classified as “poor”.
- There is possible decrease in groundwater levels and deterioration of its quality. There are limited data on groundwater pollution but some field investigations suggests that there are some areas where nitrate levels in groundwater far exceed that of the Buna/Bojana River.

[4] See chapter 9.6.4.3 “Surface water bodies”

- There is evidence of saltwater intrusion in coastal aquifers. Related data are limited due to the absence of regular and coordinated monitoring at national and transboundary levels.
- Landscape quality of the area is degraded. The ecological as well as the aesthetic quality of riverbanks is badly deteriorated, mainly due to heavy litter disposals along and in the river.
- There is degradation (fragmentation) of coastal habitats, primarily the dunes at Velika Plaža and on the Rrjolli part. There has been serious deterioration (in 1994) of the Skadar Oak (Quercus robur scutariensis) forest in Štoj at the rear of the Velika Plaža.
- Smaller wetlands zones (in Albania) are shrinking.
- There is loss of rare species in the halophyte vegetation belt.
- Decrease of birds' population is estimated in the range 10-20% - nevertheless there is no monitoring programme in place to verify estimation. The suitability of the Buna/Bojana delta for breeding of migrating birds has been impaired. The exact impacts cannot be assessed since data are limited due to the absence of a regular and coordinated monitoring at national and transboundary levels.
- Fish migration in Buna/Bojana River is impeded.
- There is decrease of fish catch in past 25 years at the level of 20-80% depending on the species (according to Albanian fisheries association).
- Some local (agricultural) varieties and breeds are declining and disappearing.
- There are increased flood risks. The frequency and intensity of floods have increased – two flood incidents in 2010 were the most severe recorded in the last 80 years. There are severe damages in households and agricultural land.
- The progress in drafting of new legislation related to the management of natural resources, in accordance mainly with the EU *acquis communautaire*, is considerable. Nevertheless, in some cases even new laws lack fundamental elements such as definitions -compliant with EC requirements- precise rights and obligations for legal and natural persons, setting of standards to be achieved and thresholds to be complied with and they fall short to determine procedural stages. Many of the new horizontal laws are framework laws. These require a number of specific and detailed subsidiary laws and regulations in order to make them applicable and enforceable in practice. Some steps regarding the preparation and adoption of secondary legislation have been made.

Impacts on the Area

- There is general degradation of the landscape due to unplanned, dispersed and rapid development.
- The high cost of infrastructure provision due to the dispersed, uncontrolled and rapid development (often along the coast and highways) has resulted in partial or even the full absence of essential infrastructure services.
- Current solid waste management results in visual pollution of river banks, drainage and irrigation ditches, beaches and sea; there are considerable pollution risks as well. Liquid waste management is leading to the pollution of both the land/feshwater and marine environments. There are indications of reduced quality of groundwater resulting in threats to human health. There is reduced sanitary bathing quality at some areas.
- The natural capital and resources of the area have been deteriorated. Ecosystems degrade in the Buna/Bojana delta as well as in the wetland zones resulting among others in the

deterioration of the ecosystem services. Significant biodiversity loss -concentrated in the coastal area- has occurred; considerable number of the waterfowl species in the Bojana/Buna Delta for example, are threatened and included in the lists of endangered species at local, regional and international level. The number of fish species in the river has declined. There is erosion of land adjacent to the river.

- There are indications of declining groundwater levels and seawater intrusion in the aquifers. Should this is proven to be true there are risks to agriculture associated with the use of groundwater for irrigation purposes.
- The economy is affected and so are the developmental potentials. There are commercial species that are no longer harvested. The loss of attractive natural areas threatens the potential for high-value tourism development and is therefore detrimental to the economic potential of the wider area.

  The deterioration of the natural resources and the disturbance of the natural processes have introduced high uncertainty in local economic development planning. Examples include disturbed coastline dynamics that lead to erosion of parts of the coastal area and jeopardize infrastructure as well as tourism related investments. Also, intense urbanization often spreads over arable land leading to its overall reduction.
- Increased flooding risks due to anthropogenic pressures and the increased potential for extreme events due to climate change threaten infrastructure, property and human safety.

5. Developing the Plan - the Plan Objectives

The Plan's objectives set out below represents the key stage of integration in the IMF process. Whilst the preceding stages of the process identified a comprehensive set of issues, the myriad of interactions and overlaps between them are complex, as are the range of potential policy responses and measures.

The eight broad objectives below are a distillation of these issues into a single set of priorities that best meet the overall integrated vision of the Plan, and from which more specific objectives and measures can be derived that respond to the multiple, overlapping issues identified. The objectives recognise that no single sector, policy type can foster the vision alone.

Plan Objectives

I. Improve the transboundary governance and cooperation – although the Bojana/Buna area is divided by the national frontier, the ecosystem functions largely as a single entity. As the analysis indicates, the many of the problems and issues can be better remediated by transboundary cooperation. Similarly, maximizing opportunities such as the development of tourism can benefit from such cooperation. In order to improve transboundary cooperation and governance it is envisaged to:

1.1 *Establish appropriate mechanisms to ensure that relevant issues of transboundary importance* (such as tourism based on cultural and natural heritage, sustainable use of natural resources, penvironment protection, climate change adaptation and mitigation, risk prevention and management) *are considered and acted bilaterally*. Establishment of the mechanism shall be based on a formal transboundary arrangement of corporation, negotiated and agreed by two countries. The role of the coordination management mechanism shall be to**:**

- Coordinate cooperation in the transboundary area in the field of sustainable development, environmental protection and water management;
- Facilitate collaboration with other initiatives and projects in the area,
- Identify important needs with the to improve the overall status of the transboundary area;
- Facilitate consultations among relevant authorities with the aim to define cross border programmes and projects that are aimed at resolving commonly agreed problems;
- Coordinate implementation of the Plan's objectives;
- Provide technical assistance to local and national stakeholders to improve capacities necessary for improvement of transboundary cooperation and meeting the Plan objectives;
- Support the development and implementation of cross-border programmes and projects under all bi-lateral agreements of relevance for transboundary area;
- Improve visibility of transboundary area and increase relevant stakeholder participation in all relevant national, regional and international forums and organizations.

1.2 *Strengthen cooperation through joint actions for the management of the transboundary area*, in particularly through increased use of the appropriate EU (or other) funding programmes such as the Instrument for Pre-accession Assistance (IPA II) 2014-2020 with the objective of contributing to economic development and reducing regional imbalances.

1.3 *Raise awareness and improve communication of the Plan area's natural and cultural values, the potential threats to it and development opportunities.*

II. Support policy changes at national levels – although the focus of the Plan is improvement of the local (transboundary) natural values and development opportunities, many issues remain within the

remit of national and local authorities, in particular spatial planning. Both countries are in the process of EU candidacy and accession and there are opportunities for policy reform. Therefore, the specific objectives of the Plan include:

2.1 *Change and/or improvement of national regulation(s) as well as improvement of their enforcement,* with priority given to the sectors of water use and consumption, protected areas, coastal management, fisheries, hunting, waste management, sand extraction and alike.

2.2 *Improve spatial planning system.*

III. Develop and make better use of the knowledge base for the management of the transboundary area – the lack of current and comparative data has proved a problem in identifying sustainable management options, or in monitoring the impacts of policy options. The focus shall be given to the specific objectives:

3.1 *Establish observation mechanisms to assess and regularly update information on the man-made and natural environment.* The mechanism should have the form of two mutually cooperating separate national level monitoring systems using commonly agreed parameters and techniques for the collection and analysis of information. An agreed (in terms of characteristics and volume) minimum set of data should be defined according to international standards (e.g. WFD, Barcelona Convention, UNECE, EEA) and shared between two countries.

3.1 *Support integration of scientific data in planning process.*

3.2 *Improve human and technical capacities of local administrations to implement the Plan.*

IV. Improve ecological and chemical status of water bodies – water has already been described as the as the "bloodstream" of both the nature and economy, and the quality of groundwaters, rivers and streams and marine is of central importance to the future of the area. Specific objectives include:

4.1 *Improve quality of inland surface and marine waters.*

4.2 *Secure availability of water of good quality for all uses, including the ecosystems and sustainable water use and consumption.*

4.3 *Maintain the natural quality and hydrological conditions of small wetlands.*

4.4 *Improve ground water status in terms of quality and maintain the function of coastal aquifer to prevent or reverse salinization trends.*

4.5 *Decrease eutrophication and improve ecological quality of transitional and coastal waters.*

V. Protect and enhance the area's high biodiversity value – the area's high biodiversity value is unchallenged, but it faces many challenges. Its protection and enhancement is a major national and international responsibility. Specific objectives include:

5.1 *Protect and enhance the biodiversity and natural values of the transboundary Buna/Bojana area.*

5.2 *Improve the management of protected area.*

5.3 *Reduce and/or eliminate impacts of hunting to biodiversity.*

5.4 *Promote sustainable fisheries.*

VI. Help raise the economic and social well-being of the area's communities – the area has some of the lowest levels of economic well-being in Europe. Economic problems are compounded by poor infrastructure and environmental problems. Opportunities to improve both the economy and the

well-being of the local population either directly or through environmental improvements should be central to the planning process. Having in mind the natural values of the area, economic activities that are based or support the nature protection should be encouraged. The specific objectives include:

6.1 *Support greening the economic activities.*

6.2 *Promote sustainable economic development of the Plan area through tourism that respects the area's high natural values, valorizes its natural and cultural heritage – maximizing its economic value to the local communities.* Implementing this objective can only be done by implementing objectives and related measures to improve sanitation, water quality, biodiversity, protection and waste management that influence tourism development. However, the area's ability to accommodate visitors to acceptable standards should be developed in parallel.

6.3 *Improve waste management in the area.*

VII. **Increase Plan area's resilience to the impacts of climate change and natural disasters** - the location, topography and outdated infrastructure of the Buna/Bojana area makes it particularly vulnerable to climate change impacts and to natural disasters such as flooding. Therefore, the specific objectives include the following:

7.1 *Decrease flood risks.*

7.2 *Protect the coastline affected by climate change and natural hazards resulting from unsustainable development.*

VIII. **Improve the quality of the landscape** – the area is of great scenic beauty, and this can be a resource for future economic development. However, the lack of effective spatial planning or its enforcement, and poor waste management undermine the potential of this key quality

The integration of the measures with the drivers and the various policy areas is show diagrammatically below (Figure 6).

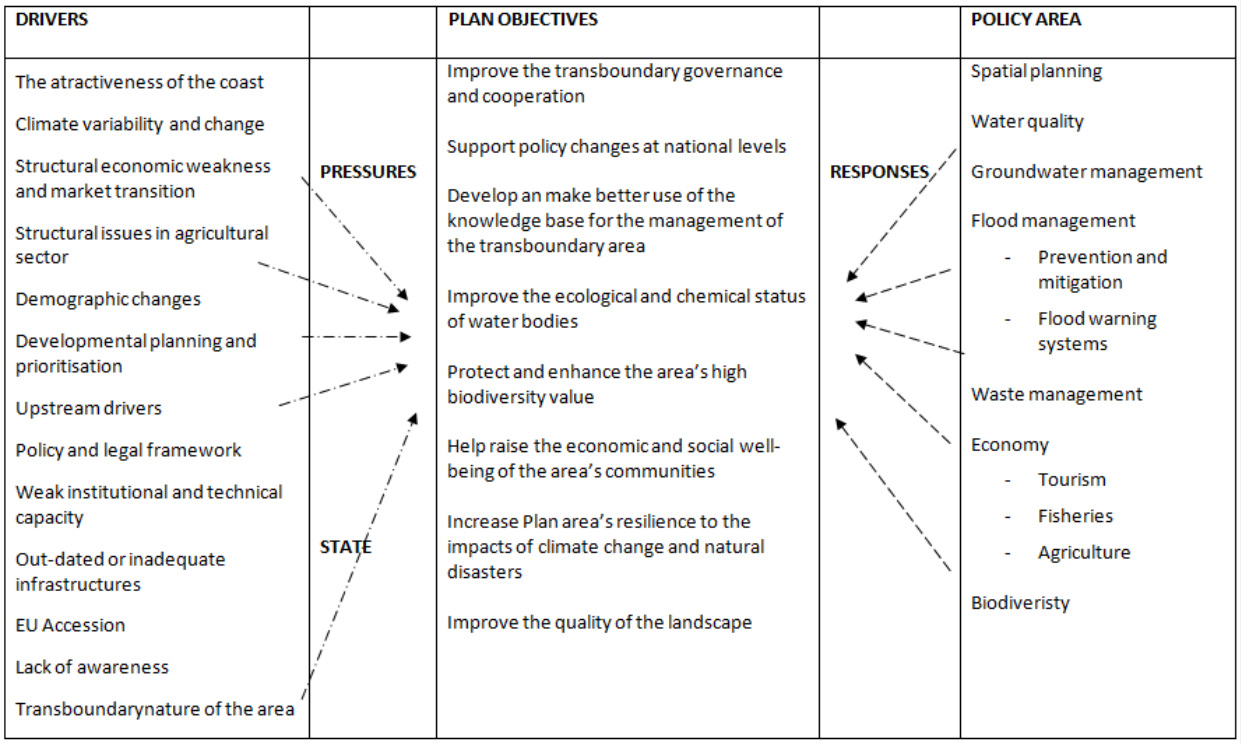


Figure 6: Integration of drivers with policy areas and corresponding objectives and measures used to achieve these.

6. Realising the Vision

This is the critical stage where policy design shifts to the facilitation of change. The Plan will deploy a combination of policy instruments, management processes and actions. The strengths of ICZM and IWRM are in their flexibility, adaptability to local circumstances, and operability across a range of sectors and issues, and with a representative governance structure. The IMF takes this flexibility a stage further by integrating the ICZM and IWRM approaches into a single set of measures.

6.1 The Measures

Measures are the proposed actions that are derived from the Objectives above. In most cases the Measures proposed are designed in an integrated way to meet multiple objectives. Measures include performance indicators so as to ensure constant feedback on its implementation.

The Measures are proposed for the period up to 2030 and its implementation is envisaged at 3 main levels:

- Supranational - setting the joint management framework;
- National - support necessary policy changes to enable implementation of measures at the local level; and
- Local implementation level.

The measures are presented in grid form as follows.

OBJECTIVE	1. IMPROVE TRANSBOUNDARY COOPERATION AND GOVERNANCE

SPECIFIC OBJECTIVE	1.1 ESTABLISH APPROPRIATE MECHANISMS TO ENSURE THAT RELEVANT ISSUES OF TRANSBOUNDARY IMPORTANCE ARE CONSIDERED AND ACTED UPON BILATERALLY
MEASURES BY 2030	1.1.1 Establish a commonly acceptable transboundary arrangement on cooperation in the fields of sustainable development, environmental protection and water management
	1.1.2 Put into force a transboundary coordination management mechanism for the implementation of the transboundary arrangement on cooperation, including the objectives of the Plan

SPECIFIC OBJECTIVE	1.2 STRENGTHEN COOPERATION THROUGH JOINT ACTIONS FOR THE MANAGEMENT OF THE TRANSBOUNDARY AREA
MEASURES BY 2030	1.2.1 Develop a joint transboundary programmes and related projects based on the Bojana/Buna area management plan

SPECIFIC OBJECTIVE	1.3 RAISE AWARENESS AND IMPROVE COMMUNICATION OF THE PLAN AREA'S NATURAL AND CULTURAL VALUES, THE POTENTIAL THREATS TO IT AND DEVELOPMENT OPPORTUNITIES
MEASURES BY 2030	1.3.1 Develop a common interpretive material for the Buna/Bojana as a whole on natural and cultural heritage and development potentials
	1.3.2 Organise awareness raising campaigns on natural values and development potentials of the area

OBJECTIVE	2. SUPPORT POLICY CHANGES ON NATIONAL LEVEL(S)

SPECIFIC OBJECTIVE	2.1 CHANGE AND/OR IMPROVEMENT OF REGULATION(S) AS WELL AS IMPROVEMENT OF THEIR ENFORCEMENT
MEASURES BY 2030	2.1.1 Review the national legislations of importance for the management of the Buna/Bojana area and identify areas for improvement; priority to be given to the following fields/sectors: - water use and consumption - protected areas - fisheries - hunting - waste management - property rights (Albania) - extraction of gravel and sand from the river bed.
	2.1.2 Introduce the coastal set-back zone across all coastal frontages by appropriate regulation (in Albania)

SPECIFIC OBJECTIVE	2.2 IMPROVE SPATIAL PLANNING SYSTEM
MEASURES BY 2030	2.2.1 Define standards for the preparation of spatial planning documents and monitoring of their implementation
	2.2.2 Support the rehabilitation of illegally built areas with poor environmental and landscape quality
MEASURES BY 2030	2.2.3 Prevent future actions that may derogate quality of built areas
MEASURES BY 2030	2.2.4 Support the introduction of land policy instruments for discouraging unsustainable land conversions for real-estate business

OBJECTIVE	3. DEVELOP AND MAKE BETTER USE OF THE KNOWLEDGE BASE FOR THE MANAGEMENT OF THE TRANSBOUNDARY AREA

SPECIFIC OBJECTIVE	3.1 ESTABLISH OBSERVATION MECHANISMS TO ASSESS AND REGULARLY UPDATE INFORMATION ON THE MAN-MADE AND NATURAL ENVIRONMENT
MEASURES BY 2030	3.1.1 Improve and harmonise -between the two countries- monitoring systems related to: – Soil quality – Water including surface and underground fresh waters – Marine waters – Air quality – Biodiversity and nature, including habitats and species of importance for the establishment of national Natura networks – Erosion processes and sediment transport – Natural hazards. Incorporate climate change elements into all components of monitoring system.
	3.1.2 Put in place harmonised (between the two countries) observation system on land transformation
MEASURES BY 2030	3.1.3 Assess - using harmonised methodologies - integrated vulnerability of the area for: - Aquifers (land based pollution, sea water intrusion, porosity of rocks, soil composition etc.) - Ecosystems (habitats), protected areas etc. - Floods - Soils/fertility - Land stability - Forests - Climate change impacts

SPECIFIC OBJECTIVE	3.2 SUPPORT INTEGRATION OF SCIENTIFIC DATA IN THE (SPATIAL) PLANNING PROCESS
MEASURES BY 2030	3.2.1 Promote utilisation of vulnerability assessments as a tool for optimisation of land use

SPECIFIC OBJECTIVE	3.3 IMPROVE HUMAN AND TECHNICAL CAPACITIES OF LOCAL ADMINISTRATIONS TO IMPLEMENT THE PLAN
MEASURES BY 2030	3.3.1 Organise capacity building programmes for local officials and technical staff to enable achievement of the objectives of the Plan
MEASURES BY 2030	3.3.2 Obtain necessary equipment and infrastructure

OBJECTIVE	4. IMPROVE ECOLOGICAL AND CHEMICAL STATUS OF WATER BODIES

SPECIFIC OBJECTIVE	4.1 IMPROVE QUALITY OF INLAND SURFACE AND MARINE WATERS
MEASURES BY 2030	4.1.1 Provide/improve sanitation infrastructure by constructing wastewater treatment systems in the Plan area, plus Shkodra town
	4.1.2 Apply eco-remediation methods complementary to WWTPs for improving the water quality; these may include the following (the list is not exhaustive): constructed wetlands, restoration of riparian vegetation, bio-engineering methods, etc.
MEASURES BY 2030	4.1.3 Apply best agricultural practices
MEASURES BY 2030	4.1.4 Apply EIA on activities that may affect water quality

SPECIFIC OBJECTIVE	4.2 SECURE AVAILABILITY OF WATER OF GOOD QUALITY FOR ALL USES INCLUDING THE ECOSYSTEMS AND SUSTAINABLE WATER USE AND CONSUMPTION
MEASURES BY 2030	4.2.1 Support policy changes towards rational and sustainable water use and consumption, primarily for irrigation

SPECIFIC OBJECTIVE	4.3 MAINTAIN THE NATURAL QUALITY AND HYDROLOGICAL CONDITIONS OF SMALL WETLANDS
MEASURES BY 2030	4.3.1 Reduce water abstraction and consumption
	4.3.2 Explore the usefulness and feasibility of the usage of good quality non-conventional water for wetland restoration and recharge of aquifers, such as use of floodwaters and grey waters
	4.3.3 Conduct survey to track heavy metal pathways entering lake Šasko and Viluni lagoon

SPECIFIC OBJECTIVE	4.4 IMPROVE GROUND WATER STATUS IN TERMS OF QUALITY AND MAINTAIN THE FUNCTION OF COASTAL AQUIFER TO PREVENT OR REVERSE SALINIZATION TRENDS
MEASURES BY 2030	4.4.1 Designate and enforce the sanitary protection zones

	4.4.2 Eliminate uncontrolled solid waste disposal and dumping, including
	In addition, measures related to objectives 4.2 and 4.3

SPECIFIC OBJECTIVE	4.5 DECREASE EUTROPHICATION AND IMPROVE ECOLOGICAL QUALITY OF TRANSITIONAL AND COASTAL WATERS
MEASURES BY 2030	4.5.1 Reduction of nutrient loads entering the Buna/Bojana from Drin
	4.5.2 Develop WWTP infrastructure for the Plan area (*see also above under other objectives)*

OBJECTIVE	5. PROTECT AND ENHANCE THE AREA'S HIGH BIODIVERSITY VALUE

SPECIFIC OBJECTIVE	5.1 PROTECT AND ENHANCE THE BIODIVERSITY AND NATURAL VALUES OF THE TRANSBOUNDARY BUNA/BOJANA AREA
MEASURES BY 2030	5.1.1 Improve the status of biodiversity in the ecologically sensitive areas (including protected areas)
	5.1.2 Assess and value ecosystem services in the area and ensure their proper integration in sectoral policies
MEASURES BY 2030	5.1.3 Assess the degree to which ecosystems are dependent on groundwater resources and enable sustainable level of water extraction

SPECIFIC OBJECTIVE	5.2 IMPROVE THE MANAGEMENT OF PROTECTED AREAS
MEASURES BY 2030	5.2.1 Establish new protected areas in Montenegro as identified in relevant spatial planning documents (including preparation of relevant studies) and appoint management structures for new protected areas as to provide effective and functional management system
	5.2.2 Improve mechanisms and capacities for monitoring and control of biodiversity and nature
MEASURES BY 2030	5.2.3 Harmonize management objectives and measures across the protected areas in the two countries

SPECIFIC OBJECTIVE	5.3 REDUCE AND/OR ELIMINATE IMPACTS OF HUNTING TO BIODIVERSITY
MEASURES BY 2030	5.3.1 Support actions related to prevention of illegal hunting
	5.3.2 Promote bird-watching in the area, as part of harmonised ecotourism schemes in both countries
MEASURES BY 2030	5.3.2 Restore riparian forests along Buna River in Albania

SPECIFIC OBJECTIVE	5.4 PROMOTE SUSTAINABLE FISHERIES
MEASURES BY 2030	5.4.1 Improve fish stock monitoring and control
	5.4.2 Stop illegal fishing along the river in the Albanian side
MEASURES BY 2030	5.4.3 Introduce sustainable fishery practices
MEASURES BY 2030	5.4.4 Introduce tourism option for the fisherman during the period of species migration into the lake

OBJECTIVE	6. HELP RAISE THE ECONOMIC AND SOCIAL WELLBEING OF THE AREA'S COMMUNITIES

SPECIFIC OBJECTIVE	6.1 SUPPORT GREENING THE ECONOMIC ACTIVITIES
MEASURES BY 2030	6.1.1 Assess the potential for green businesses in the area
	6.1.2 Raise awareness of green business opportunities
MEASURES BY 2030	6.1.3 Launch and continually enforce exchange of experience and knowledge transfer on greening schemes among local products producers

SPECIFIC OBJECTIVE	6.2 PROMOTE SUSTAINABLE ECONOMIC DEVELOPMENT OF THE PLAN AREA THROUGH TOURISM THAT RESPECTS THE AREA'S HIGH NATURAL VALUES, VALORISES ITS NATURAL AND CULTURAL HERITAGE – MAXIMISING IT'S ECONOMIC VALUE TO THE LOCAL COMMUNITIES
MEASURES BY 2030	6.2.1 Recognise the Buna/Bojana as a single tourism "destination', and promote it bilaterally under the 2014 bilateral agreement between responsible ministries of two countries in the field of tourism
	6.2.2 Develop the capacity of the area to become a sustainable tourist destination based on its natural and cultural assets

SPECIFIC OBJECTIVE	6.3 IMPROVE WASTE MANAGEMENT IN THE AREA
MEASURES BY 2030	6.3.1 Improve technical capacities for the regular waste collection and management services in the Albanian side
	6.3.2 Remove derelict construction; Remove dumped demolition waste and inert material

OBJECTIVE	7. INCREASE PLAN AREA'S RESILIENCE TO THE IMPACTS OF CLIMATE CHANGE AND NATURAL DISASTERS

SPECIFIC OBJECTIVE	7.1 DECREASE FLOOD RISKS
MEASURES BY 2030	7.1.1 Establish among countries coordinated flood forecast and early warning system
	7.1.2 Prepare transboundary flood contingency management plan
MEASURES BY 2030	7.1.3 Maintenance of existing infrastructures incl. dykes, embankments and natural protective structures including riparian and coastal forest
MEASURES BY 2030	7.1.4 Restore riparian vegetation and apply bioengineering methods for enhancing the appropriate retention and detention areas, such as heathlands
MEASURES BY 2030	7.1.5 Albania to review the operation of the dams as multifunctional systems (energy, irrigation, retention and detention of hydrological peaks) applying also EU standards for e-flows

SPECIFIC OBJECTIVE	7.2 Protect the coastline affected by climate change and natural hazards resulting from unsustainable development
MEASURES BY 2030	7.2.1 Determine zones for setback extension as to improve adaptation to climate change impacts, especially sea level rise
	7.2.2 Reduce coastal erosion

OBJECTIVE	8. IMPROVE THE QUALITY OF THE LANDSCAPE

SPECIFIC OBJECTIVE	
MEASURES BY 2030	8.1 Map landscape character of the area according to European Landscape Convention requirements
	8.2 Promote landscape improvement schemes and standards
MEASURES BY 2030	8.3 Improvement of electricity distribution networks

6.2 Formulating the Plan priority activities

The Action Plan includes short-term Priority Activities responsibilities for delivery. The Plan contains a mix of infrastructure, "concrete" actions and ”soft" tasks such as changes to laws and procedures, regulations, pricing, institutional development, training, awareness and other “soft” interventions. The activities formulated with the Plan do not represent the exhaustive list of all possible activities necessary to be undertaken as part of related measure. They include only those selected, priority activities whose implementation is possible in the short-term and those which are the key for the overall implementation of the measure. Based on expert evaluations from Albania and Montenegro, initial budget range for each activity has been envisaged.

Starting point would be to initiate the process for adopting the cooperation agreement and establishing coordination mechanism. National ministries for environment and water management shall take the lead in this process, in collaboration with the local authorities. Initial funding and technical support for this action could come from international organisations or already established international programmes and projects.

Based on the agreement, project proposals for ensuring further funding (including national allocations) shall be prepared, highlighting the Plan priorities. Detail programme of work, along with institutions to be involved, shall be done as part of the project proposals’ preparation process.

Similarly, national ministries for environment and water management as well as local authorities shall be the holders of the process, with possible technical support given by the national and international organisations. However, upon approval of the projects, it is recommended that the coordination mechanism coordinates the implementation of the activities, with the support of local and technical bodies.

The initial list of priority activities is given in the grid form as follows.

MEASURE 1.1.1: ESTABLISH A COMMONLY ACCEPTABLE TRANSBOUNDARY ARRANGEMENT ON COOPERATION IN THE FIELDS OF SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL PROTECTION AND WATER MANAGEMENT		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET (USD)**	**PROCESS INDICATORS**
1.1.1.1 Organise consultations for negotiating and agreeing a transboundary arrangement on cooperation (*Agreement*). Initial draft of the Agreement is presented in Annex 2.	3.500 – 8.000	Consultation meetings organised Transboundary arrangement on cooperation (*Agreement*) for the Plan area is formally approved
1.1.1.2 At the final stage of consultations undertake necessary official steps to formally approve a bilateral arrangement on cooperation (*Agrement*) by two countries		

MEASURE 1.1.2: PUT INTO FORCE A TRANSBOUNDARY COORDINATION MANAGEMENT MECHANISM FOR THE IMPLEMENTATION OF THE TRANSBOUNDARY ARRANGEMENT ON COOPERATION, INCLUDING THE OBJECTIVES OF THE PLAN		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET (USD)**	**PROCESS INDICATORS**
1.1.2.1 Organise consultation process, including local authorities, in both countries that will consist of the following steps: - Conduct a feasibility study to determine options for establishing a governance framework in Buna/Bojana transboundary area (the Plan area). The aim is to define and establish a coordination management mechanism taking into account the need to provide link or synergy with existing coordination mechanisms in both countries such as the Skadar/Shkoder commission; ICZM coordination mechanism in Montenegro etc. – Prepare a detailed roadmap to establish the most appropriate transboundary coordination management mechanism. Envisage involvement of local authorities in operation of the mechanism. – If appropriate, and agreed by the countries, the feasibility study should consider a scenario to revitalise and extend the Skadar/ Shkoder agreement between Albania and Montenegro to include the Buna/Bojanaarea as well as to extend the mandate of the Skadar/ Shkoder Commission to include the Buna/Bojana area, including a wider set of transboundary cooperation	46.500 – 110.000	Consultation meetings organised Coordination management mechanism is in place

priorities. Undertake necessary steps to launch process to formally establish operationally and financially viable coordination mechanism		

MEASURE 1.2.1: DEVELOP A JOINT TRANSBOUNDARY PROGRAMMES AND RELATED PROJECTS BASED ON THE BOJANA/BUNA AREA MANAGEMENT PLAN		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
1.2.1.1 Prepare and submit for approval joint, transboundary project-proposals for the Buna/Bojana area	85.000 - 100.000	Transboundary project proposals are developed
1.2.1.2 Provide technical support to the institutions that will undertake implementation of the transboundary projects for the area; Ensure necessary financial contributions of the countries		

MEASURE 1.3.1: DEVELOP A COMMON INTERPRETIVE MATERIAL FOR THE BUNA/BOJANA AS A WHOLE ON NATURAL AND CULTURAL HERITAGE AND DEVELOPMENT POTENTIALS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
1.3.1.1 Develop promotional (interpretative) material; develop and maintain a shared web site for the whole area	22.000 – 40.000	Promotion materials produced Communication strategy prepared
1.3.1.2 Develop a communication strategy		

MEASURE 1.3.2: ORGANISE AWARENESS RAISING CAMPAIGNS ON NATURAL VALUES AND DEVELOPMENT POTENTIALS OF THE AREA		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
1.3.2.1 Prepare in both languages communication and awareness raising material on the importance of the area and the coordination management mechanism (that may be established in the area)	50.000 - 90.000	Number of people involved in the events Relevant campaigns/events organised

1.3.2.2 Organise joint, transboundary local celebrations, building on existing ones such as Skadar Lake Day, Mediterranean Coast Day[5] celebrations etc.		

[5] www.coastday.org

MEASURE 2.1.1: REVIEW THE NATIONAL LEGISLATIONS OF IMPORTANCE FOR THE MANAGEMENT OF THE BUNA/BOJANAAREA AND IDENTIFY AREAS FOR IMPROVEMENT		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.1.1.1 Undertake an analysis of national legislations and related consultation process to identify gaps related to the implementation of the objectives of the Plan for Buna/Bojana area, primarily in regard to the requirements of the ICZM Protocol and WFD	20.000 - 50.000	Gaps in regulations and policies are identified and addressed Consultation process among relevant stakeholders on the proposed changes in the regulations is realised
2.1.1.2 Propose necessary changes in the legislation and if possible, changes in the operation of the enforcement mechanisms (especially operation of the inspection control)		

MEASURE 2.1.2: INTRODUCE THE COASTAL SET-BACK ZONE ACROSS ALL COASTAL FRONTAGES BY APPROPRIATE REGULATION (IN ALBANIA)		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.1.2.1 Undertake set-back assessment and provide guidance document for Albania (a similar document for Montenegro already exists)	20.000 – 50.000	Set-back assessment, with related proposals for Albania prepared Consultaion process realised
2.1.2.2 Propose necessary changes related to coastal set-back in the legislation; undertake necessary consulations with stakeholders		
2.1.2.3 If appropriate, propose the necessary changes related to determination of no construction zone in the relevant spatial plans		

MEASURE 2.2.1: DEFINE STANDARDS FOR THE PREPARATION OF SPATIAL PLANNING DOCUMENTS AND MONITORING OF THEIR IMPLEMENTATION		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.2.1.1 Prepare technical guidelines on the obligatory contents, criteria and procedures for the preparing spatial plans particularly adapted to specific conditions and needs for Albania and where applicable for Montenegro. The guidelines should provide instructions on the use of vulnerability assessment as a	30.000 – 45.000	Albanian and Montenegrin technical guidelines are prepared Training programmes are organised on a

tool for integrating nature and landscape values into spatial planning. *The guidelines shall be tested through pilot application (see action 3.2.1.1)*		continual basis
2.2.1.2 Organise training for national (and local) authorities responsible for spatial planning) for the implementation of guidelines and the utilisation of information technologies in spatial planning processes		

MEASURE 2.2.2: SUPPORT THE REHABILITATION OF ILLEGALLY BUILT AREAS WITH POOR ENVIRONMENTAL AND LANDSCAPE QUALITY		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.2.2.1 Prepare guidelines for rehabilitation of illegally built areas and areas with degraded landscape due to inappropriate building practices (taking into account action 2.2.1.1); include possible rehabilitation models	50.000 – 120.000	Guidelines are prepared Pilot project implemented
2.2.2.2 Undertake at least one rehabilitation pilot project at a location within the planned construction areas (within the in project zone		

MEASURE 2.2.3: PREVENT FUTURE ACTIONS THAT MAY DEROGATE QUALITY OF BUILT AREAS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.2.3.1 Organise awareness-raising events in order to strengthen the involvement of the civil society in the prevention of illegal building	5.000 – 30.000	Number of awareness events that are organised

MEASURE 2.2.4: SUPPORT THE INTRODUCTION OF LAND POLICY INSTRUMENTS FOR DISCOURAGING UNSUSTAINABLE LAND CONVERSIONS FOR REAL-ESTATE BUSINESS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
2.2.4.1 Analyse utilisation and efficiency of existing land policy instruments both in Albania and Montenegro	40.000 – 100.000	Proposals for land policy instruments are prepared. Consultation process among relevant stakeholders is organized
2.2.4.2 Based on the results of the analysis, prepare proposals and technical guidelines for the improvement of the land policy		

2.2.4.3 Demonstrate, at selected locations in Buna/Bojanatransboundary area, utilisation of the appropriate land policy instrument(s) in order to contribute to the sustainability of the spatial planning systems in Albania and Montenegro		Utilisation of the land policy instruments for the purpose of national spatial planning systems is demonstrated.

MEASURE 3.1.1: IMPROVE AND HARMONISE MONITORING SYSTEMS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.1.1.1 Prepare water quality monitoring programme (see Annex for a related proposal). Review existing monitoring systems and address present gaps	75.000 – 500.000	Appropriate monitoring infrastructure and programmes are in place
3.1.1.2 Engage national institutions competent for chemical and biological analyses, and where appropriate, research institutions in inter-laboratory exercises using reference materials and standardised inter-calibration and monitoring methods		Staff is trained Training courses are organised
3.1.1.3 In collaboration with competent and relevant national institutions develop and implement experimentally local indices and/or metrics for the classification of the ecological status of surface waters.		Local metrics for the classification of the ecological status of surface waters is in place
3.1.1.4 Update and harmonize detailed habitat maps	40.000 – 50.000	Habitat map produced
3.1.1.5 Undertake baseline surveys (inventory) for forest area quality and type		Inventory for forest area quality and type is in place

MEASURE 3.1.2: PUT IN PLACE HARMONISED OBSERVATION SYSTEM ON LAND TRANSFORMATION		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.1.2.1 Define responsibilities in coordination mechanism structures in terms of managing spatial data of the area	55.000 – 100.000	Land transformation observation system is in place, including set of indicators
3.1.2.2 Agree on compatible GIS systems and protocols for the exchange of spatial data		

3.1.2.3 Agree on the format and content of the priority GIS layers for land transformation monitoring. Preferably, it should include: - built areas - planned urbanisation zones (urban areas, tourism areas and industrial zones - urbanised natural land (agricultural and forest))- land take		
3.1.2.4 Undertake baseline analysis of: - built areas, - planned land uses - land take		
3.1.2.5 Define and use a system of indicators for monitoring land transformation processes, including percentages of: - built areas - area planned for urbanisation - built coastline - 1000 metres zone planned (for building) - 1000 metres zone built - natural area (agricultural, forest and other) planned for building and built		

MEASURE 3.1.3: ASSESS - USING HARMONISED METHODOLOGIES - INTEGRATED VULNERABILITY OF THE AREA		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.1.3.1 Based on data availability agree a common methodology for vulnerability assessment, including selection of the priority themes	30.000 – 50.000	Vulnerability assessment is completed
3.1.3.2 Undertake vulnerability assessment in transboundary Buna/BojanaArea		

MEASURE 3.2.1: PROMOTE UTILISATION OF VULNERABILITY ASSESSMENTS AS A TOOL FOR OPTIMISATION OF LAND USE		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.2.1.1 Demonstrate the utilisation of vulnerability assessment in at least one	30.000 - 50.000	Technical guidelines are prepared

spatial planning document (adapt its results to the needs of spatial plan). Preferably, this could be applied in Albania, in the detailed territorial plan for Buna Protected Area		Utilisation of vulnerability assessment is demonstrated in selected spatial plan Trainings with spatial planers and local authorities organised
3.2.1.2 Raise awareness of spatial planners and local authorities on the benefits of using this tool.		
3.2.1.3 Exchange experience in utilising the tool in Montenegro as part of preparation of Coastal Area Spatial Plan		

MEASURE 3.3.1: ORGANISE CAPACITY BUILDING PROGRAMMES FOR LOCAL OFFICIALS AND TECHNICAL STAFF TO ENABLE ACHIEVEMENT OF THE OBJECTIVES OF THE PLAN		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.3.1.1 Conduct a training needs analysis	30.000 – 50.000	Training needs are identified Training courses are organised
3.3.1.2 Based on the analysis, organise a series of trainings and workshops. Among others organize trainings on the following issues: - Use of GIS and other planning tools - Spatial planning methodologies, processes and alike (see related action) - Participatory planning.		

MEASURE 3.3.2: OBTAIN NECESSARY EQUIPMENT AND INFRASTRUCTURE		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
3.3.2.1 Ensure at least one high capacity broadband node point in each commune/municipality	55.000 – 100.000	Equipment is in place
3.3.2.2 Secure necessary computer hardware		
3.3.2.3 Server based centrally or at the appropriate higher administrative level, (see related actions)		

MEASURE 4.1.1: PROVIDE/IMPROVE SANITATION INFRASTRUCTURE BY CONSTRUCTING WASTEWATER TREATMENT SYSTEMS IN THE PLAN AREA, PLUS SHKODRA TOWN		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
4.1.1.1 Undertake necessary activities for the construction of priority wastewater treatment systems for major point pollution sources such as Shkodra city. Apply EIA	200.000 – 400.000	Agreed priorities for introduction of WWTS Prepared documents for their installation Allocated funds for their implementation EIA applied (rate of) Improvement in the ecological and chemical status parameters at each water body at annual basis

MEASURE 4.1.2: APPLY ECO-REMEDIATION METHODS COMPLEMENTARY TO WWTPS FOR IMPROVING THE WATER QUALITY		
MEASURE 4.1.3: APPLY BEST AGRICULTURAL PRACTICES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
4.1.2.1 Provide funding support and advice to farmers to apply eco-remediation methods to address diffuse pollution	100.000 – 150.000	Workshops organised Funds allocated for farmers' sustainable practices Concentrations of the pollutants are below statutory (mandatory) levels.
4.1.3.1 Work with farmers (capacity building), among others, on the following areas: - using compost from household waste as fertilizers - applying eco-remediation measures - sustainable and eco agricultural practices - understanding the services they can obtain from the authorities - etc		
4.1.3.2 Improve management of stockbreeding waste, etc		

MEASURE 4.2.1: SUPPORT POLICY CHANGES TOWARDS RATIONAL AND SUSTAINABLE WATER USE AND CONSUMPTION, PRIMARILY FOR IRRIGATION
MEASURE 4.3.1: REDUCE WATER ABSTRACTION AND CONSUMPTION. REDUCE WATER LOSSES IN DISTRIBUTION SYSTEMS

PRIORITY ACTIVITES 2020	PROVISIONAL BUDGET	PROCESS INDICATORS
4.3.1.1 Establish a cadastre of water use	200.000 – 250.000	Cadastre of water use and monitoring of consumption is in place Water consumption analysis is done, and unsustainable practises are identified Relevant national legislation and policy changes are initiated Consultation process of relevant stakeholders with regard to the proposed policy and legislative changes is organized
4.3.1.2 Establish water consumption monitoring system for surface water and groundwater. Install water-metering systems for consumption and abstraction		
4.3.1.3 Analyse current and expected water use and consumption needs in both countries in the Buna/Bojana area, with a focus to the irrigation needs		
4.3.1.4 Identify unsustainable water consumption practices and propose intervention measures. Where necessary, propose relevant changes in national legislation and relevant policies		
4.3.1.5 Promote irrigation-saving measures such as the restructuring of agricultural products and dripping irrigation systems		

MEASURE 4.3.3: REDUCE HEAVY METAL CONCENTRATIONS IN ŠASKO LAKE AND VILUNI LAGOON		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
4.3.3.1 Conduct survey to track heavy metal pathways entering lake Šasko and Viluni lagoon	50.000 – 100.000	Survey undertaken Water quality in Šasko lake is improved

MEASURE 4.4.1: DESIGNATE AND ENFORCE THE GROUNDWATER SANITARY PROTECTION ZONES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
4.4.1.1 Conduct aquifers vulnerability assessment	20.000 – 40.000	Vulnerability assessment undertaken All sanitary zones included into spatial plans and other relevant legal documents
4.4.1.2 Define the areas for the establishment of sanitary protection zones. Integrate them into relevant legal documents.		

MEASURE 5.1.1: IMPROVE THE STATUS OF BIODIVERSITY IN THE ECOLOGICALLY SENSITIVE AREAS (INCLUDING PROTECTED AREAS)		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.1.1.1 Assess the status, zoning, category of protection and borders of the existing protected areas, and revise as appropriate	50.000 – 90.000	Statuses of protected areas assessed Indicator species are selected Population of indicator species is increasing
5.1.1.2 Analyse status of habitats and species in the area; propose protection measures for the ecologically sensitive habitats and species		
5.1.1.3 Define and undertake actions aimed at the improvement of the inter-connectivity (e.g. through corridors) of protected areas and other ecologically sensitive sites (EMERALD, IPA, IBA, Natura 2000), and valuable landscapes		

MEASURE 5.1.2: ASSESS AND VALUE ECOSYSTEM SERVICES IN THE AREA AND ENSURE THEIR PROPER INTEGRATION IN SECTORAL POLICIES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.1.2.1 Conduct a study for the valuation and valorisation of the ecosystem services; the study should include proposals for the use of the findings for the improved management of the area	50.000 – 100.000	Ecosystem services are valued and the findings of the study are used for piloting a management scheme
5.1.2.2 A management scheme proposed through the study is piloted in one of the countries or both countries		

MEASURE 5.2.1: ESTABLISH NEW PROTECTED AREAS IN MONTENEGRO AS IDENTIFIED IN RELEVANT SPATIAL PLANNING DOCUMENTS (INCLUDING PREPARATION OF RELEVANT STUDIES) AND APPOINT MANAGEMENT STRUCTURES FOR NEW PROTECTED AREAS AS TO PROVIDE EFFECTIVE AND FUNCTIONAL MANAGEMENT SYSTEM		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.2.1.1 Initiate necessary steps for the establishment of a protected area in Solana Ulcinj (Montenegro); maintain the operation of the Solana as it provides important ecologic services of primary importance, as feeding and reproducing grounds for migratory birds	20.000 – 30.000	All relevant studies, background and policy documents necessary for establishment of PAs prepared
5.2.1.2 Support establishment of Saško Lake protected area		

MEASURE 5.2.2: IMPROVE MECHANISMS AND CAPACITIES FOR MONITORING AND CONTROL OF BIODIVERSITY AND NATURE		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.2.2.1 Prepare management plans and annual operational plans for protected areas in Montenegro	20.000 – 50.000	Management plans for protected areas in Montenegrin part of Plan area are prepared Background study on payment fee optons prepared Payment fee in Velipoja introduced Increased number of regular rangers and trained guides Training programmes and transfer of knowledge and best practices are maintained on a continuous basis
5.2.2.2 Introduce an entry payment fee for visitors in the Velipoja protected area to assist the maintenance costs and other environment protection measures on a trust-fund model	20.000 – 30.000	
5.2.2.3 Increase human and technical capacities of existing rangers/guards and environmental inspectors, in particular in protected areas	10.000 – 30.000	

MEASURE 5.2.3: HARMONIZE MANAGEMENT OBJECTIVES AND MEASURES ACROSS THE PROTECTED AREAS IN THE TWO COUNTRIES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.2.3.1 Prepare a feasibility study for the harmonisation of the protection statuses of the respective areas across the border, including the designation of a transboundary protected area (e.g. Regional Park)	30.000 – 40.000	Feasibility study prepared

MEASURE 5.3.1: SUPPORT ACTIONS RELATED TO PREVENTION OF ILLEGAL HUNTING		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.3.1.1 Analysis of existing hunting practices and regulations with the aim to identify irregularities and sustainable trends. If necessary, propose relevant changes in national legislation and relevant policies (*see measure 2.1.1*)		Unsustainable hunting practices are identified Relevant national legislation and policy changes are initiated

MEASURE 5.3.2: PROMOTE BIRD-WATCHING IN THE AREA, AS PART OF HARMONISED ECOTOURISM SCHEMES IN BOTH COUNTRIES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.3.2.1 Develop a bird-watching programme that would include sites in both countries and a joint team of guides	30.000 – 80.000	Bird-watching programmes prepared Number of visits of birdwatchers is increased Capacity building programmes organised
5.3.2.2 Ensure transfer of best-available practices in the field of bird-watching through capacity building events and study visits in places abroad with experience on the subject		

MEASURE 5.4.1: IMPROVE FISH STOCK MONITORING AND CONTROL		
MEASURE 5.4.2: STOP ILLEGAL FISHING ALONG THE RIVER IN THE ALBANIAN SIDE		
MEASURE 5.4.3: INTRODUCE SUSTAINABLE FISHERY PRACTICES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.4.1.1 Assess the feasibility of establishing first lending and first sale places located in each country enabling better inspection of fish harvesting in Shkoder/Skadar lake covering also the Buna/Bojana area	30.000 – 90.000	Feasibility study prepared Fishing monitoring system is established Commercial fish stocks are increased
5.4.3.1 Determine and establish common approach in river fish catch monitoring. Based on the results, explore the need and possibility of applying spatial and temporal restrictions of specific fish species fishing		

MEASURE 5.4.4: INTRODUCE TOURISM OPTION FOR THE FISHERMAN DURING THE PERIOD OF SPECIES MIGRATION INTO THE LAKE		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
5.4.4.1 Promote and support sport-fishing practices and schemes with the participation of local fishermen as tourist guides	5.000 – 20.000	Analysis prepared to determine legal options for fishermen to participate in tourism activities Fishermen are allowed to provide tourism services

MEASURE 6.1.1: ASSESS THE POTENTIAL FOR GREEN BUSINESSES IN THE AREA		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
6.1.1.1 Undertake feasibility study on state and potentials for development of green business in the are	20.000 – 35.000	Feasibility study prepared

MEASURE 6.1.2: RAISE AWARENESS OF GREEN BUSINESS OPPORTUNITIES		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
6.1.2.1 Organise promotion activities for local entrepreneurs and authorities on the benefits of green developmen	6.000 – 20.000	Number of awareness raising events organised

MEASURE 6.1.3: LAUNCH AND CONTINUALLY ENFORCE EXCHANGE OF EXPERIENCE AND KNOWLEDGE TRANSFER ON GREENING SCHEMES AMONG LOCAL PRODUCTS PRODUCERS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
6.1.3.1 Organise capacity building trainings for local entrepreneurs on the available funding schemes for green business	7.000 – 10.000	Numebr of trainings organised Numebr of local entrepreneurs participating in the trainings Number of local entrepreneurs applied (received) green business fundings
6.1.3.2 Organise pilot demonstration with selected number of local entrepreneurs to increase quality of local products through greening of activities	50.000 – 100.000	Pilot project implemented

MEASURE 6.2.1: RECOGNISE THE BUNA/BOJANA AS A SINGLE TOURISM “DESTINATION”...		
MEASURE 6.2.2: DEVELOP THE CAPACITY OF THE AREA TO BECOME A SUSTAINABLE TOURIST DESTINATION BASED ON ITS NATURAL AND CULTURAL ASSETS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
6.2.1.1Prepare project proposal(s) under the IPA Cross-Border Programme Albania – Montenegro; *link (see) action 1.2.1.1*		Project proposal prepared and submitted for

Projects should include (some of) the following:		adoption
Define the local “tourist product” and its characteristics: it should provide an “added value” to the tourist, should be of “local character” and should be based on sustainable use of the resources it utilizes. Among others (such as hiking, biking, sport fishing, bird watching etc), it could include agro-tourism, and farm-based ecotourism activities		
Identify and engage key local stakeholders including community leaders, businesses and organisations in developing the sustainable tourism strategy for the area		
Identify, provide and improve thesmall-scale infrastructure in terms of access to natural values/ecosystem services such as visitor centres, footpath/cycle-ways and parking, and information required on key natural sites and beaches to accommodate tourists		
Build relationships across the wider tourism industry, in particular with the major tour operators in the both countries, and lobby to become part of national’ tourist offer targeting markets through national schemes		
Incentives, advice and training schemes at community level to update establishments and private properties to current standards. Mainly to upgrade tourist accommodation and retail facilities		
Appropriate incentives for development of the outdoor recreation activities, including water sports, walking, cycling, recreational fishing and others		
Prepare and advertise a “local cuisine offer” for visitors		
Design and implement a “buy local” campaign for local food/artisan/cultural produce		
Organise trainings for the rangers/guards to appropriately guide visitors		
Encourage visitors to choose environmentally sustainable options		

MEASURE 7.1.1: ESTABLISH AMONG COUNTRIES COORDINATED FLOOD FORECAST AND EARLY WARNING SYSTEM		
MEASURE 7.1.5: ALBANIA TO REVIEW THE OPERATION OF THE DAMS AS MULTIFUNCTIONAL SYSTEMS (ENERGY, IRRIGATION, RETENTION AND DETENTION OF HYDROLOGICAL PEAKS) APPLYING ALSO EU STANDARDS FOR E-FLOWS		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
Priority actions already undertaken as part of the GIZ supported project "Climate change adaptation in the Western Balkans" (https://www.giz.de/en/worldwide/29000.html)		

MEASURE 7.2.1: DETERMINE ZONES FOR SETBACK EXTENSION AS TO IMPROVE ADAPTATION TO CLIMATE CHANGE IMPACTS, ESPECIALLY SEA LEVEL RISE		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
7.2.1.1 Conduct vulnerability assessment to climate change impacts, including modelling of the sea level rise. Based on the results of the vulnerability assessment propose setback extension and appropriate measures of to improve adaptation of population, coastal infrastructure and nature to climate change impacts	20.000 - 30.000	Climate change vulnerability assessment undertaken Extended set-back in vulnerable areas introduced

MEASURE 7.2.2: REDUCE COASTAL EROSION		
PRIORITY ACTIVITES 2020	**PROVISIONAL BUDGET**	**PROCESS INDICATORS**
7.2.2.1 Conduct sediment transport and coastal dynamics study	60.000 – 80.000	Sediment transport and coastal dynamics study in place
7.2.2.2 Prepare beach management plans aiming at the restoration of eroded areas, enhancing natural retention and accretion of sand dunes		Beach management plan in place
7.2.2.3 Monitor sediment loads		*Link with actions under measure 3.1.1*

PART B: BACKGROUND INFORMATION - THE TRANSBOUNDARY AREA IN DETAIL

7. The Transboundary Planning Zone

The transboundary planning zone has been defined to appropriately address the coastal zone, river basin and respective aquifers management issues, using the criteria described in chapter 1.3.

The terrestrial part of the transboundary coastal zone includes Buna/Bojana sub-basin, underlying coastal aquifers and the coastal zone, with the approximate surface of 500 km^2. It has been defined based on administrative boundaries and the boundaries of the watershed. The focus of the marine area within the Plan is determined based on the direct effect of the Buna/Bojana's River outflow - using the maximum sea surface salinity isolines to approximate this (with average threshold being at 35PMU) (Figure 7; see chapter 9.4).

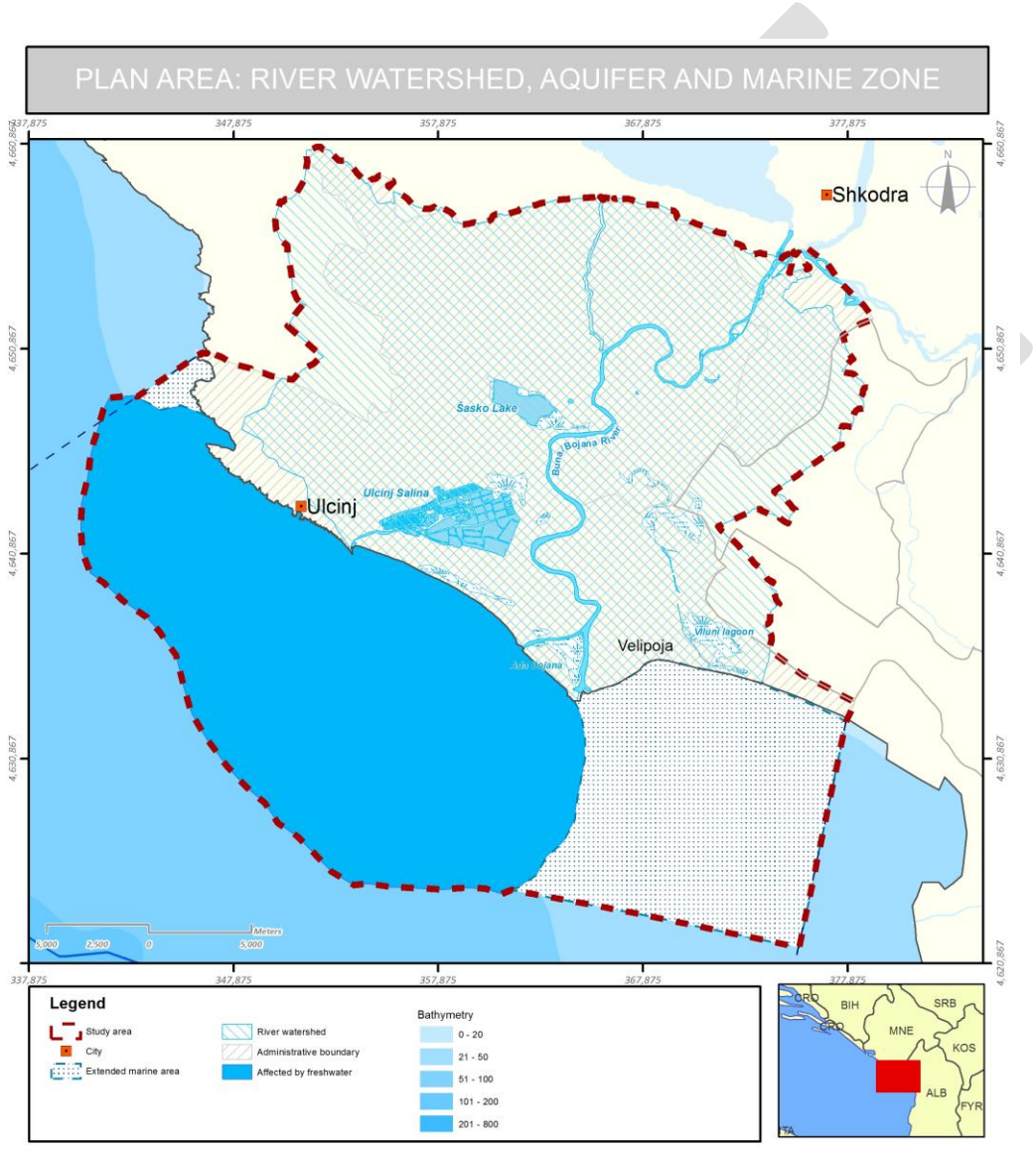


Figure 7: Transboundary Zone: sub-basin, aquifer and marine zone

Understanding the different components of this system and the interactions between them is central for its sustainable management.

The Buna/Bojana River is the outflow of the Lake Shkoder/Skadar and receives the waters of the Drin Basin[6]; in this regard, its catchment, with a total area of 20,585 km^2, stretches at and composes of the catchments of the Lakes Prespa, Ohrid and Drin River to the South, the White Drin River to the East and the Lake Shkoder/Skadar -the Balkan's largest lake- to the North-North East (Figure 8). The hydrological regime of Drin has been much altered due to the construction of a cascade of dams. During high-water periods and favourable winds, Drin water enters Shkoder/Skadar Lake, often resulting into floods. Furthermore, the economic activities and the natural processes (e.g. currents) in the coastal waters allow the interaction with marine areas in the north, south and west of the area of focus.

Figure 8: The extended Drin river basin, with Skadar lake basin (adapted from The Drin River Basin map)

In this regard, it is evident that the Plan area is affected by natural and anthropogenic processes and managing regimes occurring in a geographical zone that extend well beyond its boundaries.

[6] The Drin Basin is described in Part C - Water Resources Management – Situation Analysis.

This Plan also considers the effects of the processes beyond its boundaries as input to the Buna/Bojana system.

In the medium/long-terms, management of the Buna/Bojana will be sustainable only when the area is managed by a coordinated and integrated scheme that is implemented across the Drin Basin and the adjacent marine area.

7.1 Physical Characteristics

The Buna/Bojana River is short, only 44 km, with a mean annual discharge of approximately 20 km^3/year, of which approximately 50% originates from Lake Shkoder/Skadar. Combined with the flow of the Drin River, **constitutes over the half of the total Albania's river runoff** (more information about the Drin Basin is provided in Part C the "Analysis of the State of the Water Resources"). The Buna/Bojana's hydrological and ecological character, aquatic quality and sediment regime comprises a continuation of Drin River and Lake Shkoder/Skadar. The Buna/Bojana (sub) basin is 508 km^2 with an average altitude of 105,5 m (max altitude 909 m).

The Bojana/Buna starts as the southern outflow of Lake Shkoder/Skadar (Box 2) situated close to the city of Shkodra (less than 3 km downstream from the old Skadar fort). From this source the river meanders in a broadly south-westerly direction to the Adriatic, a straight line distance of only 25 kms, dividing into channels to form a marshy delta and the island of Ada Bojana where it enters the sea. The beaches to the south of the delta have encouraged the development of the Albanian resort of Velipoje.

The Bojana/Buna's average width is 200 metres and its depth varies from 2 to 4 metres. The river, below its mid-portion, forms the natural border between Albania and Montenegro.

Bojana/Buna River is navigable by small vessels which can sail through its mouth. At lower water levels navigation can be carried out as far as the village of Bori on the border between Montenegro and Albania, while at higher water levels the river may be navigable even to the lake.

Box 2: Lake Shkoder/Skadar

Lake **Shkoder/Skadar** (basin area: 5,180 km^2), is the largest, in area, lake in the Balkans shared between Albania and Montenegro. It receives its waters mainly by the 99 km long Moraca River (about 62% of its inflow - Bushati et al., 2010), small streams and karstic inflows, and drains into the Bojana/Buna River. The lake surface varies from 372 to 542 km^2 and the maximum depth exceeds more than five times the mean (8 m). The lake is protected by the RAMSAR convention for its flora and fauna biodiversity. More than 80 species of aquatic higher plants are found, some of them are endemic or endangered species.

The lake harbours about 49 species of fish, among them six trout species. About 20% of fish species from Lake Shkoder/Skadar migrate towards the sea.

The lake is threatened by inflows of the industrially polluted Morača River and the municipal liquid and solid wastes of the capital of Montenegro.

Figure 9: Phyisical characteristics of the area

The riverbed forms very long and curved meanders. **The river basin** is composed of limestones, sandstone, shales and recent deposits. The river has cut its bed through three limestone cliffs. The first notch is formed at Shkoder in the reef Taraboš - Rosaf, in the main structure of Rumija, the other is at Fraskanjel in the ridge of Šas hill and the third through Rečka Gora. Excluding these, the bed of the Buna/Bojana River is cut into alluvial, mainly loamy, deposits.

Sections from the mouth of the Drin to Obotia - the riverbank in these sections is composed of gravel-sandy material - is characterized by sporadic crumbling riverbanks, among which the most vulnerable ones to erosion are from Lisna Bore and Paratuk Mahala, downstream of Rec. At the locations where the bed slopes are covered by vegetation, especially willow, the banks are more stable.

The immediate banks of the Buna/Bojana River are high in relation to the surrounding area. In fact, almost along the entire flow of the Buna/Bojana River, except the sections that cut through the limestone cliffs, the banks of the river are raised above the ground up to 2 metres as a flood protection measure.

The Buna/Bojana delta region comprises a recently developed small delta, several different lagoon complexes and freshwater lakes, as well as typical riverine and coastal landscapes. The growth of the delta by 1 to 1.5 km in the last 100 years is relatively slow compared to other Mediterranean deltas such as the Rhone and Po (about 4 km in 100 years). The deltaic landscape, in particular the lagoon and the coastline, has been formed by high flood events, from both the river and the sea.

The Ada Bojana island (Montenegro) is located in the delta. The island formed after a big storm in the mid-nineteenth century, when the ship "Merito" was stranded between two small islands, which led to depositing of river sediment around her sunken hull and around both islands. During the long-term deposition of sediments and uplift of the sandbar, a triangular island was formed; two narrow branches of the Buna/Bojana River the island from the mainland. The left branch forms the border between the two countries.

Buna/Bojana River is an important source of sediments that defines coastal morphology in the transboudary zone and contributes to the creation of beaches in the delta of the river. The total length of the beaches in the delta is about 20 km. In addition to the Ada island beach (2.9 km long), the most important beaches are Velika plaža (Montenegro) - approximately 13 kilometres long and 100 m (average) wide- and Velipoja beach (Albania) that is 4 km long.

The marine zone in front of the Buna/Bojana delta (Figure 10) is characterised by the generally extended continental shelf reaching its maximum extension of about 60-80 km from the coastline. It is interesting noting that approximately 80 kilometres from the Buna/Bojana coastline (even though outside the Plan area) is the deepest point in the Adriatic, 1,223 meters deep (map below).

There are no precise data sets on the tidal regimes of the area. However, application of modelling simulations[7] indicates that the difference between mean high waters and mean low waters (within a year) at the Buna/Bojana river mouth is approximately 30 cm, while the amplitude between the highest and the lowest waters is approximately 50cm. The amplitudes of the most energetic tidal constituents are estimated to reach above 10cm.

Similarly, there are few available observed data on wind waves in the area. Still, based on some specific studies and projects[8], it is clear that the majority of the waves come from south-west; the average significant wave height is 2m with highest values of 4 meters.

[7] Application of Adriatic Forecasting System (AFS) numerical model, for the year 2003; Adricosm-Star project
[8] Adricosm-Star project

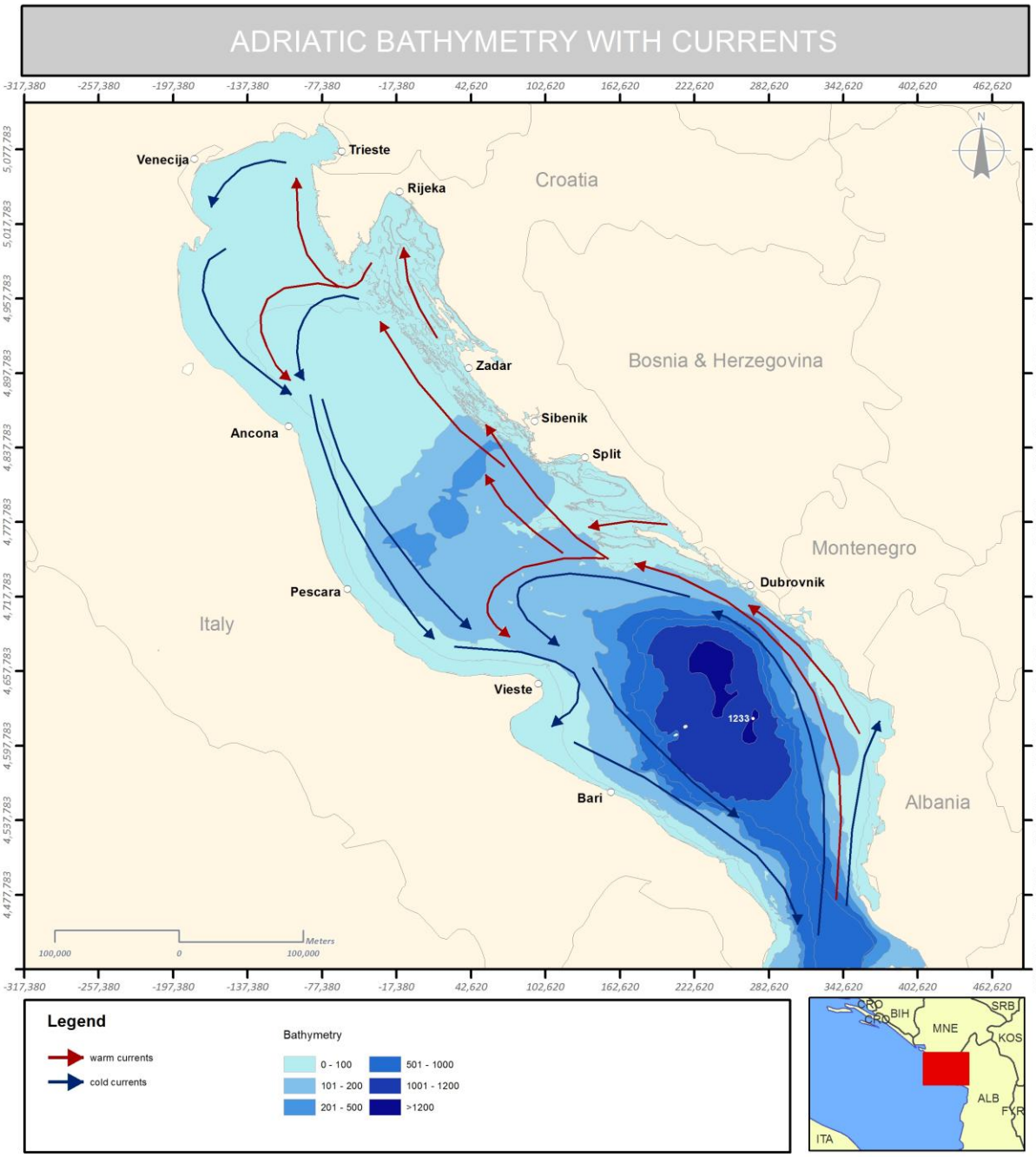


Figure 10: Adriatic bathymetry with currents (adapted from http://proleksis.lzmk.hr/28692/

The interaction of the river flow and sediment transport, currents, tides and the wave activity form the morphology of the bed of the river and determine the intrusion of saline water upstream. At the marine part of the river delta, underwater thresholds of sediment layers are created and are cut through by the fresh-water flow. During the summer low-water level period -at water flow of 100 m^3/s- a lake can be formed upstream of the threshold, in the riverbank.

Considering that the bottom slope of the Buna/Bojana river bed is quite flat, under conditions of high tide, seawater may intrude the river and reach Reč, or even further upstream. The impact may be observed during dry periods, when flow of fresh water is reduced.

8. SOCIAL AND-ECONOMIC CHARACTERISTICS

KEY HIGHLIGHTS

- **Superficially, the demographic data shows a contrasting pattern between the two countries – namely a decline in Montenegro compared to the growth in Albania. However, the Albanian, voter registration based statistics, may disguise a trend of outward migration following the national trend of migration to urban areas or overseas.**
- **Population density is significantly higher in the plan area than the average for each of the partner countries, reflecting a general pattern of decline in inland rural areas. Unless there is a significant change in economic and educational opportunities these trends are unlikely to reverse.**
- **The key political and economic related parameters affecting the area include the EU accession process and transition to market economy.**
- **Some procedures and scales of data collection and processing are different for two countries, therefore data is difficult to compare directly.**
- **Per capita GDP (2011) in the area is low, compared to the EU average (€25,200; Eurostat); namely, in Montenegro was €5,211 and in Shkoder County estimated at €2,175 in 2011, amongst the lowest in Albania.**
- **Agriculture predominates in the economy of the Albanian Plan area. Being rich in fertile soils, the area's productive potential is very high.**
- **In Montenegro, the Plan area is extremely favourable for agricultural development, but its contribution to the overall GDP is low.**
- **Tourism is an important economic activity in the area. In Albania, it is only developed in Velipoja, with estimated 20,000 staying and additional 50,000 day visitors per year. In Ulcinj, 120,548 tourists and 878,305 overnights were recorded in 2011 (increase of more than double compared to 2001).**

Data on socio-economic issues in this section is sourced from the two national jurisdictions of Montenegro and Albania. The range (categories) of demographic data collected in the two countries is broadly compatible. However, the local statistical units – generally based on local administrative areas – vary considerably in scale. Data has been aggregated or disaggregated to the plan area where possible.

8.1 Population distribution

Data is shown according to the respective administrative structures as described and presented in the Figure 11 below.

Albania has a four-tier administrative system including; national government, counties (Albanian: *qark or prefekturë*), districts (Albanian: *rreth*), municipalities and communes (Albanian: *bashki and komunë*). The municipalities and communes are the first level of local government, responsible for local needs and law enforcement (Ligj, Nr. 8652, 2000). However, as of 2015, the communes no longer have the

administrative power; they are integrated withinmunicipalities as the lowest level of government within the organizational structure of the country.

The Plan area in Albania falls under the County of Shkodra (*Shkodër*) as well as District of Shkodra. The landward part of the Plan in Albania includes the territory of 4 communes; i.e., the Commune of **Ana e Malit,** the Commune of **Bërdice,** the Commune of **Dajç** and the Commune of **Velipojë**, with their respective villages, within Shkodra District. In addition, the area includes a small part of the Bushat, Balldreni i Ri and Rrethine Communes; however, these were not included in the assessment as its territory largely belongs to another watershed.

Montenegro's administrative system has only two main levels: national and municipalities (Montenegrin: *opštine*). In addition, each municipality has number of settlements (Montenegrin: *naselja*) that are also statistical reference units (Figure 12).

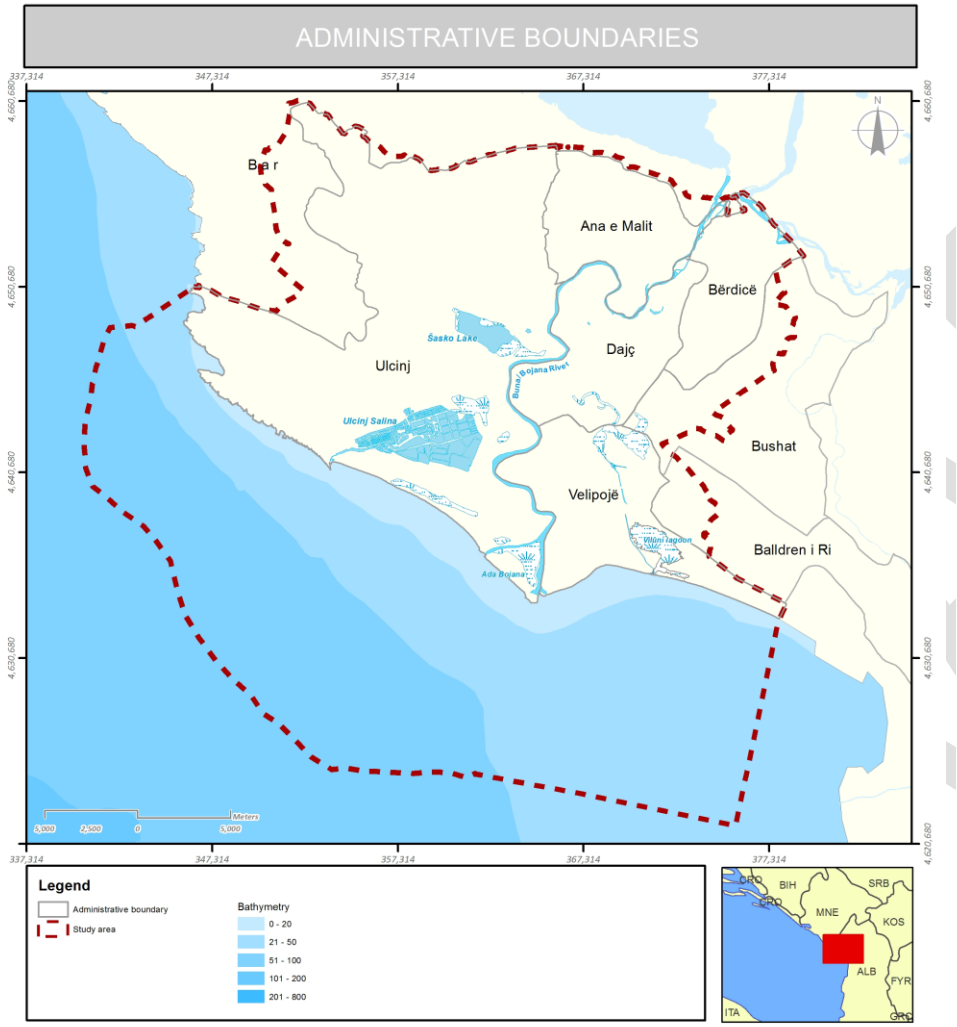


Figure 11: The administrative boundaries of the Plan area

Figure 12: The administrative boundaries with settlements in Montenegro

The landward part of the Plan in Montenegro primarily includes the territory within the administrative boundary of the Municipality of **Ulcinj**, and some settlements of the Bar municipality.

The Plan area had a total population of over 53.000 in 2011 with an average density of 107 people per km^2 (Figure 13).

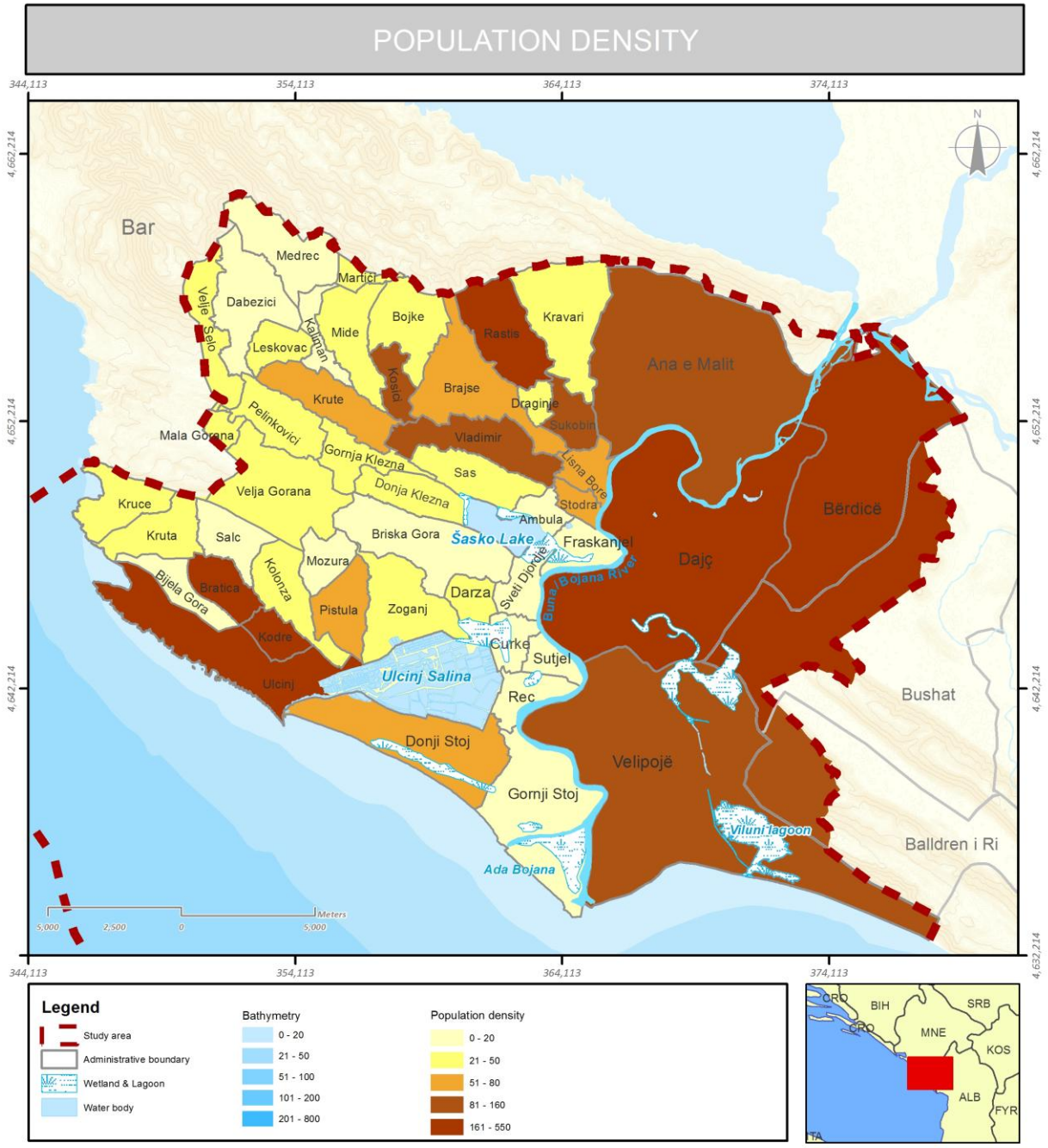


Figure 13: Population density in the Plan area

Albania - Plan area population (2011): **32,382 (**SRC, 2011)[9]**, 61%** of the Plan area; the average density of habitants is 153 habitants/km^2 (higher than the Albanian average 98.5/km^2) (INSTAT, 2012*)*.

Montenegro - Plan area population (2011): 20,575, 39%of the Plan area; the average population density is 72 habitants/km^2 (significantly higher than Montenegrin average – 44.9 habitants/km^2;) (MONSTAT, 2011).

On the Albanian part, four communes are part of the Plan area, with three more only partly included. On the Montenegrin side, municipality of Ulcinj is part of the Plan, with three more settlements from the municipality of Bar (Table 2).

Table 2: Municipality/ communes coverage and population in the extended Plan area (Monstat 2011; SRC, 2011)

Country	Communes/ Municipalities	Area (km^2)	% of total	Population (2011)	% of total
Albania	Ana e Malit	41.8	8.4%	5,859	11.1%
Albania	Balldren i Ri	9	1.8%		
Albania	Berdice	31	6.2%	9,172	17.3%
Albania	Bushat	26	5.2%		
Albania	Dajc	30.2	6.1%	8,633	16.3%
Albania	Rrethine	2	0.4%		
Albania	Velipoje	72.4	14.6%	8,718	16.5%
Montenegro	Dabezici (Bar)	9.3	1.9%	160	0.3%
Montenegro	Pelinkovici (Bar)	6.1	1.2%	141	0.3%
Montenegro	Velja Gorana (Bar)	13.7	2.8%	353	0.7%
Montenegro	Ulcinj	255	51.4%	19,921	37.6%
	Total	**496,5**	**100%**	**52,957**	**100%**

8.2 Population Change

Between two censuses (2001-2003/2011), significant changes in the number of citizens in both parts of the watershed were recorded (Figure 14).

The Montenegrin part is largely dominated by the decrease in number of people; however trend of population increase is evident in the narrow coastal areas, in particularly towards northern Montenegrin coastline (Bar). In contrast, increase is evident in the Albanian part that was, in past two decades, involved in the dynamic changes and transformations. However, it should be noted that although the official figures for the Albanian part show increases in population, in reality the area may be suffering

[9]It should be taken into consideration that different official sources use different data. For example, official INSTAT data for 2011 show difference of 94 people. Shkodra Regional County data for 2012 show increase of 461 people (in Berdice and Dajc communes). For the purpose of this Plan, mainly data from Shkodra Regional County were used.

from outward migration. Namely, many residents may still be registered in their original administrative unit (mainly for voting purposes), but have in fact moved away from the area. Therefore, all the Albanian population data should be taken into considerations with precautions/reservations as it may not reflect the demographic reality of the area.

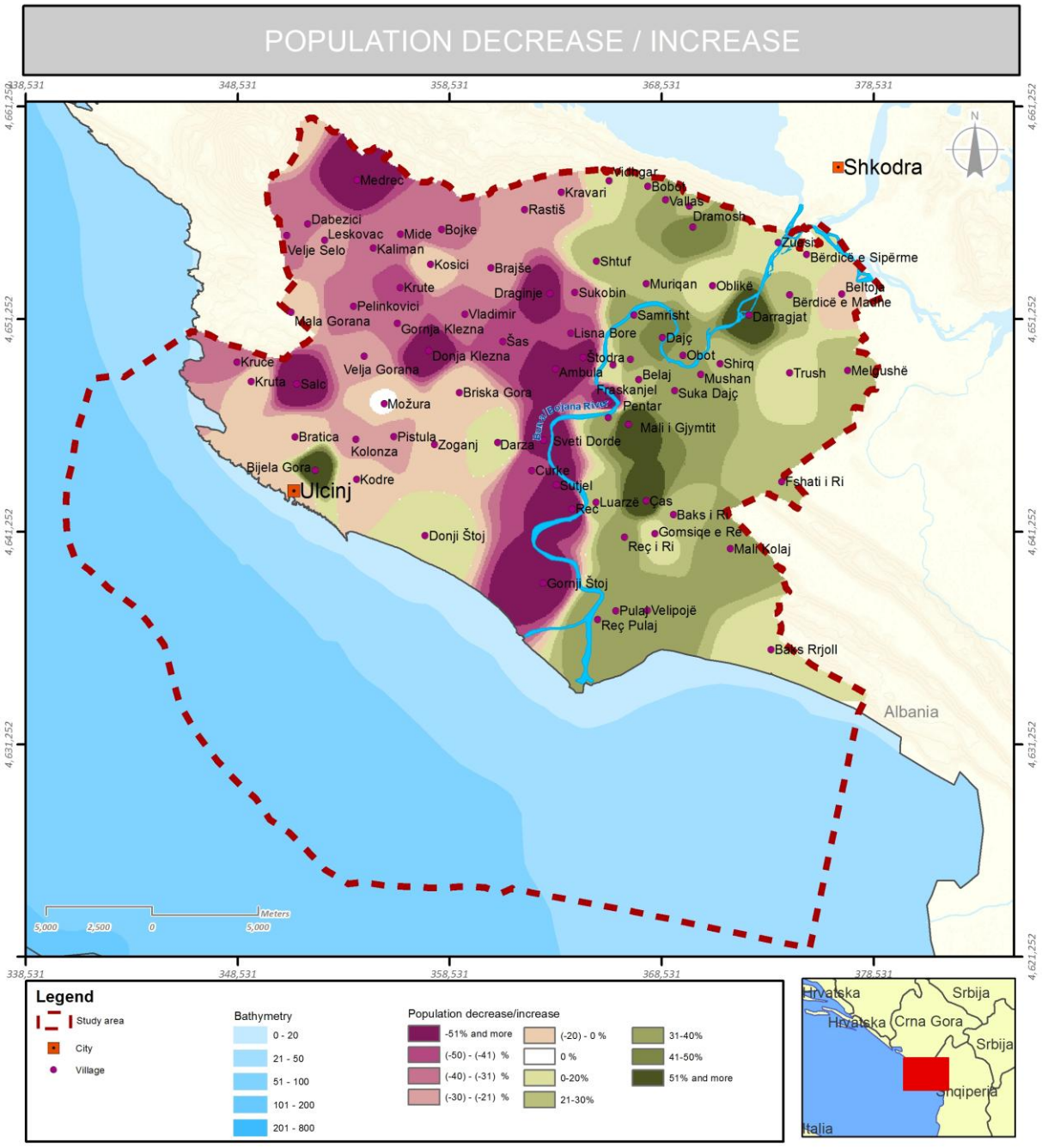


Figure 14: Increase/decrease of population in the Plan area

Rural-urban and overseas migration in Albania is widely evident over the last decade, in particular among the youth seeking educational and employment opportunities. There is a decreasing migration towards rural settlements due to a lack of basic infrastructure (water, electricity, road communications) and a lack of employment opportunities outside of fishing, agriculture and (to some extent) tourism, as

well as very little support for commercial endeavours and start-ups. Some migrations occur towards the coastline area (Figure 15). However, predominant migrations are still outside the country itself.

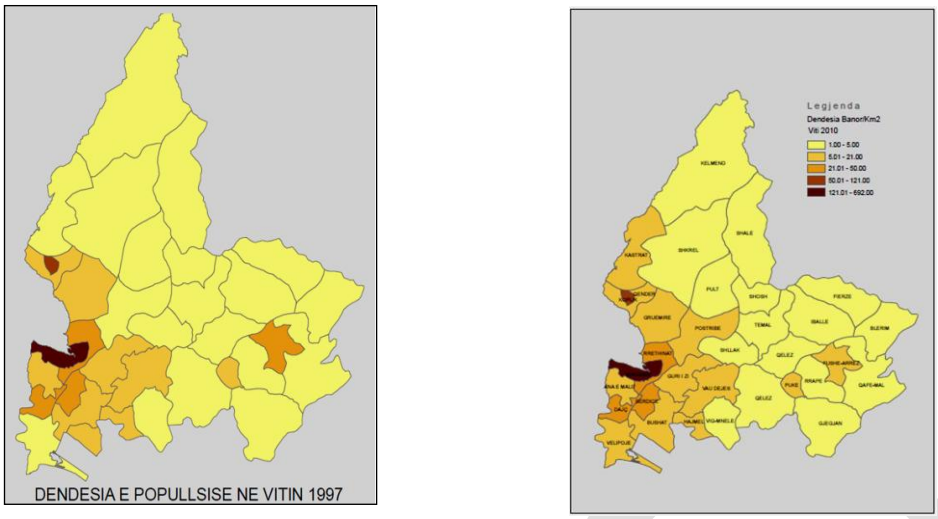


Figure 15: *Population Change in Shkodra County in 1997 and 2010 (SRC, 2010)*

Migrations in Montenegro are mainly characterised by internal migrations, especially from the northern to the southern (coastal) part of the country. Even though rural areas are attracting more and more population, people are still mainly drawn by the urban areas.

8.3 Age and Gender Structure

Gender structure is quite similar on both parts of the watershed, with almost the same ratio of female and men (female having a slight predominance; 51%). The only significant difference is in the commune of Ana e Malit, where the female population counts for almost 60%.

The age structure in Montenegrin part indicates a relatively negative trend. The predominant age groups are ones from 10-24 and 50-54 years, (Figure 16). In addition, aging population index (elder-child ratio[10]) shows a growing trend of predominance of elderly population (103; compared to 87.5 from 2003). Albanian data on age structure at the level of communes is not available. However, there is data for the prefecture level that could be used and from which some general conclusions could be drawn. Albanian age structure is more diverse, with significant predominance of the age group from 15-19 years, followed by 10-15 years that shows relatively young population structure, with aging population index of 79.

[10] Following an UN agreed cutoff of 60+ years to refer to the older population (although most developed countries use age of 65 years, associated with the age at which one can begin to receive pension benefits).

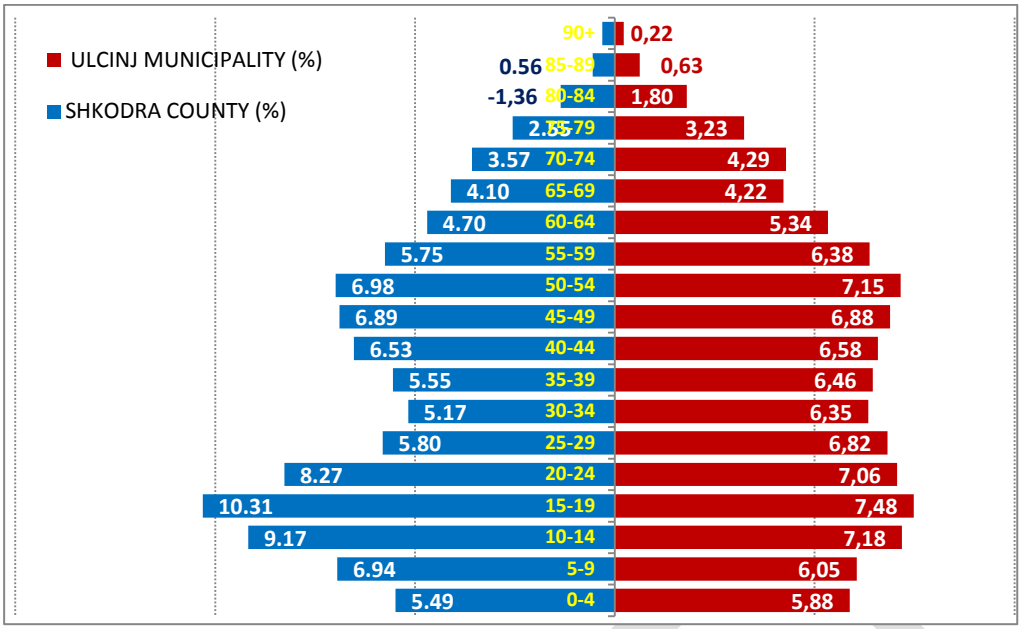


Figure 16: Age pyramid for Albanian and Montenegrin area

Statistical data on education in Montenegro show reduction trend in illiteracy. In the last 8 years (MONSTAT 2004; 2011), in Bar and Ulcinj there was an increase of high educated people from 6.65% to 10.22%, with the reduction in percentage of people with no education from 5.21% to 2.64%. For the Albanian part the official data (INSTAT, 2012; CeSPI, 2010) for the Shkodra county show increase in enrolment to the primary and secondary school, with 8% of people having higher education (or are currently attending the higher education schools). This trends show positive trend in increasing education opportunities for younger generations.

8.4 Economic Potential

The key economic and political related parameters dominating the development pattern of the Plan area include transition to market economy and EU accession process.

The **transition to a market economy** was initially marred by periods of political, social and economic instability characterized by extensive migration of people from rural to urban areas. During this period, production at many former state-controlled industrial facilities was either drastically reduced or suspended completely; particularly after the 1990's. As a result, anthropogenic impacts on the environment had, in general, decreased.

Both Albania and Montenegro are **Candidate Countries for the EU**. Montenegro is in the process of detailed negotiations whereas Albania is still not in this stage. Accession to the EU would open up economic opportunities and eligibility for Cohesion and other funding which could be used for development and infrastructure within the plan area.

Even though it can be concluded that both countries follow similar development paths, direct comparisons on all economic components are not feasible as there is no unique statistical data collection standard for both countries. The socio-economic (statistical) data collected according to the EU NUTS standard[11] for Montenegro is only available at national level (entire Montenegro as a single

[11] Nomenclature of Territorial Units for Statistics, the EU's standard statistical subdivision of countries

NUTS region; population 620,000). The statistical data in Albania are collected for three NUTS levels. The plan area within the county of Shkoder is part of the "North" region (population 926,000).

Albania

After the nineties Albania experienced a significant macroeconomic growth, averaging around 6%, between 2004-08, but declined to about 3% in 2009-11. Remittances, mainly from Albanians resident in Greece and Italy declined from 12-15% of GDP before the 2008 to 8% of GDP in 2010. Tourism is underdeveloped compared to Montenegro.

Shkodra County, and the Buna area in particular, falls under the category of less developed areas in Albania. Velipoje Commune, among the four communes of the Buna area, has the highest income with 467 Lekë/capita/day (less than 3.5 €). These figures indicate that GDP in the Buna area is actually even less than in the Shkodra County (€2,175, compared to €3,016 on the national level). Unemployment is the main reason for the high poverty coefficient in this zone (60% – 81%), which is significantly higher compared to the poverty coefficient at national level (58%) (Golder Associates, 2010)[12]. However, official data shows that a relatively low number of people are receiving economic aid (approximately 2% of households). Based on the data provided by the Shkodra Regional Council (2011), a total of 370 households (out of 8,649) receive financial assistance. Many families are receiving remittances from abroad[13]. Such remittances are mainly used for house construction.

The active population of working age of the area is 41%. A large share of the labour force of the Shkodra county is engaged in the agricultural sector. This represents approximately 47% of the active population, and approximately 65% of the total employment (CESPI, 2010). In addition, private business activities include retail trade, with a limited number of production businesses and small dairy companies. In four communes of the Buna area 95% of all employed people (9,092 people) are employed in private sector; agricultural enterprises make up to 97% of all (mainly small-scale or self-employed) private enterprises.

Still, same as for the other statistical data for Albania, these should not be considered as absolute. It should be noted that Albania is characterised by the economic informality where many business (in particular within small enterprise sector) are not formally licensed or recorded (Rustja, 2011). In particular this relates to manufacturing, trade, transport, construction, retailing and other small business services sectors where it can be assumed that informal production is about 40% larger than formal production (OECD, 2004).

Montenegro

After independence, from 2006 - 2008, Montenegro was one of the fastest growing economies in Europe, with GDP growth rates of up to 10.7% in 2007. However, Montenegro's economy is characterised by a lack of diversification, rendering it vulnerable to international crises and GDP growth fell back to 2.5% in 2011 (Monstat, 2011). Tourism revenues is increasingly important as it out performed other sectors of the economy in recent years. Per capita GDP in 2011 in Montenegro was €5,211 compared to the EU average of €25,200.

The coastal zone is the most economically developed area on the Montenegrin coast. However, the municipality of Ulcinj is less economically developed than some other municipalities (like Bar) and depends greatly on tourism and its seasonal duration (having the highest number of employees – 24%)

[12] At the same time, it is important to stress that according to LSMS (2008) the poverty headcount rate (the percentage of the population whose per capita incomes/expenditures are below the poverty line; i.e. 49.56 USD per month) was 14,6% for the rural area, compared to 12.4% for the urban areas.

[13] End-of-year balance of payments data for 2011 (on the country level) suggest that remittances from Albanian migrants accounted for about 8% of GDP (wiiw, 2012).

(Figure 17). Despite significant resources for agriculture development (362ha), there are only 4 agricultural enterprises in Ulcinj, registering only 0.8% of working places. The public sector employs a significant number of people, with 10.6% people employed in public administration and 10.1% in education. Finally, it should be emphasized that this municipality is also known for highest grey market, thus all registered revenues are low compared to real situation.

After a decrease in economic activity and drop in the number of employed in 2010 (mainly due to the economic crisis) a slight recovery was recorded, resulting with the unemployment rate of 10.7% (2011), the share still lower than the Montenegrin average (11.5%).

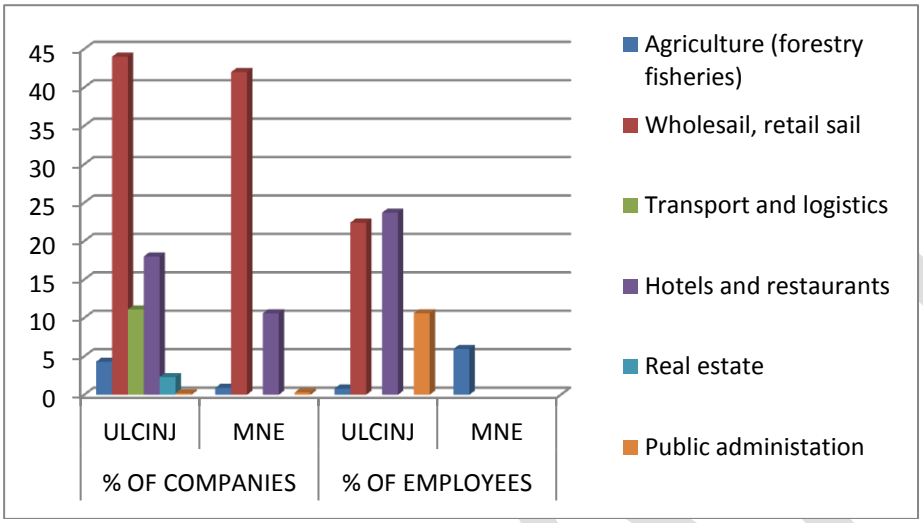


Figure 17: Structure of companies, employees and revenues in Montenegro (source, MONSTAT, 2011)

The trend of average net earnings recorded constant growth from 2006. However, compared to Montenegro (€484 per month) they are significantly lower, in with average net earnings of €375. According to the 2011 statistical information, coastal municipalities in Montenegro have 15.2% of people that are considered poor[14], with 3.9% of people in Ulcinj receiving social aid in 2011.

8.4.1 Agriculture and fishery

Albania

The agricultural sector accounts for almost half of employment but only about one-fifth of GDP in Albania. In the Plan area, agriculture is the biggest contributor of the economy. Even though there are no figures on agriculture's share of GDP in the area, looking at the number of agricultural enterprises and number of employed people in the agricultural sector, the area is highly dependent on agricultural production. Out of 8,269 agricultural producers (technically registered as enterprises but actually self-employed individuals) few can be considered as commercial producers, with fields larger than 2ha.

The agricultural land is very fertile with high productivity yields. Most of the commune's territory is agricultural land. Four communes of the Buna area have from 42% (Velipojë) - 90% (Dajç) of agricultural land within the entire commune area. Figures for the Shkodra County (REC, 2006) indicate that greatest share of cultivated area (in the field of Shkodra depression) relates to cultivation of animal fodder (51%),

[14] The absolute poverty line in Montenegro for 2011 was 175.25 Euro.

cereals (28%), vegetables (16%). The rest relates to fruits (which has a long-standing tradition for this area.), olives, vineyards etc. However, this production is not large-scale or commercial production; the villagers use the land mostly to meet their daily needs.

The rearing of cattle, sheep, goats, pigs, horses and donkeys is a traditional way of life for local communities and there are several breeds of domestic animal in the area, including some rare breeds such as Siska pig, Busha cattle, Zackel sheep, domestic Balkan donkey etc (Schneider-Jacoby et al., 2006).

Local authorities are currently launching a consulting service that provides useful advices for farmers on profitable and sustainable production. In Dajc commune, there has been an initiative to raise the awareness and the capacity of local farmers to produce and utilise compost as fertiliser.

Fishing is an important activity and a significant source of income for several villages along the Buna river bank (Obot, Samrisht, Reç, Pulaj), Velipoja coast and the Viluni Lagoon. Fishing supports many livelihoods in both a commercial capacity and for subsistence use.

Montenegro

Agriculture has always been highlighted as the second most important economic priority of Montenegro. However, the share of the agriculture sector (including fisheries and forestry) in GDP on the national level is only 7.7% (2010) which also indicated drop of 1.3% compared to 2009. In addition, only 6% of the population (mainly outside the coastal area) is involved in agriculture activities. Trends at the national level indicate that, compared to the 2003 census, the number of farms decreased by almost 20%.

Furthermore, when analysing resources available (mainly share of companies and employees per sector), in the municipality of Ulcinj, agriculture is far from being considered as an important economic sector (less than 5% of companies and below 1% of employees; Figure 16). At the same time, even though only 3.4% of all agricultural land is located in the coastal area of Montenegro, some of the most attractive areas for agriculture development (mainly based on the quality of the soil, but also sun exposition and the relief) are in the municipality of Ulcinj, characterised by alluvial and colluvial-alluvial soil, where some of the most important agricultural areas are, such as Ulcinjsko field, Štoj, Šasko (Figure 18) and Anamalsko field (Image 1). In total, 41% (9,153 ha) of all of the most attractive agricultural areas are located in Ulcinj municipality.

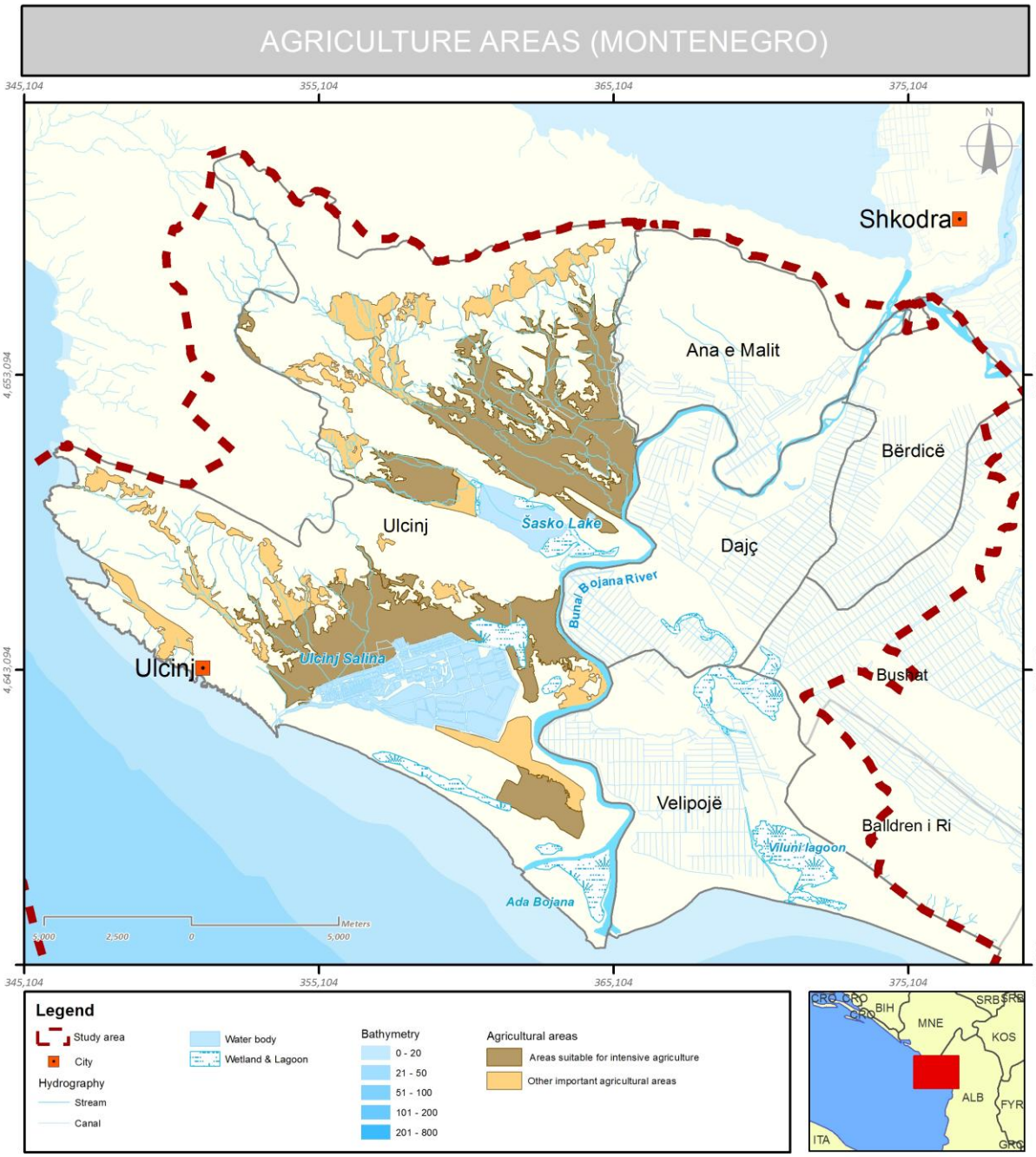


Figure 18: Important agricultural areas in Municipality of Ulcinj

The production in these areas relies on the cultivation of citrus fruits, olives, viticulture and the beekeeping. In Ulcinj there are significant complexes of olive trees. The area is favourable for irrigation and intensive agriculture.

Image 1: Šasko polje – highly attractive agriculture area (Google Earth, 2009)

Out of all economically active population in Ulcinj (6,207) less than 30% (1731) are involved in agriculture; out of those, 63% are having agriculture as the only or the primary activity (Monstat, 2011a).

In order to support the agriculture development, in particular in the rural areas, local municipalities are introducing different instruments for encouraging agriculture production, such as formation of Agrobudget measures which are implying set of encouraging measures for agriculture development. After 2006, Agrobudget is being financed through the State budget. Examining the amount and structure of Agrobudget starting from 2006, can be concluded that agriculture is gaining more and more funds yearly, which are mostly focused on the market-pricing policies, and then of rural development policy, as well as specialist services, and agriculture services, meaning three basic columns of agriculture policy. However, Agrobudget in Ulcinj municipality was only 0.02% of total Municipality budget in 2014. In addition, there are number of EU (and other international organisations and donors such as FAO etc) funding schemes supporting agricultural development, however, local population (as well as public institutions) do not have adequate capacity to fully use the available resources.

Fishing used to be an important traditional activity in the villages Reč, Sutjel and Sveti Đorđe. Coastal area at the mouth of the Bojana River and Port Milena, was identified as important spawning and feeding area of economically important fish species (eel and mullet). Particularly important are the traditional fishing activities with "kalimero" nets in Port Milena, former outfall of Zoganjsko lagoon, and the current drainage of Ulcinj Salina (Image 2). However, due to, among others, construction of dams on the Drini and pollution increase, river fishing has declined significantly. Illegal fishing with dynamite is also registered in Port Milena (Dömpke, 2008).

Fishing on Šasko Lake became important economic activity after the Second World War. Fishing was mainly sezonal, with limited equipment and implemented during spawning, feeding and wintering seasons of salmon, whitefish and carp. Local fishermen from nearby villages (Saša, Ambule, Fraskanjela, Svetog Đorđa, Briske gore i Donja Klezne) were intensively fishing on the lake, that was important source of additional income. Even though there were no professional fishermen in the area, fishing was very prevalent, with no control and compliance with the regulation, which resulted in excessive overfishing of economically important fish species (eel , sea bass , carp , trout , salmon). Due to lack of investments, there is no significant fish production nowadays (Dömpke, 2008).

Marine fishery is mainly small scale, coastal fishery, along the beach areas (Ada Bojana, Mala Plaža, Velika Plaža) mainly supporting local restaurants. In addition to fish species, fishing of commercially important, high-quality species of cephalopods such as *Lorge vulgaris, Sepia officinalis, Sepiola rondeleti* and *Eledone mostchata* are also relevant in the area (Dömpke, 2008).

Large-scale and more profitable industrial fishing on the high seas is largely in the hands of Italian companies (Dömpke, 2008).

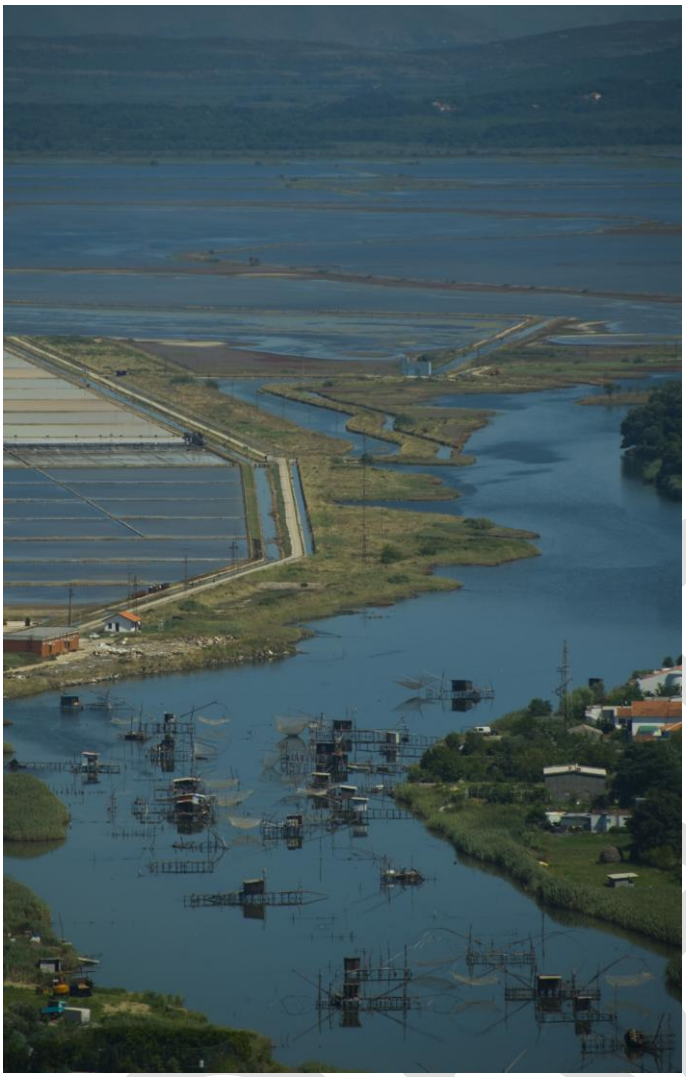


Image 2: Fishing practice (with kalimera nets) near Ulcinj saltwork

8.4.2 Tourism

Albania

Direct contribution of tourism in Albanian GDP was 4.8% in 2013; indirect contribution is significantly higher reaching 16.7% of national GDP. Also, data show that in 2013 tourism employed 4.3% of people (15.2% of total employment indirectly supported by the industry) (WTTC, 2014). In 2011, nearly 3,000,000 foreign visitors were recorded, mainly from Kosovo (46%), Macedonia (12%), Montenegro and Greece (6%) (WTTC, 2012*).*

The Buna River protected area is rich in natural (such as the sandy coastal area, the forests, lagoons, agricultural landscapes and the mountains) and cultural attractions (such as the traces of ancient habitats in Luarzi Mountain and on the Black Top, archaeological findings of the XV century and alike) making tourism one of the priority areas for the economic development.

However, tourism is an economic activity only in Velipoja commune, which, according to the Shkodra Regional Office (2011), has around 300 ha of tourist areas (compared to 1,180 ha in the entire Shkodra County). There are no exact data on accommodation capacities, but they are estimated to be around 2,500 units (hotels and private accommodation). Similarly, there are no official records on number of visitors, but they are estimated to around 20,000 staying visitors during a few weeks in July and August; in addition, there are much more day visitors in the entire area (up to 50.000 visitors). Tourists coming in the area are mainly from the country itself or from Kosovo and Macedonia; other foreign tourists are visiting the area mainly for business reasons.

Having in mind that the total Velipoja beach area is approx. 190 ha, estimated physical carrying capacity of the beach ranges from 95,000 – 380,000 people. Therefore, it can be concluded that the economical and recreational potential of the beach is underutilised.

Montenegro

The share of tourism in national GDP is constantly increasing since 2001. Direct contribution of travel and tourism industry in the overall national GDP for 2013 was 9.8% (20% of GDP total, indirect contribution). In addition, it directly supported 8.8% of total employment with 208 mn EUR of investments (WTTC, 2014a), indicating significant importance of tourism for Montenegrin economy.

The share of tourism in the local economy of the Plan area follows a similar pattern. The municipality of Ulcinj has recorded 120,548 tourists and 878,305 overnights in 2011 (rise of more than double compared to 2001), with average stay of 7.3 days. Still, predominant accommodation types are private apartments, rooms, secondary homes and alike (i.e. *complementary tourism resources*). Hotel capacities are underutilised (%) and of lower quality (over 60% of all hotel capacities are in one and two star hotels).

The key resource for tourism development in Ulcinj are the beaches, representing 90% of the total tourism product (offer). In addition, sandy beaches in Ulcinj are also the most important natural and tourism resource in the coastal area of Montenegro. In order to preserve and adequately utilise beach resources in Montenegro Public Enterprise (PE) Morsko Dobro has the mandate to manage the beach areas.

Having in mind the absolute dominance of beaches as the tourism resource in Montenegro, the concept of tourism carrying capacity in the Plan area (and in total coastal area of Montenegro) should largely be based on the physical limits (including ecological)[15] of the beach resources. Infrastructural limits[16] should also be taken into consideration, although these are not fixed limitations and, with certain infrastructural investments, these could easily be changed (improved). Rapid assessment of tourism carrying capacity indicates that it is not yet exceeded in wider Ulcinj area (Table 3). However, planned tourism development in the area indicates even greater growth of tourism capacities that would pose significant pressures to the over-utilised beach resources, leading to degradation of tourism offer in the area, unless serious actions toward tourism diversification take place.

[15] Phyisical and ecological elements include all components related to physical space/environment, i.e. the spatial area, coastline etc. It also includes all the elements related to biodvirsity preservation.

[16] Infrastructural elements include all the components related to infrastructire, i.e. trafic, water suply, sewage, waste etc.

Table 3: Beach carrying capacity in Ulcinj

Municipality	Tourism 'unit'	Beach type	surface (m^2)	range	capacity	
ULCINJ	Ulcinj	Hotel and resort	950	10. - 30.	32	95
		Public beach, limited natural value	27.404	5. - 10.	2.740	5.481
		Total	**28.354**		**2.772**	**5.576**
	Štoj (Velika plaža)	Hotel and resort	58.850	10. - 30.	1.962	5.885
		Public beach, with natural value	405.500	10.-20.	20.275	40.550
		Total	**464.350**		**22.237**	**46.435**

8.4.3 Green business

Green business could be defined as a business model based on sustainable production, consumption and saving practices, is a response of different challenges that have emerged in the past decades. There are three main segments of the green entrepreneurship: environmental protection and resource conservation; social well–being and equity; and economic prosperity and continuity.

Since 1991, Montenegro has been self-declared as the ecological state. However, support of the green business concepts that would be in line with such ecological orientation in almost inexistent. Some individual, small scale activities, in line with green entrepreneurship concepts, could be found in Ulcinj.

Based on available information, there are no green economy initiatives in the Albanian area. Having in mind the natural values of the Buna area and quality of the agricultural land, the area has good preconditions for green development. Still, lack of some basic sanitary conditions, leading to environmental degradation, should be adequately treated.

Stronger support and actions for promotion and development of green business, entrepreneurship in particular, should be in the focus of national and local administrations' policies, in particular those related to development of rural areas.

9. NATURAL ENVIRONMENT AND RESOURCES

This section provides information and describes - at the extent possible given the availability of data - the components of the natural environment in the plan area and the natural resources therein. This serves as the background against which the state of the resources will be presented in the following chapter.

9.1 Biodiversity and protected areas

KEY HIGHLIGHTS

- **There is lack of continuous and systematic monitoring of biodiversity, especially the marine. The data and information basis is weak. Furthermore, there is little research done in both countries regarding ecosystem services, hence related knowledge is inadequate.**
- **The Buna/Bojana and Lake Shkoder/Skadar wetlands support about 900 - 1000 plant species and about 25,000 wintering waterbirds.**
- **Over 76% of the bird species in the Buna/Bojana delta are migratory; the area is an important component of the Adriatic bird migration flyways.**
- **Nearly half of the waterfowl species in Buna/Bojana delta are included in the lists of endangered species at local, regional and international level**.
- **The mouth of the river Buna/Bojana represents a rare example of a natural delta on the East Adriatic coast. The connection of the rivers Bojana and Drin has an outstanding importance as migration route for fish, linking Lake Shkoder/Skadar with the Adriatic Sea.**
- **The wider region of Buna/Bojana delta with Shkoder/Skadar Lake is also recognized as one of the Balkan centres of Reptile Biodiversity.**
- **The whole Albanian part of the Buna/Bojana area is under protection status; it is designated as Important Bird Area and as a Ramsar site. On the Montenegrin side there are number of sites protected under the national law while some are designated as Important Bird Areas and EMERALD sites.**
- **Lake Shkoder/Skadar, although outside of the Plan area, is important for the biodiversity of Buna/ Bojana Area. It has been designated as protected area in both countries.**

9.1.1 Bio-geographic characteristics

The ecological system of the Plan area belongs to the Mediterranean bio-geographical region (Figure 19) and the Dinaric Western Balkan ecoregion (Figure 20). It is dominated by mixed evergreen and deciduous vegetation of maquis and garrigue.

The aquatic components of the area consist of freshwater (rivers and lakes), brackish water, marine waters and coastal wetlands.

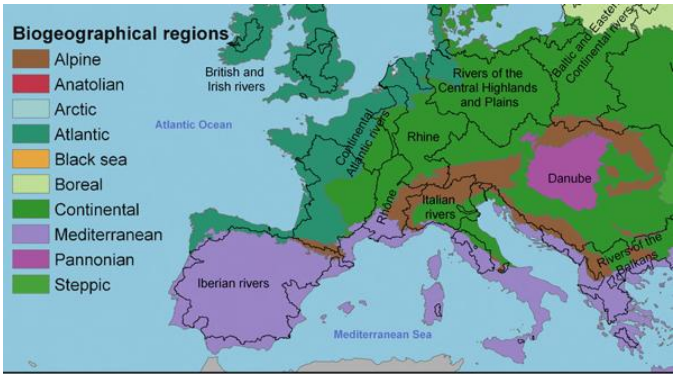


Figure 19: Bio-geographical regions in Europe (adapted from Tockner et al., 2009)

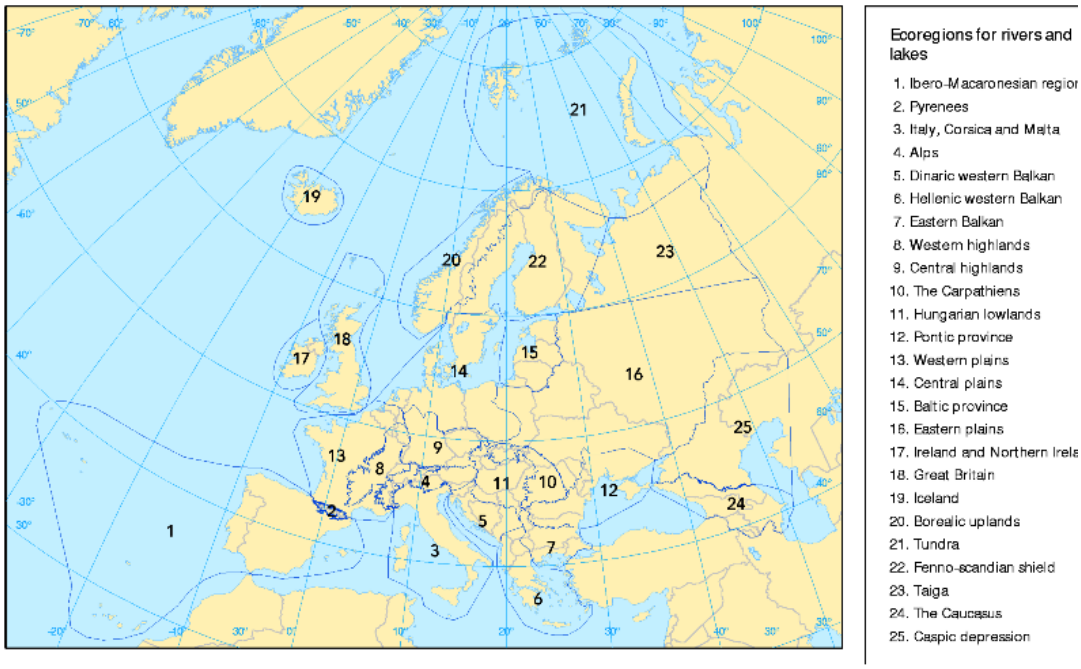


Figure 20: European ecoregions according to Illes

9.1.2 Habitats

Various terrestrial, freshwater, marine and brackish habitat types exist in the area. Wetlands and water related habitats are dominant.

Data and information from a number of sources have beenused for the preparation of the land cover/habitat map (Figure 21) for the purposes of the Plan (Dömpke, S et al, 2008; Schwartz, U., 2010).

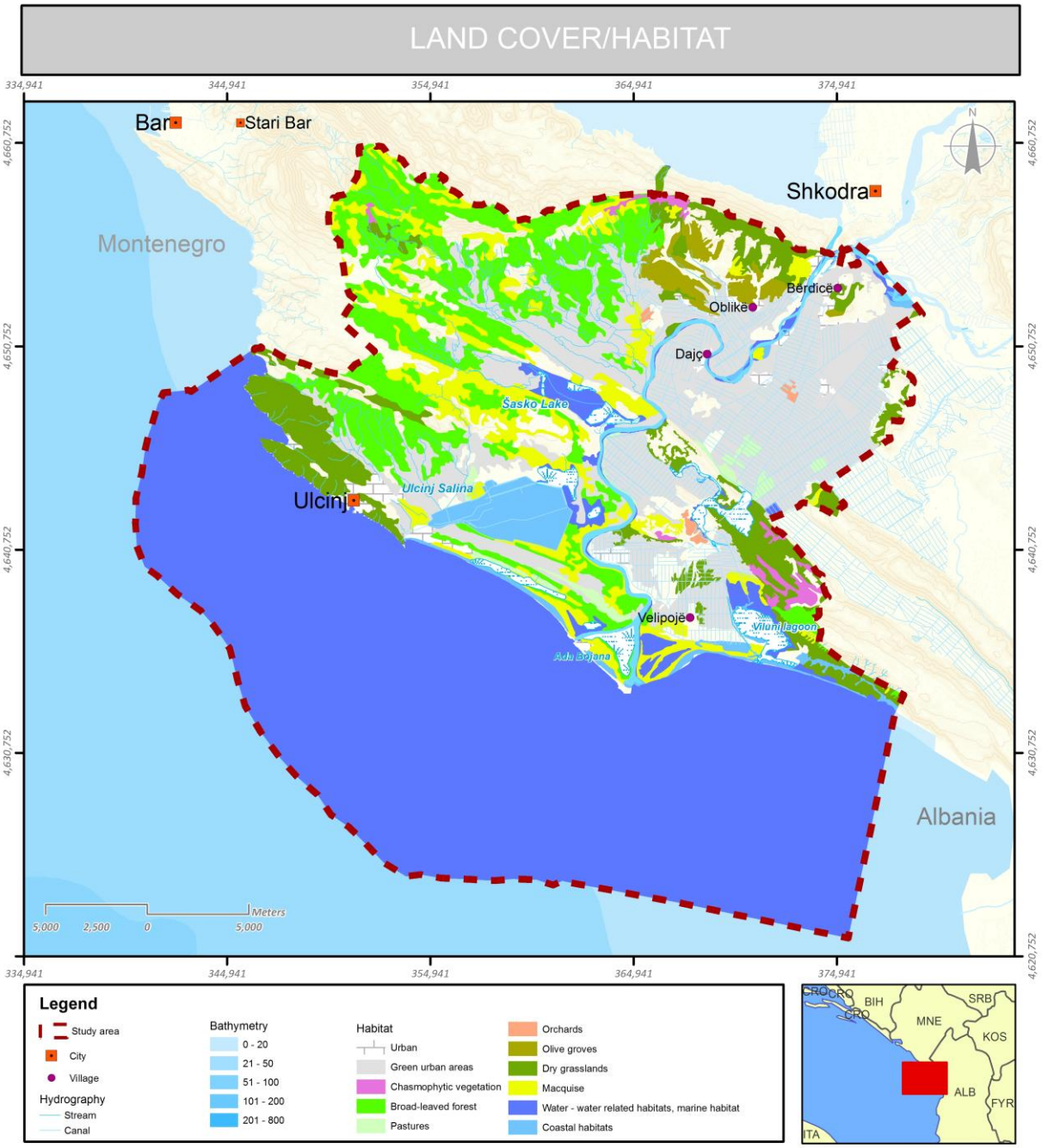


Figure 21: Land cover / Habitat Map

Terrestrial habitats

The majority of the Plan area is covered by agricultural land, dominated by arable crops (permanent and annual), olive trees, etc. The remaining undeveloped territory is covered by forest, or forest remains and semi-natural areas including: maquis and garrigue, shrubs and pastures, beaches, sand dunes, dray grasslands, etc.

The slopes of Rumija mountain are important habitat for Mediterranean vegetation. The Renci mountain plays the role of a natural bridge for terrestrial mammals crossing Buna/Bojana river, including brown

bear (*Ursus arctos*), jackal (*Canis aureus*), wolf (*Canis lupus*), fox (*Vulpes vulpes*) and wild boar (*Sus scroffa*).

In the coastal area (a narrow but lengthy area stretching from the south in Velipoja beach over Ada Bojana, Velika Plaža, Đerane, Mavrijan, Valdanos and Kručeto Stari Ulcinj island in northwest), the main vegetation types present are as follows:

- **Sand-dwelling**, *psamo-halophyte,* vegetation distributed along the coastline from Baks-Rrjolli area to Velika Plaža; a representative area with the most developed and preserved psamo-halophyte vegetation is in the hinterland of Velika Plaža;
- **Association of *Tamarix africana* and *Juncus acutus*** are mostly present in the coastal area, particularly at the end part of the river, along the Viluni channel, but also at some localities along the Buna/Bojana river and Šasko lake;
- **Mixed forests** are present in both countries including a dense vegetation belt of wet/hydric forests mainly composed of different Ash tree species (*Fraxinus excelsior, Fraxinus angustifolius*, *Fraxinus oxycarpa*, etc), coniferous (*Pinus halepensis*, *Pinus nigra*), white poplar (*Populus alba*), field elm (*Ulmus minor*), common alder (*Alnus glutinosa*), but also the endemic subspecies of oak *Quercus robur ssp scutariensis* - Skadar Oak. Along both sides of the River there are large complexes of floodplain forests consisting mainly of softwood trees with a series of different transitions down to hardwood floodplain forest. The association of tree spurge (*Euphorbia dendriodes*) is typically present in small rocky areas, at very warm and dry habitats of southern and south-western inclination, from Cape Đerane to end part of Kruče in Montenegro.

Key freshwater, wetland and brackish ecosystems/habitats

Plant communities of *Phragmites* and *Typha* dominate water bodies and wetlands. The following are the most important habitats under this category:

- **Domni marsh** (Albania) - 60% of the surface is covered by the associations of *Phragmites australis* and *Typha angustifolia*[17]. Endangered and rare species for Albania are present here[18]*;* the association of *Trapa natans* exist in the channels near this marsh.
- **Marsh of Murtemza** (Albania) - a small remnant of the wetland complex of Domni-Casi-Pentari-Murtemza fed by the Buna River. This complex was well-known for the fish, ducks and aquatic vegetation present and especially for the White Lotus or Nuphar (*Nymphea alba*) and *Phragmites australis*.
- **Viluni lagoon** (Albania) - a typical coastal lagoon communicating with a major channel with the sea, covering an area of 390 ha. There is an abundance of fish (eel, mullet, sea bass, etc.). The lagoon is an important nursery area for fish species migrating between the wetlands and the open sea. Wet/ hydric shrub vegetation can be found in the hinterland. The surroundings of the Lake (towards Fraskanjel, Donja Klezna and Buna/Bojana River) provide good conditions for flooding meadows, hydrophitic forests and shrub vegetation.
- **Ulcinj Salina/Saltworks** (Montenegro) – Variety of wet habitats are present in this area and their distribution depends on the level of soil salinity. The halophyte plant community is characteristic. The wet meadows, enriched by reeds (*Phragmites communis*) could be observed along the embankments of the pools of both, salty and brackish waters. Away from the water pools, the decrease of salinity is reflected in the variety and structure of plant communities. In the zones with

[17] Main species present are the following: *Sparganium erectum*, *Schoenoplectus lacustris*, *Myriophyllum spicatum*, *Ceratophyllum demersum*, *Utricularia vulgaris*, etc.
[18] *Sagittaria sagittifolia*, *Hydrocharis morsus-ranae*, *Lemna trisulcata*, *Spirodella polyrhiza*, *Nymphaea alba*

muddy substrate the following are present: *Juncus acutus, J. maritimus* and *Tamarix africana*. Ruderal vegetation is present along the roads, pathways and on the embankments.

Image 3: Ulcinj Salina (© Branko Strugar)

Marine ecosystems/habitats

The marine zone is poorly studied, particularly in the Albanian part. Little information exists regarding the marine habitats and species along the coast of the Buna/Bojana delta. In Montenegro there is some more information available, however, there is a lack of continuous and systematic monitoring of marine biodiversity[19].

Coastal waters at Velika plaža and Buna/Bojana river mouth are under strong mechanical impact and experience very frequent changes in terms of physico-chemical parameters. The shallow gradient of the seafloor results in the first isolines of 20 m and 50 m being far from the coastline. The benthos (sea floor9 at the area near the Buna/Bojana river consists of *terrigenous* sands, mud, and silts. In the marine zone of Ulcinj municipality there are generally muddy habitats.

Marine zone around Stari Ulcinj - *Posidonia oceanica* meadows are present, with lower than normal density; there are indications that these are under stress.

[19] Related information provided under this plan comes from various, mostly scientific, projects. More data regarding marine biodiversity can be obtained from the thematic reports produced in the framework of DFS project "Startup of „Katič" MPA in Montenegro and Assessment of marine and coastal ecosystems along the cost" (2011 – 2013).

Image 4: Coastal – marine waters in front of Bojana / Buna River Mouth (© Branko Strugar)

9.1.3 Species

Flora and fauna inventories are incomplete for this area[20] and generally there is lack of information and data about species' diversity, population dynamics, ecology and the degree of genetic variations. This causes difficulties in designing adequate protection measures.

Characteristic vegetation types and plant species that can be found in the coastal area are presented in the tables below. Many of these species are rare, endangered and protected; among them are the Daffodil (*Pancratium maritimum*), found in sand dunes, and the Tree Spurge (*Euphorbia dendroides)* found on coastal rocky slopes.

Table 4: Coastal habitats and respective vegetation types

Coastal Habitat	***Characteristic vegetation types***
(i) Sand beaches (Velipoja, Viluni, Velika plaža, Valdanos etc. - movable sand and high saltness)	*Psamo – Halophyte vegetation*
(ii) coastal rocky habitats (open and steep calcareous rocks)	*Crithmo-Limonietea*

In the lowland area (Velipoja, Štoj) there are wet/hydric forests with very sporadically present endemic sub-specie of Skadar Oak (*Quercus robur ssp scutariensis)*.

[20] The first integrated lists of species for the area was produced by EURONATUR and published in its Rapid Assessment (Schneider-Jacoby et al., 2006).

Table 5: Forest habitats and respective species

Forest Habitat	***Characteristic Species***
Wet / hydric forests	White Poplar (*Populus alba*) Ash (*Fraxinus angustifolia*), Alder (*Alnus glutinosa*) White willow (*Salix alba*), Tamarisk (*Tamarix africana*), Chasteberry (*Vitex agnus-castus*), but also with Silk Vine (*Periploca graeca*), Water Mint (*Mentha aquatica*), Purple Loosestrife (*Lythrum salicaria*) etc.

In the terrestrial part of the area the species are adapted to the local conditions. In general, Rumija massif hosts over 1,500 species/subspecies of plants. Among the registered species there are 62 nationally protected[21] as well as 14 rare, 2 vulnerable and 2 endangered. The evergreen coniferous forests with Holm Oak (*Quercus ilex*) that are often degraded to macquis[22] are characteristic for the area. The presence of Kermes Oak (*Quercus coccifera* L.) at Mavrijan hill close to Ulcinj is a regional specificity.

Water and water-related habitats provide shelter for both, commercial and ecologically important species. Marine species[23] are less studied than freshwater species. Mollusks, particularly bivalves, dominate the estuary due to the abundance of phytoplankton.

Fish

The presence of important fish species in the sea and freshwaters contribute in the ecological and economic importance of the area.

The group of commercially important freshwater fish in the hydrological complex of Buna/Bojana river, Skadar/Shkodra Lake and Drin river, include the: Common Carp (*Cyprinus carpio*), Prussian Carp *(Carassius auratus gibelio)*, Bleak *(Alburnus alburnus alborella),* Rudd *(Scardinus erythrophthalmus scardafa),* Chub *(Squalius platyceps*), Perch (*Perca fluviatilis*) etc. Endemic fish species, such as the Roach *(Pachychilon pictum*), are also present in these waters. There are about 50 marine species at the estuary/river mouth, coastal waters and deep sea.

The Buna/Bojana river links marine and freshwater ecosystems being a fish migration corridor; there are 13 species moving from the Adriatic Sea to Skadar/ Shkoder Lake.

[21] Decree on the protection of certain flora and fauna species (Official Gazette, MNE, No. 76/06)

[22] Due to human activities, original Holm Oak association is degraded in dense and impassable macquis that belongs to a particular Adriatic form – association *Orno - Quercetum ilicis* Horvatić (1956 & 1958). Further degradation of maquis is leading to the vegetation type garigue. Garigues are short and sparse evergreen scrub-shrubs, mainly composed by heliophytic flora, usually bushes and semi-bushes. Garigue vegetation determined as *Erico - Cistetum cretici* Horvatić (1958) is also present at end slopes of Rumija mountain. Final degrading stage of Holm Oak forests are associations of dry swards and rocky pastures in the association Cymbopogo - Brachypodion ramosi. These plant associations are often result of anthropogenic impacts.

[23] Recent investigations provided more information on the biodiversity in marine coastal waters in Montenegro (DFS survey in 2011 – 2012), for example following Invertebrates group: **Porifera:** *Demospongia n.d., Ircinia sp., Hemymicale columella,* **Cnidaria:** *Cladocora caespitosa, Virgularia mirabilis,* **Polichaeta:** *Protula tubularia,* **Mollusca:** *Aglaja tricolorata, Tethys fimbria, Chelidonura Africana, Bolinus brandaris, Natica sp. (eggs), Sepia officinalis, Ensis sp., Hypselodoris orsini, Phyllidia flava, Discodoris atromaculata, Bolma rugosa, Octopus vulgaris,* **Briozoa:** *Smittina cervicornis,* **Crustacea:** *Macropodia sp.,* **Echinodermata:** *Paracentrotus lividus, Echinaster sepositus, Astropecten sp., Arbacia lixula, Holoturia tubulosa, Ophioderma longicaudum, Coscinasterias tenuispina,* **Ascidiacea:** *Diplosoma spongiforme*

Birds

The shallowness of the lagoons and the mudflats - particularly in the (coastal) wetlands in the areas Velipoja, Viluni lagoon, Ada island, Velika plaža, Ulcinj Salina with neighbouring swamps[24] and Šasko lake- are optimal habitats for **Birds**.

Over 76% of the bird species in the Buna/Bojana delta are migratory; the area is an important part of European bird migration flyways, more specifically, the Adriatic flyway. There are also migratory movements between this area and Shkoder/Skadar Lake. About 29% of birds in the Buna/Bojana delta are nesting species.

Numerous passerines land in this area[25]. This area is visited by the Dalmatian Pelicans (*Pelecanus crispus*). The average number of birds counted in winter seasons along the river banks in the last years is 8,000. Bird count in Velipoja indicates the presence of more than 5,000 individuals of some 170 bird species (Beqiraj S. and Dhora Dh. 2007).

Nearly half of the waterfowl species in Buna/Bojana delta are included in the lists of endangered species at local, regional and international level. For example, Ferruginous Duck *(Aythya nyroca)* and Pigmy Cormorant *(Phalacrocorax pygmeus*) are globally threatened species.

Amphibians and Reptiles

Wetland habitats in the Buna/Bojana delta also host amphibians and reptiles[26].

The wider region of Buna/Bojana delta with Shkoder/Skadar Lake is also recognized as one of the Balkan centres of Reptile biodiversity (Đukić, 1995); particularly for reptiles that depend on water. Sea turtles (*Caretta caretta*) sporadically lay their eggs at Ada Bojana.

Mammals

A number of terrestrial mammals are present; among the most characteristic are brown hare (*Lepus capensis),* fox *(Vulpes vulpes) and* golden jackal *(Canis aureus),* concentrated in the forests and marshes of the riverine floodplains; European badger *(Meles meles),* least weasel *(Mustela nivalis),* European polecat *(Mustela putorius),* wild boar *(Sus scrofa)*, the insectivorous bicolored shrew (*Crocidura leucodon), l*esser white-toothed shrew *(Crocidura suaveolens),* Etruscan shrew *(Suncus etruscus*), and southern white-breasted hedgehog *(Erinaceus concolor*) (Bego F. 2003, Dhora et al., 2001, Schneider-Jacoby et al., 2006). The otter (*Lutra lutra*) is a rare aquatic mammal of the Buna River and this globally threatened species has been recorded several times in the Buna over the last few decades.

The presence of the dolphins *Delphinus delphis* and *Tursiops truncatus* is recorded at the mouth as well as at the middle stretches of Bojana/Buna River (Schneider-Jacoby et al., 2006).

9.1.4 Ecosystem Services

Both countries lack significant research on ecosystem services, hence related knowledge is inadequate. The costs of ecosystem services are not internalized either by private or the public sector. This is particularly true in the coastal zone where there is urbanization and tourism development. The ecosystem in Buna/Bojana area is interconnected with this of the Lake Shkoder/Skadar and so are their values (Box 3).

[24] "Kneta" is local name for swamps

[25] The following are among the most characteristic: Eurasian Skylark *(Alauda arvensis),* Meadow Pipit *(Anthus pratensis),* White Wagtail *(Motacilla alba),* Goldcrest *(Regulus regulus)* and Blue Tit *(Parus caeruleus*)

[26] Such as the large Whipsnake (*Coluber* gemonensis*),* European Pond Turtle *(Emys orbicularis*), Tree Frog (*Hyla arborea)* etc.

Box 3: Buna/Bojana and Lake Shkoder/Skadar wetlands

General description

The system of lake Shkodra/Skadar and the outflowing river Bojana/Buna with its delta area on the Adriatic Sea contains important ecosystems with fresh and brackish water as well as wide variety of natural and human-made coastal habitats, including one of the largest transboundary lake in South-Eastern Europe, floodplain forests, freshwater marshes, extensive reed beds, sand dunes, karst formations, calcareous rocks, wet pastures, ponds and irrigated lands. These habitats support about 900-1,000 plant species and about 25,000 wintering waterbirds.

Main wetland ecosystem services

The wetland is important for water retention and flood control in a wide area around Lake Shkoder/Skadar and along the Buna and lower Drin river floodplains. The presence of large water bodies and vast floodplain forest significantly humidifies the regional climate, thus mitigating Mediterranean summer droughts. Sediments carried by Drin and Buna/Bojana rivers support the stabilization of the Adriatic shoreline and prevent the salinization of the coastal aquifers and agricultural lands, provided that human interventions allow the continued functioning of these natural dynamics.

Supporting socio-economic services

The wetland is used for fishing and to some extent for hunting and provides essential support for agriculture and livestock rearing on temporarily flooded grasslands. Peat, sand and gravel are exploited along the lake and river shores. Leisure activities for urban dwellers from Podgorica (the capital of Montenegro), as well as beach, natural, village and cultural tourism are developing rapidly in the area.

Cultural values

The area is well-known for its old civilizations and rich history. The distribution of historical settlements followed the hydrological network. Shkodra town with a history of more than 2,000 years has been an important commercial and cultural centre in South-Eastern Europe. Customs, traditions, old crafts and folklore together with ancient castles, fortresses, medieval monasteries and traditional villages represent a rich cultural heritage of this area.

The role of groundwater in sustaining ecosystems is often overlooked, since it is an invisible resource. Groundwater in the Plan area supports ecosystem health by providing water and nutrients to coastal wetlands and also through submarine groundwater discharges which contribute to the creation of brackish water ecosystems in the coastal zone. These ecosystems represent a high value eco-landscape, supporting biodiversity and also providing a potential buffering capacity for the nutrients in the water of the Bojana River. While no detailed study has been undertaken to determine the role of groundwater in sustaining coastal ecosystems (terrestrial and marine) in the Plan area, at least some of the coastal lagoons in the Plan area are known to have a strong link with groundwater, as in the case of the Viluni lagoon in Albania (Beshku, 2012).

9.1.5 Protected areas

The entire **Albanian part** of the Buna/Bojana area is under protected status (Figure 22).

In November 2005, the Council of Ministers approved three Decisions related to the enlargement of the protected areas system, among which were the designation of the Protected Landscape “Buna River -

Velipojë". The protected area includes three main zones: the core zone, the buffer zone and the transition area.

In addition, the areas of "Shkodra Lake" and "Buna River" were included in the list of Ramsar sites on 2nd of February 2006, as internationally important areas, especially for the water birds. The Lake Shkodra and River Buna Ramsar Site comprises of the Albanian part of the Shkoder/Skadar Lake including a narrow strip of its shoreline, the Buna, its delta and coastal areas as well as adjacent part of the Adriatic coast.

The **Montenegrin part** of Skadar Lake - north of Buna/Bojana watershed, adjoining the planning area - and its surrounding area were declared as the National Park "Skadarsko Jezero" in 1983 (Lake Skadar - Skadarsko Jezero); in 1995 the territory of the National Park was proclaimed a Ramsar site (20,000 ha).

Furthermore there is a number of protected areas designated under the Law on Nature Protection:

- The Velika Plaža, Mala plaža, Valdanos, Stari Ulcinj island with neighbouring beach, have been under protection since 1968. The revision of protection status, category and regime for these areas (as stipulated in the Law on Nature Protection (2008)) is pending.
- The Ada Bojana and Šasko Lake ared esignated as an EMERALD site (Resolution 4, Bern Convention).
- The Ulcinj Salina (Solana Ulcinj) - an area of salt-pans, largely without vegetation and bordered by agricultural land - became the first Important Bird Area (IBA) in Montenegro.
- The Šasko Lake is a transboundary IBA (with Velipoja in Albania).

Table 6: Protected areas

Site Name	National Category	International designation	Area (ha)	Country
Lake Shkoder/Skadar and River Buna		Ramsar	49,562	Albania
Lake Shkoder/Skadar	National Park			Albania
Buna River -Velipojë Buna River and the surrounding wetland territories including: delta, Franz Joseph island, Velipojë, Viluni lagoon, Rrjolli Baks beach, the Domni swamp and surrounding territories	Protected Landscape (IUCN Category V), with three zones: the core zone, the buffer zone and the transition area		23,027	Albania
Lake Skadar/Shkoder[27]	Managed Nature Reserve (IUCN Category IV)		26,535	Albania
		Important Bird Area	14,000	Albania
Velipoja[28]		Important Bird Area	700	Albania
Lake Skadar/Shkoder	National Park	Ramsar	20,000	Montenegro
Velika Plaza[29]	Natural Landscape Reserve	EMERALD site (Ada Bojana along with the eastern side of	600	Montenegro

[28] The site includes two coastal areas: the Viluni (or Velipoja lagoon) and surrounding Velipoja forest and the inland Dumi wetland (Keneta e Dumit). Viluni lagoon is a large, shallow coastal lagoon at the feet of a rocky and forested mountain area (Bregulbunes mountains). The surrounding marshes and the Dumi wetland are drained by a channel. Sand-dunes, beaches and small brackish pools are found along the coastline, while along the Buna River and its delta (to the north and within the IBA) there is riparian deciduous woodland. The main land-uses are hunting, fishing, agriculture and tourism.

[29] Also characterized as an area of exceptional natural values

		Velika plaža and Šasko Lake)		
Ulcinj Salina		Important Bird Area EMERALD	1,350	Montenegro
Šasko Lake		Important Bird Area	350	Montenegro
		EMERALD site (Ada Bojana along with the Eastern side of Velika plaža and Šasko Lake)		
Mala plaža	Natural Landscape Reserve		1.5	Montenegro
Valdanos	Natural Landscape Reserve		3	Montenegro
Stari Ulcinj island with neighbouring beach (Vučja uvala)	Natural Landscape Reserve		2,5	Montenegro

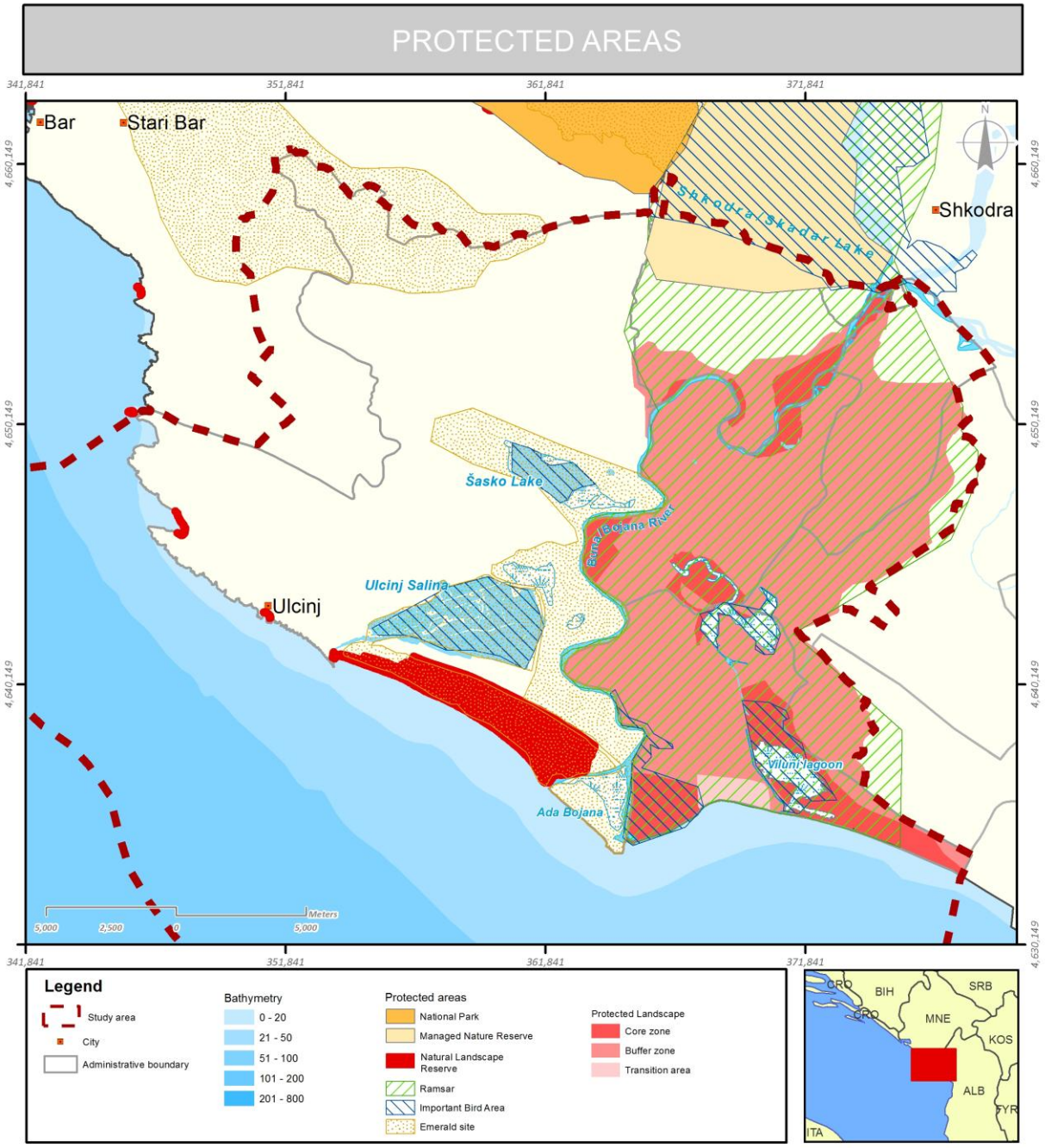


Figure 22: Protected areas

9.2 Hydrology

KEY HIGHLIGHTS

- **The average discharge of Buna/Bojana is 21.19 km^3/year; this is the third bigger discharge in the European part of the Mediterranean after this of Rhone and Po Rivers.**
- **Buna/Bojana receives water from the Drin River and Lake Skadar/Shkoder hence, its hydrological regime is directly depended on the hydrological regime of the Drin-Lake Skadar/Shkoder hydrological system.**
- **Occasionally, the outflow from the lake in Buna/Bojana is impeded due to the increase of the flow of the Drin River. With high Drin levels and low Buna/Bojana levels, Drin water even enters Lake Skadar/Shkoder increasing its water level significantly.**
- **Due to the low gradient of its channel, Buna/Bojana has a weak transport and erosive capacity to remove sediments from its bed.**
- **Change in the land uses in the adjacent to the river channel area had led to downsized floodplain hence alteration of the ecosystem structure and hydrologic functioning of the river. Before the intensive drainage and melioration of the area, almost 50 percent of the whole Buna/Bojana River and Delta region was regularly flooded.**
- **The Lower Drin – Buna/Bojana River and Skadar/Shkoder Lake watersheds are subject to a high risk of flooding.**

The Buna basin experiences a climate of Sub-Mediterranean type with mild, wet winters and hot prolonged summers.

Box : Climate Summary

The mean annual air temperature ranges between 16 and 18 ^{o}C. The coldest month is January (2.3 - 8.3^{o}C), and the hottest month is July (19.8^{o}C - 25.0^{o}C). The number of days with air temperature over 25^{o}C range from 110 to 130 per year. The mean precipitation in Albania varies from 968 mm in the east at Kukes to 3,166 mm in the west at Boge (average 2,089 mm). In Montenegro precipitation varies between 1,287 and 2,597 mm. Maximum precipitation occurs in November-January and minimum in July-August (Bogdani, 2011; Sekulic G. & Radojevic, 2007).

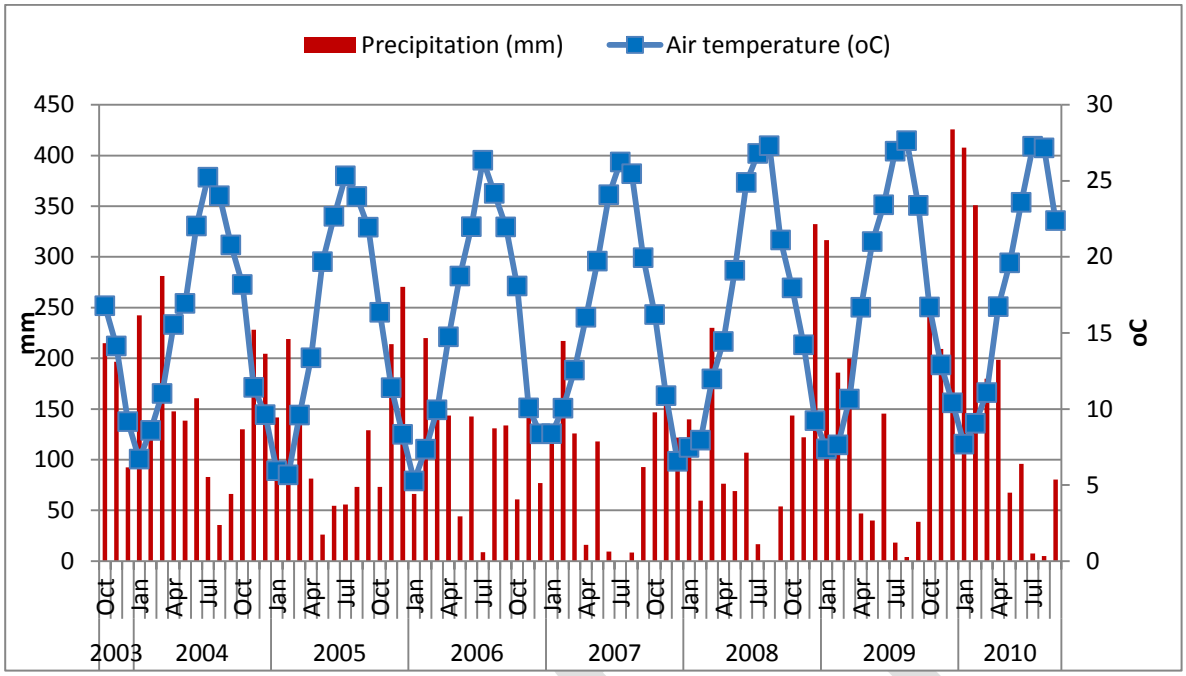


Figure 23: Monthly average rainfall and air temperature for the stations of Ulcinj, Bushat, Dajc and Velipoje in the period 2003-2010.

As already indicated the hydrological regime of the Buna/Bojana is directly depended on this of the Drin-Lake Skadar/Shkoder hydrological system. In Montenegro, several small torrential streams flow in Buna/Bojana River, together with waters of the Šasko Lake through a channel.

The mean annual discharge of Buna/Bojana River prior to its confluence with Drin is 10.1 - 10.4 km^3/year, of which 9.47 to 10.09 km^3/year (APAWA & CETI, 2007; Bogdani, 2011) originate from Lake Skadar/Shkoder. The average discharge of Buna/Bojana is 21.19 km^3/year (Bogdani, 2011); this is the third bigger discharge in the European part of the Mediterranean after this of Rhone and Po Rivers.

More information about the surface hydrology of River Drin and Lake Skadar/Shkoder is given in Part C Water Resources Management – Situation Analysis.

The inter-annual distribution of discharge in Buna/Bojana River presents two peaks, one in winter (December) and one at the end of the spring (April–May), and a minimum in August. The max/min flow ratio in Buna/Bojana River is 5.3 (Cullaj et al., 2005).

Figure 24 presents the monthly discharge distribution for Buna/Bojana and Drin Rivers prior to their confluence in the period 2001-2008.

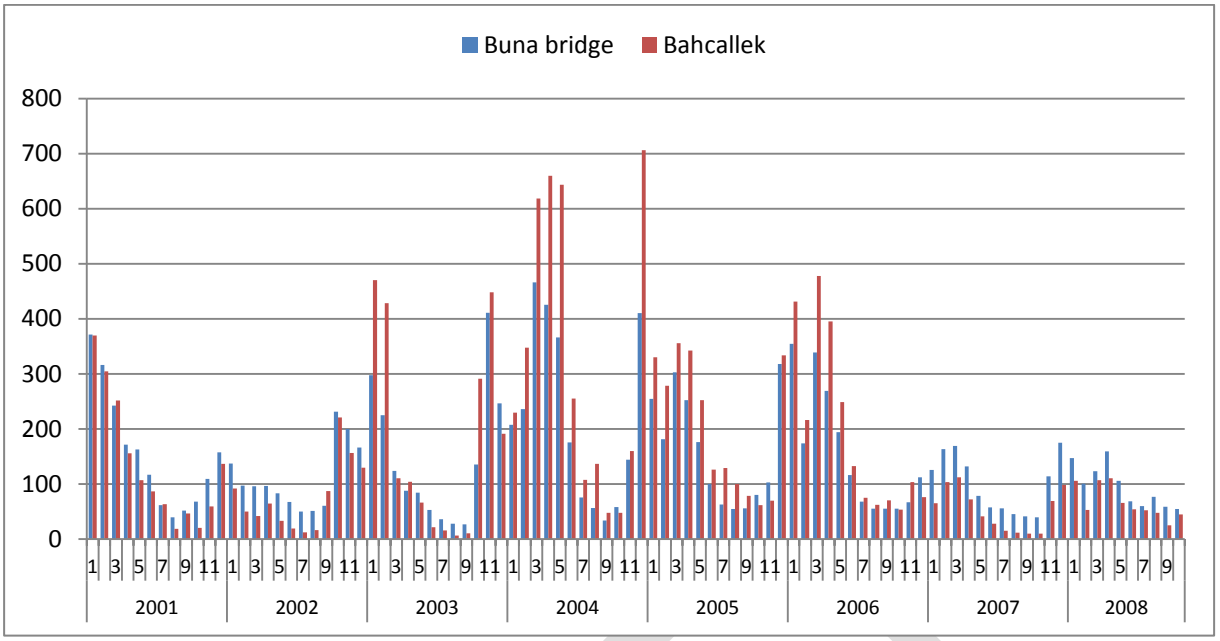


Figure 24: Mean monthly discharge (in m3/s) distribution of Buna/Bojana and Drin Rivers prior to their confluence

Occasionally, the outflow from the lake in Buna/Bojana is impeded due to the increase of the flow of the Drin River. With high Drin levels and low Buna/Bojana levels, Drin water even enters Lake Skadar/Shkoder increasing its water level significantly. This occurs mostly from December to February, but may also occur during other periods, depending on a number of factors including the water quantity released from the hydro-power dams (Vau Dejes), which, in turn, depends on rainfall as well as on electricity demand.

The construction of dams on Drin (see in Section 10.4 Hydro-morphological issues) resulted in reduced suspended solids. Nevertheless, the connection of Drin to Gjader and Kir[30] Rivers allows a significant load of sediments to be carried to Drin and then to the Buna/Bojana River; this load eventually accumulate on the river bed of the latter as well as in the Drin-Buna/Bojana confluence point, thereby further obstructing the outflow from the lake. Due to the low gradient of its channel, Buna/Bojana has a weak transport and erosive capacity to remove sediments from its bed. The sediment accumulation in the bed of Buna/Bojana results to regular flooding of nearby land.

Change in the land uses in the adjacent to the river channel area had led to downsized floodplain hence alteration of the ecosystem structure and hydrologic functioning of the river. Before the intensive drainage and melioration of the area, almost 50 percent of the whole Buna/Bojana River and Delta region was regularly flooded.

Generally, the Lower Drin – Buna/Bojana River and Lake Skadar/Shkoder watersheds are subject to a high risk of flooding (for more information on floods see Section 10.4 Hydro-morphological issues).

[30] Kir is a spring flowing as a stream. The high load of suspended solids derives from severe erosion of its banks.

9.3 Hydrogeology

KEY HIGHLIGHTS

- **A considerable part (~24%) of the area is comprised of karst limestone formations which offer a great potential for groundwater exploitation.**
- **The coastal aquifers interact with the sea, including in the form of submarine groundwater discharges which contribute to the creation of brackish water habitats in the coastal zone.**
- **A significant portion (~54%) of the Plan area is classified as having low and very low vulnerability to groundwater pollution.**
- **Only 7,2% of the area can be considered as having very high and high vulnerability to groundwater pollution.**

A considerable part of the planning area is comprised by karstified limestone formations (~24% of the total) that present very high permeability rate and therefore have a great potential for groundwater exploitation. Most of this karstified rock mass is in the west and northern parts of the Plan area. During the course of the Buna/Bojana River outcrops of this formation are regularly encountered and thus strong interaction of the concurrent aquifers with the river is possible. Karstified limestone is present in the broader area of the Buna/Bojana hydrological basin and the karstic aquifer extends beyond the Buna/Bojana catchment.

Excluding these, the bed of the Buna/Bojana River is cut into alluvial, mainly loamy, deposits. Low permeability rocks such as Flysch formations are observed in ~26% of the Plan area while moderate to high permeability formations (usually alluvial) are encountered in ~50% of the Plan area.

On the basis of lithostratigrafic composition, structure and spatial position of hydrogeological phenomena, the following permeable hydrogeological units (with potential for exploitation) are encountered:

- Alluvial sediments mostly represented by a complex of gravel, sand and clay, with frequent vertical and horizontal variations of these members. Transmissivity is mostly between 15-50 m^2/day, specific yield 0,1-0,3 l/s/m and maximum yield 0,5-2l/s.
- Terrace sediments that are represented with more or less cohesive conglomerates and gravel, with limited spreading at the rim of Ulcinjsko field, deposited over the Miocene sediments.
- The group of Quaternary rocks of integranular porosity with low and good transmissivity; the transmissitvity is low near the coast and is increasing towards the north. It consists mainly of gravely and sandy sediments, partly clayish. Transmissivity is mostly between 1,000-8,000 m^2/day, specific yield 10-35 l/s/m and maximum yield of well, within the limits of 60-80l/s.
- The most important rocks from a hydrogeological point of view are the Upper Cretaceous and dolomitic limestones. They make up the anticline structure of Možura, Brivska Gora and Šasko hill in Montenegro and Karst aquifer of Renci anticline structure in Albania. This is a highly karstified terrain, marked with numerous superficial and underground karst forms with great potential for water exploitation.

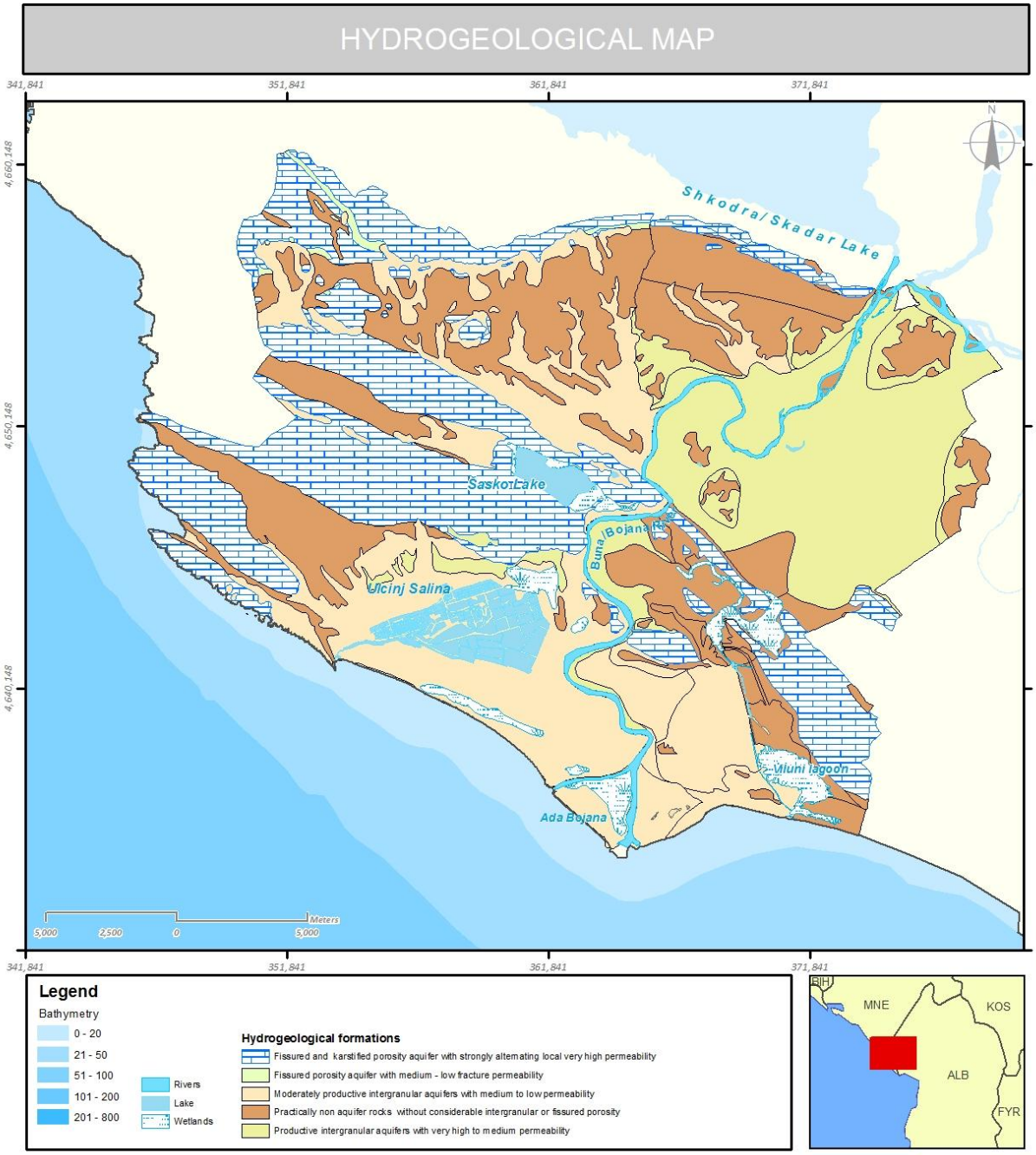


Figure 25: Hydrogeological Map of Buna/Bojana Basin

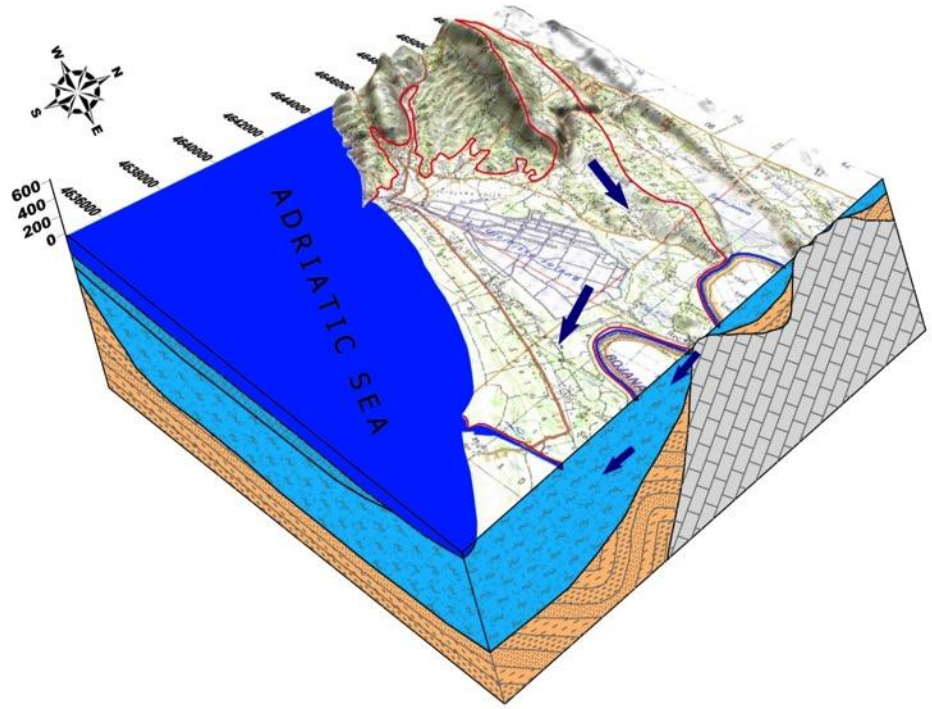


Figure 26: Main groundwater flow component in the Montenegrin part of the Buna/Bojana basin

Table 7: Main Hydrogeological formations and their extent in the Plan area.

Formations	**% of total**
Fissured and karstified porosity aquifer with strongly alternating local very high permeability	23.56
Fissured porosity aquifer with medium - low fracture permeability	0.45
Moderately productive intergrannular aquifers with medium to low permeability	29.83
Practically non aquifer rocks without considerable intergranular or fissured porosity	25.67
Productive intergrannular aquifers with very high to medium permeability	20.49

As frequently the case, and particularly where large karstic areas affect the movement of groundwater, river basins do not coincide with groundwater units; this is the case in the Buna/Bojana basin as well.

The quaternary aquifers in the Buna/Bojana basin are recharged mainly through infiltration from the hydrographic network, with additional infiltration from precipitation and irrigation water. Karstic aquifers recharge mainly from precipitation. The recharge in the Albanian part is estimated at 10.4 Mm^3/yr (Beshku, 2014).

The coastal aquifers interact with the sea, including in the form of submarine groundwater discharges which contribute to the creation of brackish water habitats in the coastal zone. The submarine groundwater discharges to the Adriatic Sea in the Albanian portion of the Plan area are estimated at 0.29 Mm^3/yr (H Beshku, 2014) while no estimate exists for Montenegro.

Groundwater is extracted primarily for drinking purposes, with a secondary use being the irrigated agriculture. Depending on local conditions groundwater is exploited through wells, mainly in the plains and valleys, or through springs, most frequently in the hills and mountain areas.

The rich groundwater potential has created a tendency to exploit it in a great degree; there are indications of salinization issues in aquifers in the coastal area. The officially recorded boreholes are approx. 130, most of which are located in the karstic aquifer at the north part of the catchment and in the broader deltaic plain at the lower part of Buna/Bojana catchment. This number is not exhaustive.

The total annual extraction of groundwater from the aquifers in the Buna/Bojana Plan area is estimated at just over 10.3 Mm^3, of which ~4.7 Mm^3 for Albania and 5.5 Mm^3 for Montenegro (Radojevic, 2014). Nevertheless, the consumption from many privately owned boreholes and wells are probably not included in these estimates and therefore they have to be updated and validated from a groundwater monitoring program (considering the piezometric level fluctuations).

9.3.1 Vulnerability of groundwater to land-based pollution

The vulnerability of groundwater[31] to pollution in the Buna/Bojana basin was assessed using the COP method (Part C Water Resources Management – Situation Analysis).

Box 4: COP method

The COP method combines three different thematic maps: Concentration of flow map; Overland layer protection map and Precipitation reduction map.

The "Concentration of flow" map ranks the catchment areas according to the pollutants' potential velocity intrusion into the aquifer. Thus, karstic areas, shallow holes and highly fissured substrate with low to moderate

[31] Vulnerability is the measure of physical protection provided in the aquifer by the topographic, geologic, soil and vegetative conditions in the catchment (pollution sources are not considered). There are several methods to assess coastal aquifer vulnerability, and three of them have been tested as demonstrations as part of MedPartnership Project by UNESCO IHP. Two were specifically targeted to karstic environments of the Croatian coasts -highly exposed to both vertical and horizontal infiltration of pollutants and seawater intrusion- and one was instead tailored for the alluvial coastal plains and estuaries of the Tunisian coast, where clastic sediments of varied granulometry accumulate and unconfined shallow aquifers are common and widespread.

Choosing the most effective method for the Plan area was not simple. The Plan area is in fact large and extends well beyond the coastal area sensu strictu, including mountainous reliefs and highly variable lithology, from karstic carbonates to flysch, to alluvial sediments. Eventually, the COP method (Andreo et Al., 2006), which in spite of being mainly designed for karst has proven a certain level of flexibility, was selected. The methodology assess the protection provided to the aquifer based on the physical properties of the area.

The method can be used in a comparatively manner only (to identify areas that are more prone to pollution than others within the same catchment). Therefore, the classification scale of vulnerability can be used to depict the different magnitude of protective conditions within the particular catchment and cannot be considered in an 'absolute' sense. In this regard, the fact that an area is classified as of low vulnerability does not imply that the groundwater cannot be polluted but it means that groundwater is more "naturally protected" than other areas that are classified as of moderate or high vulnerability within the same catchment area.

However, the results obtained must be considered with much caution, given the large size of the area, its complex geomorphology, and –especially- the lack of sufficiently detailed information. For more information see the Part C Water Resources Management – Situation Analysis.

slopes and sparse vegetation lead to low C map values (no protection - high risk) while absence of karstic features and high slopes lead to high C map values (low pollution risk).

The “Overland protection” map classifies the catchment according to the protective function of the overland soil layers. Therefore areas with clayey, thick topsoil and low infiltration potential are classified as highly protected areas (low pollution risk) while areas with sandy, thin topsoil and karstic substrate are considered as low protected areas (high pollution risk).

The “P map” refers to the reduction of protection from the precipitation patterns, since high intensity rainfalls in combination with moderate annual rainfall levels (800-1600 mm) enhance the pollutants drainage towards the aquifer (Zwahlen, 2004).

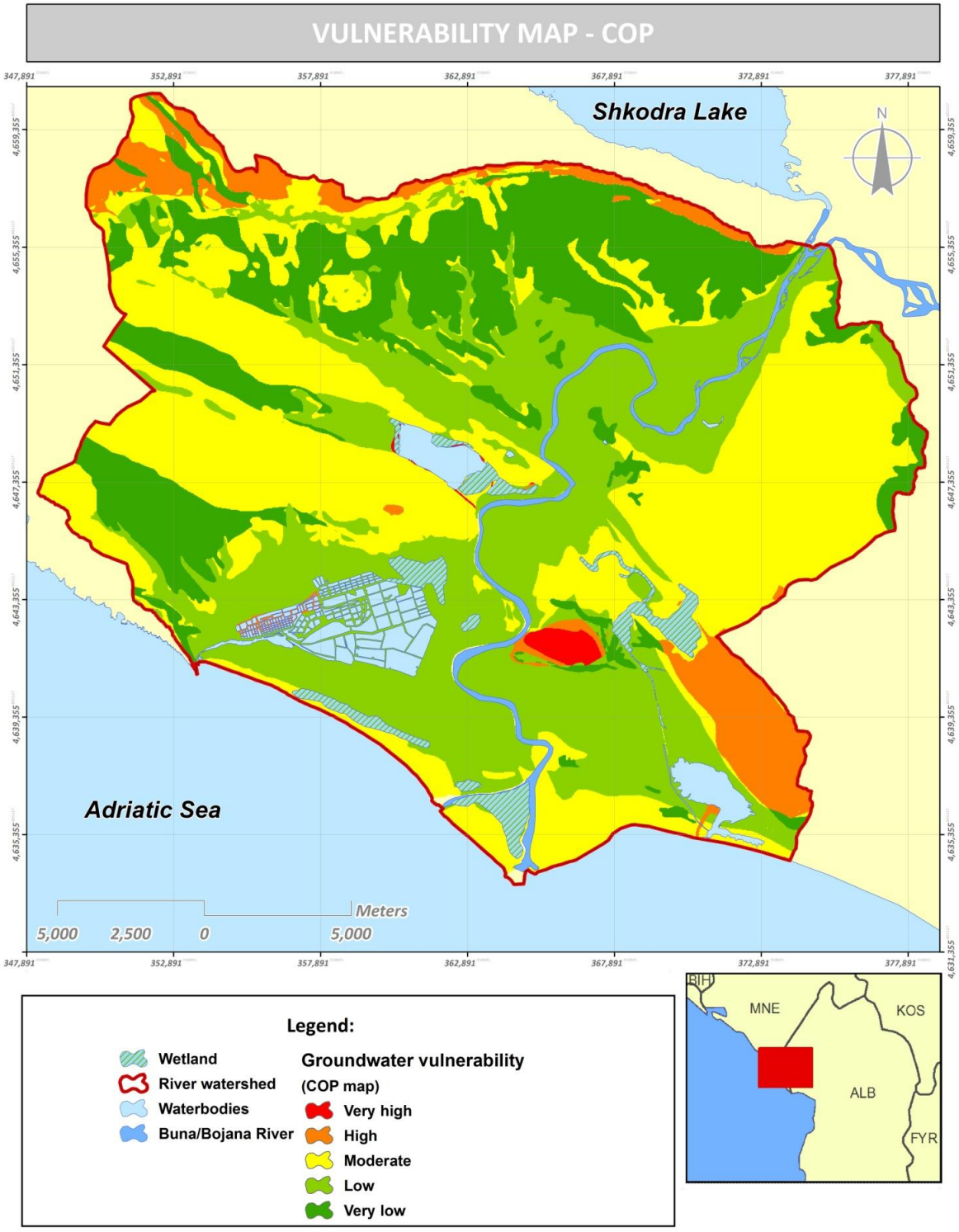


Figure 27: Groundwater vulnerability - COP map

Based on the results of the assessment[32] the forested or semi natural areas over flysch/ non permeable formations, as well as the cultivated sedimentary (medium to low permeability) areas at the southern, north and northeast parts of the watershed are classified as of low and very low vulnerability to groundwater pollution. This area represents ~54% of the Buna/Bojana basin. There is moderate vulnerability in the central, western and coastal parts of the basin (39% of the total area) where there are either karstic formations with significant soil cover and/or natural vegetation cover, or medium to low permeability porous formations with soil protective layers and natural vegetation. The area considered as having very high and high vulnerability to pollution (7.2% of the Buna/Bojana basin) lies in the central, north-western and eastern part of the Buna/Bojana watershed where there are calcareous formations with lack of thick overlying soil layer and/or without natural vegetation and with slopes of low gradient.

[32] There are limitations regarding data availability and accuracy in relation to land uses, soil and vegetation cover; these limitations affect the accuracy of the output of the COP methodology used here. The Corine 2006 land use map was used.

9.4 Coastal and marine environment and processes

KEY HIGHLIGHTS

- **The marine area that is under the direct influence of Buna/Bojana River is defined by the sea surface salinity values (combinations of the monthly isolines of 35 PSU average).**
- **Bojana/Buna fresh water runoff is one of the four main external factors driving Adriatic currents. It seems to be the dominant forcing factor for the circulation in early spring along with the seawater coming from the Ionian Sea.**
- **The tidal regime present high variability at daily, monthly and yearly time scales. Due to the flat bottom slope of the Buna/Bojana river the tides can "travel" upstream of the river for several kilometres.**
- **River sediments are accumulated in the right mouth of the Buna-Bojana river while the left one is under an erosion regime.**

Most of the area is open and to the highest extent exposed to influences from the open sea, as well as to those of the fresh water and sediment inputs from the Buna/Bojana River that is the main factor responsible for the creation of sandy beaches present in this area.

The extend of the area influenced by the River can be defined and depends on, among others, the river discharge, the temperature of freshwater and marine water, the morphology of the sea floor, the sea currents, the wave activity, the groundwater discharges of freshwater towards the sea etc. Based on information on the sea surface salinity, the area under the direct influence of Buna/Bojana is determined (Figure 30).

9.4.1 Current, tide and wave regimes

Using the Adriatic Forecasting System (AFS) simulations (Guarnieri et al., 2010) it can be concluded that predominant currents are northward during winter and autumn and reverse during summer. The marine currents in the area are driven by four main 'external' forces: (i) the inflow of Ionian waters from the south; (ii) the local winds; (iii) the air-sea heat and water fluxes (called collectively the buoyancy forcing) and (iv) the Buna/Bojana fresh water runoff. Depending on different season, different factors are becoming dominant. River fresh water runoff and the entering Ionian waters seems to be the dominant forcing factor for the circulation in early spring (Marini et al., 2010)

Although there are no precise data sets on the tidal regime, the AFS time series (Guarnieri et al., 2012) indicate that the dominant tidal frequency in the coastal zone of the Plan area is the semidiurnal one, the same as in the rest of the Adriatic basin. Simulations for the Buna/Bojana river mouth (for the year 2003) show that the difference between mean higher waters and mean lower waters is approximately 30 cm, while the amplitude between the highest and the lowest waters is approximately to be 50 cm. The maximum values of the zonal and meridional currents are approximately 5-6 cm/s and present high variability at daily, monthly and yearly time scales. Considering that the bottom slope of the Bojana/Buna river is quite flat, this means that the tides can "travel" upstream of the river for several kilometres.

Information regarding the wind waves in the coastal zone is very limited and insufficient. Moreover, the majority of this information has been collected by visual observation from ships, providing only

qualitative estimates. Based on studies undertaken during the Adricosm-Star project, using the SWAN wave model it can be concluded that the majority of the waves in a location in front of the Buna/Bojana River mouth come from south west and the average significant wave height is 2 m with highest values of 4m.

9.4.2 Coastal sediment transport

River fluxes influence a number of parameters among which is the sea surface salinity; in addition to some physicochemical parameters (Chapter 10.5) the latter is the only parameter for which information is available. Salinity levels are lowest at the area between Buna/Bojana River and Ulcinj Salina (Figure 29). By using the combinations of the monthly isolines of 35 PSU, as an average sea surface salinity, the area under the direct influence of Buna/Bojana is designated and shown in Figure 30); it covers the total of the Montenegrin part of the coast of the catchment.

Sediment investigations in the Buna/Bojana delta are rare and insufficient[33]. However it is evident that the sediments are accumulated in the right mouth of the Buna/Bojana river while the left one is under an erosion regime (Figure 28). The main outflow of sediments and fresh water occurs clearly from the left branch which is also much deeper than the right one. The most important seasons for sediment transport along the river are winter and autumn when the highest water flow in the river occurs.

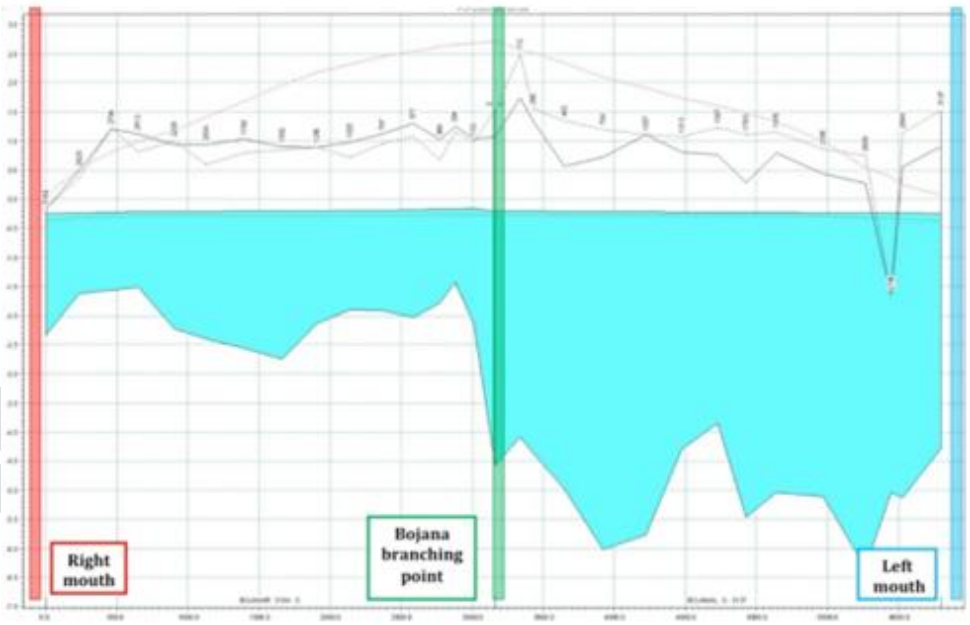
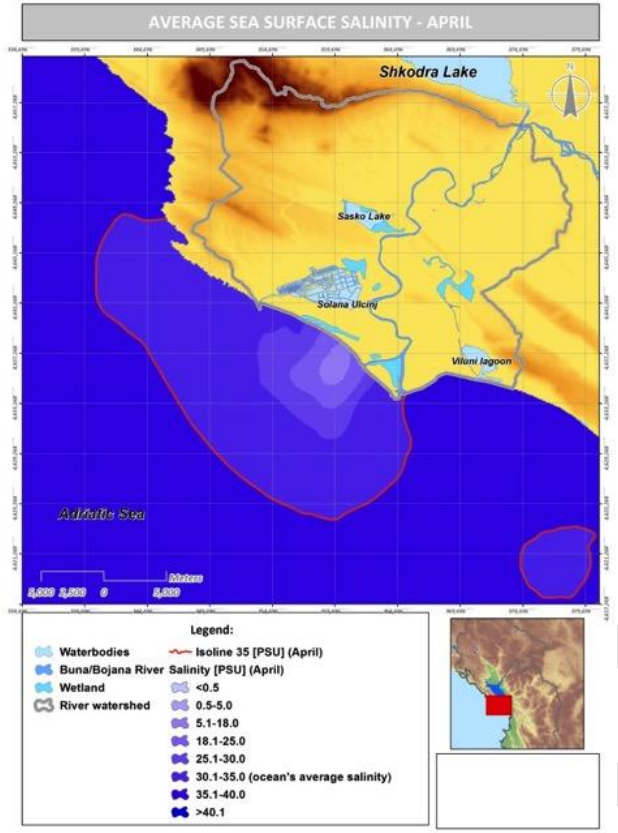


Figure 28: Longitudinal profile of the right (western side) and left (eastern side) Bojana river branches starting from the branching point (green line) up to the sea mouth (Source: Adricosm-Star project)

The coastal area in front of the right branch of the delta is a sediment accumulation area, in spite of the small input from the river. The coastal area in front of the left branch, on the contrary, is an area of erosion (see Chapter 10.4.2). During the winter and autumn seasons, despite the strong input from the river, the quantity of sediment from the river and from advection in the sea is not high enough to balance the erosion effect of the combined activity of waves and currents. As a result, the sediment material is carried by the currents and waves away from the river mouth along the coastline.

[33] Related work and analysis is still continuing under the Adricosm-Star project and final results are as yet unavailable.



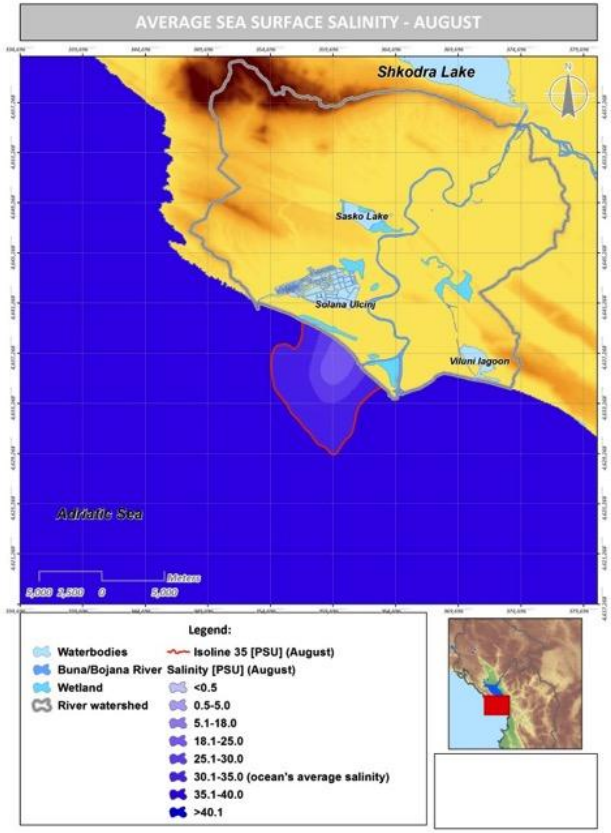


Figure 29: a) Salinity values in the coastal area in April (annual maximum) and b) Salinity values in August (annual minimum)

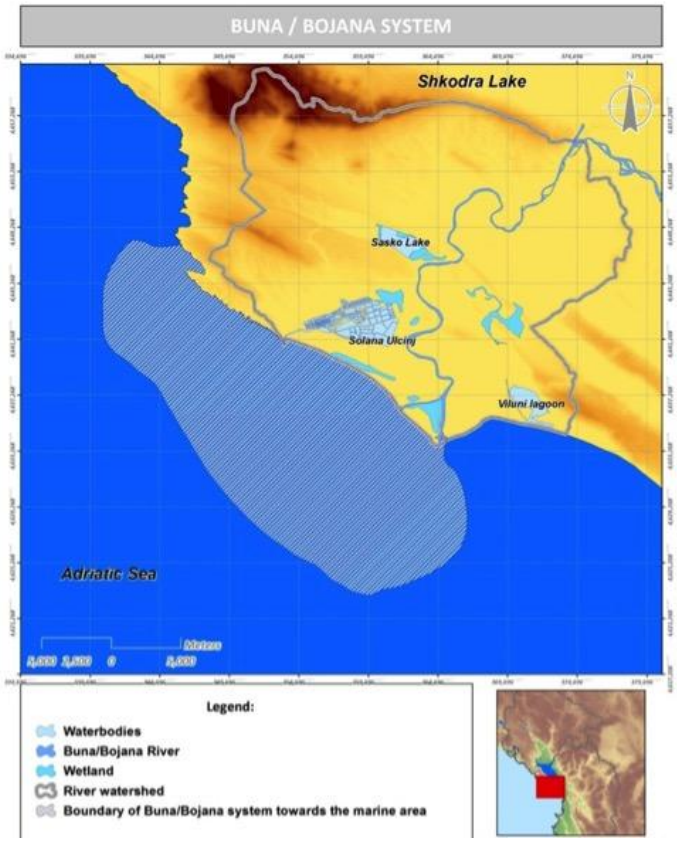


Figure 30: Marine area with direct influence by freshwater coming from Buna/Bojana River

On the contrary, the period of the year from May to October is characterized by a balance between erosion and deposition.

Simulated interaction between Buna/Bojana river plume and waves at the mouth of the river (Adricosm-Start project) shows that the river plume, containing sediments, tends to be deviated south-easward of the Buna/Bojana thus indicating a possible accumulation region south of the river. In addition, taking into considerations seasonal currents at the river delta (spring and summer), sediments will be advected south-eastward from the river mouth, both due to waves and currents. However, during winter and autumn, currents are northward and waves and currents act in an opposite way, thus giving the possibility that some sediments are also transported northward.

10. Major issues and problems to the natural environment

The analysis of the pressures and their impacts in the system will allow the identification of measures that will enable action towards the sustainable growth in the area and in the preservation of ecosystems or improvement of their status as appropriate.

Within this chapter, main pressures on natural values, hydrological, hydrogeological and hydromorphological issues, climate change and pollution are analyised.

10.1 Pressures on the natural values

Buna/Bojana delta of the Plan area is a highly dynamic natural system that is posed to various impacts that threaten its natural balance, particularly sensitive coastal ecosystems. These impacts are present in both sides of Plant area, but some of them are significant for both sides, respectively.

Increasing **tourism** and **human habitation** causing several adverse impacts on the natural values such as:

(i) *Loss, degradation and fragmentation of natural habitats, particularly coastal and wetlands habitats* - Most threatened coastal habitats are **sand dunes** in Baks-Rrjolli near Velipoja and Velika Plaža in Ulcinj that are one of the latest resorts of unique and rare halophyte vegetation[34].

(ii) *Landscape degradation* – Construction of new tourism, infrastructure and urban areas physically – visually changing landscape characteristics. These changes are evident in newly constructed zones such as Štoj area in the hinterland of Velika plaža.

(iii) *Pollution of marine and freshwaters due to increased discharge of polluted and untreated waste waters* - According to overall assessment of the status of the water bodies, as most threatened are considered waters of Buna/Bojana **river and coastal waters**[35]. As a consequence of pollution **Eutrophication** phenomena has been observed, particularly in Port Milena and Buna/Bojana River.

(iv) *Disturbance* – Presence of tourists / visitors in nature, particularly in the wilderness, disturb and moderate (spatial distribution / aggregation) biodiversity, particularly in the peak of **summer season** (July – August).

Direct use of natural (primarily **biological) resources** cause significant *loss of biodiversity* due to:

(i) *Fishing* – This is intensive and destructive[36] impact, that include unsustainable fishery practices such as (i) use of nets with small mesh size**,** (ii) trawling in depths <50m and (iii) use of dynamite and electricity. No permit fishing in marine and freshwaters is still present due to poor inspection. Illegal collection[37] of Data Mussel (protected species) is also present. Fish catch on Albanian side decreased from 20-80% in last 25 years[3839] According to Pobjeda (May 2015) 35 dynamite fishermen are identified in Ulcinj

[34] Include following endangered psamo- and halophytes: *Cakile maritima, Xantium italica, Salsola kali, Euphorbia peplis, Euphorbia paralias, Polygonum maritimum, Atriplex hastate, Echinophora spinosa, Eryngium maritimum, Agropyrum junceum, Medicago marina, Inula crithmoides, Lagurus ovatus, Cuscuta sp.*

[35] See more in chapter 10.5

[36] Destruction affects other marine organisms and habitats, not only fishes

[37] Collection of Data Mussels (*Lithophaga lithophaga* L.) causing heavy destruction of submarine rocky habitats

[38] Source: (Albaninan) Fishery Managment Organisation

(ii) *Hunting* – Similar to fishing, this is also destructive[40], poorly controlled and very often illegal activity. Hunting is formally banned in Velipoja (core area) and Ulcinj Salina. However, no permit or illegal hunting practices are present in the coastal zone, usually in wetlands / water habitats and agriculture areas.

(iii) *Loss of local agricultural varieties and breeds* – Due to introduction of new agriculture species and varieties (cattle, crops, vegetables etc), local ones are declining and disappearing, such as Ulcinj sheep "**Ijaba**"[41].

Plans for **drying** wetland / water areas are possible cause of impacts that can endanger biodiversity in wider area, particularly fish populations. At present, general hydrologic processes are causing shrink of smaller wetlands zones, such as swamps ("knete") around Ulcinj Salina.

Natural values of the Plan area are also threatened by invasive / alien species.

Among marine **invasive species**, the following are present in plan area: (i) fishes: *Tylosurus acus imperialis* and *Sphoeroides pachygaster* (ii) decapods - crustaceans *Callinectes sapidus* (2006, Port Milena) and (ii) plants: *Caulerpa racemosa*. From previous time, populations of some introduced non-native fish like Goldfish (*Carassius auratus gibelio*), European perch (*Perca fluviatilis*) and Topmouth Gudgeon (*Pseudorasbora parva*) had negative impacts on the population of the native fish species, such as cyprinids, and especially the commercially important wild Carp (*Cyprinus carpio*). Terrestrial invasive plant species are also poorly investigated but following are often present: Black Locust (*Robinia pseudoacacia*) that is almost resident, Chinese Sumac (*Ailanthus altissima*) and Paper Mulberry (*Broussonetia papyrifera)* in urban areas.

In general, the low level of public awareness about environmental issues is a specific problem resulting in the lack of appreciation of the ecosystem services and natural values.

[39] Data indicate Twaite shad live in critical condition, while Sturgeon species are very rarely present or completely missing in Bojana / Buna river

[40] A massive destruction – "massacre" of migrating birds has been observed on Albanian side in February 2012. On the other side, decrease in bird population is assessed (Schneider-Jacoby, unpublished) in the range 10-20%.

[41] Source: NBSAP Montenegro for period 2010-2015

10.2 Hydrological and Hydrogeological issues

10.2.1 Water Budget

The water budget of the Buna/Bojana basin is calculated for the period 07/2006 - 10/2009[42]. The methodology used, the calculations made and the analysis conducted are given in Part C Water Resources Management – Situation Analysis. Raw data from the meteorological stations indicated in Figure 31 were used.

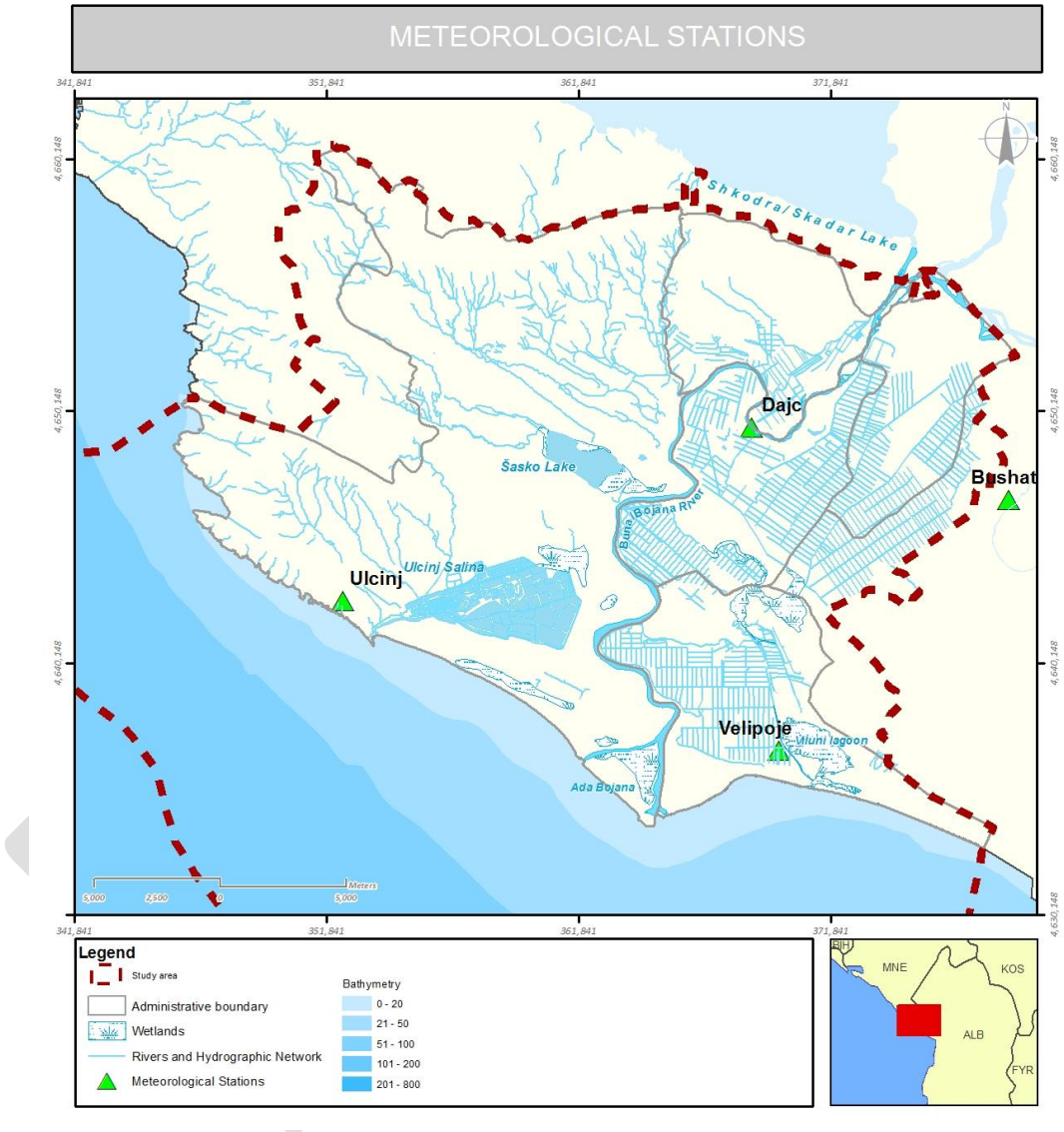


Figure 31: The main meteorological stations in the Plan area[43]

[42] The period for which complete and appropriate for use, hydrologic and meteorological dataseries were made available to the project. The water budget was calculated using data for precipitation, surface water inflow, actual evapo-transpiration, discharge to the sea, water used for irrigation, domestic and industry; groundwater exchanges between Buna/Bojana catchment and neighboring basins were considered -for the needs of the calculations- to be negligible.

[43] Dataseries from these stations were used for the hydrologic and water quality estimations and calculations made in this study.

Table 8: Meteorological stations at the wider area of Buna/Bojana watershed used for the calculation of the water budget – see also Figure 32

a/a	Name	WMO	Owner	lat	lon	Thiessen weight
1	Ulcinj	WMO13464	Hydrometeorological Institute of Montenegro	41.916667	19.216667	0.4
2	Bushat	-	Institute of GeoSciences, Energy, Water and Environment	41.964500	19.536461	0.1
3	Fshati	-	Institute of GeoSciences, Energy, Water and Environment	42.053250	19.489064	0.2
4	Velipoje	-	Institute of GeoSciences, Energy, Water and Environment	41.870442	19.427647	0.3

The results of the monthly water budget analysis of Buna/Bojana basin indicate that:

- 40.1% of the total amount of water available (770.8*10^6 m^3) is evaporated and transpired, 15.0% is used for irrigation and 4.3% covers domestic and industrial needs.
- 39.4% of the total amount of water is either stored surficial at the numerous waterbodies and wetlands of the basin, or go underground at the porous and karstic formations, or is discharged to the sea directly from Buna / Bojana River or through underwater springs at Adriatic Sea.

Table 9: Water budget of Buna/Bojana watershed (07/2006 - 10/2009)

Month	Precipitation	Actual evapotranspiration	Irrigation	Domestic and industrial use	Change of storage and runoff
	*10^6 (m^3)				
Oct	76.6	31.1	0.3	1.1	62.7
Nov	82.8	14.7	0.0	1.0	95.7
Dec	121.5	8.4	0.0	1.1	133.7
Jan	126.0	7.2	0.0	1.1	120.2
Feb	103.3	8.9	0.0	1.0	93.2
Mar	93.5	17.6	0.0	1.1	68.0
Apr	42.9	32.1	22.2	1.0	-49.6
May	37.4	52.4	7.6	1.1	-46.5
Jun	45.5	73.0	12.6	7.7	-49.4
Jul	5.4	20.6	34.3	8.0	-66.2
Aug	2.2	7.3	32.2	8.0	-52.3
Sep	33.8	35.6	6.4	1.0	-5.8
Total *10^6 (m^3)	**770.8**	**309.0**	**115.6**	**33.2**	**303.7**
Total (%)	**100.0%**	**40.1%**	**15.0%**	**4.3%**	**39.4%**

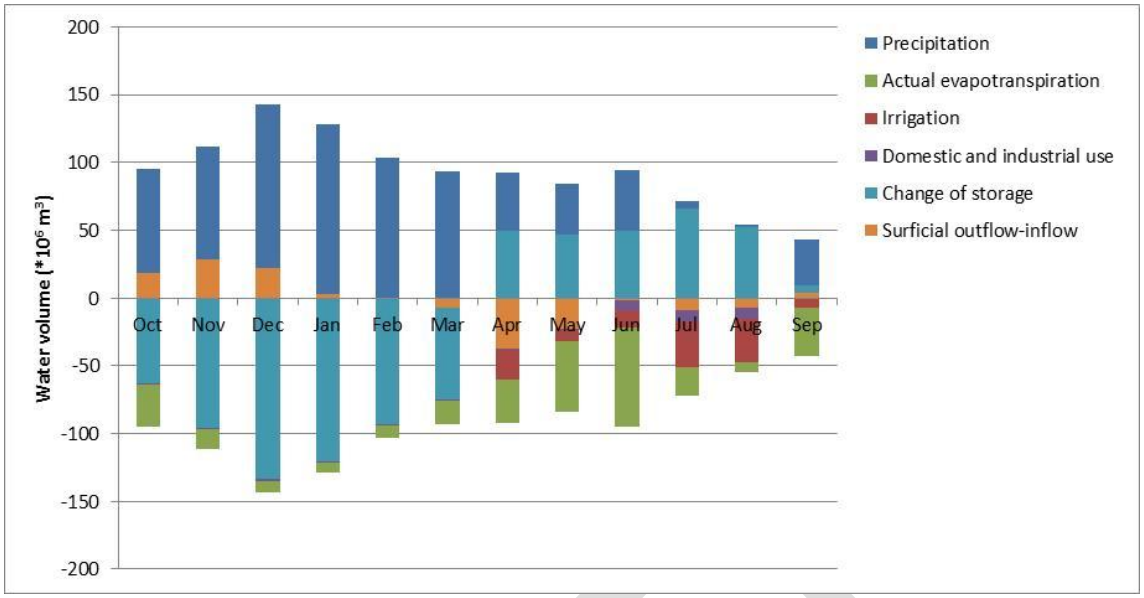


Figure 32: Water budget of Buna/Bojana watershed (07/2006 - 10/2009)

The above given data indicate that there is generally high water availability in the Plan area.

Nevertheless, the amount of water necessary to support the ecosystems has not been quantified and taken into account. In this regard, it is likely that an increase of abstraction rates (water use for human activities) may have a direct or indirect effect to the water dependent ecosystems.

Equally important, increased abstractions could have an effect to the water resources replenishment rate resulting in deficit in the water balance hence, to reduced water availability; an effect on the aquifer's water table and water quality is possible.

Additional hydrological and hydrogeological monitoring and data of succicient quality and quantity in terms of land and water uses are necessary to more precisely assess the water budget. This information could then be used to support managerial decisions related to allocation of water among its different uses, should this is found to be necessary.

The effects of climate change may be important in this area (see later in the document); these effects could not be quantified in this study. As alterations in the hydrological cycle are possible, affecting water replenishment rates, mitigation and adaptation measures should be taken.

10.2.2 Groundwater[44]

Decreasing groundwater levels may be an issue in the area. Monitoring is necessary in this regard. In Albania, there is related anecdotal evidence in coastal aquifers from observations of abandoned wells in which it was noted that aquifers remain under pressure but with decreased piezometric

[44] Groundwater quantitative and qualitative data for the area are very scarce and only few instantaneous measurements exist in low depth constructed wells and 2 exploratory boreholes. The available few data in this study cannot be considered representative and adequate for evaluating the groundwater status in the area. Therefore, there is an urgent need to establish a groundwater monitoring program in order to be able to assess with accuracy the qualitative and quantitative status of the aquifers. A detailed study should be conducted to examine possible seawater intrusion in the aquifers.

levels. There is also limited indication included in scientific work (Puri 2010[45]; work was carried out in the Montenegrin part of the Buna/Bojana area - in Part C Water Resources Management – Situation Analysis of the Plan).

The geophysical structure of the Buna/Bojana River favors salinization phenomena. The base of the river is below the level of the sea and therefore seawater may flow along the river bottom[46] and interact with the alluvial aquifers. According to Puri, 2010, measurements of TDS in alluvial aquifers indicate levels ranging from 151 to 2,944 mg/l. A review of the hydrogeology (Puri, 2010) of the salt pans in the Plan area -they are directly in connection with seawater- indicate that they are at least partly in connection with the surrounding alluvial aquifer; this is despite the fact that the salt pans are engineered structures.

There are some indications of inflow of saline water from alluvial aquifers into karstic aquifers:
- Following the wet season when groundwater levels are at the highest point, the Gac spring in Montenegro, which discharges from a karstic aquifer in the Plan area, yields a maximum of 1,000 l/s. In summer, when groundwater levels decline, the spring discharge nearly vanishes and the water that is discharged is saline. It is possible that overextraction results in decreased groundwater levels and this causes intrusion of saline water from the alluvial aquifers that are in contact with the Sea (Radojevic, 2012).
- In Ulcinj, the extracted groundwater used for irrigation has been observed to demonstrate elevated salinity; perhaps this is a result of seawater intrusion induced by decreased groundwater levels (Radojevic, 2012).
- In Albania, TDS levels have been measured between 4.1 and 16.8 mg/l in the Velipoja Plain (Beshku, 2014).

[45] Between 2008 and 2010 the AQMOD (the Bojana Bay catchment Aquifer Model component of the ADRICOSM-STAR Project) hydrogeological study regarding the aquifers in the Bojana Delta of Montenegro was conducted, by UNESCO-IHP. This aimed to model the behavior of coastal aquifers in the Bojana Bay of Montenegro. For this, a 3-D aquifer system model was prepared that included a review of archive data, a preliminary conceptual model formulation, a field campaign, exploratory drilling, and finally a synthesis of all of the data into a model.

[46] This hypothesis is supported by the fact that marine macro-invretebrates have been found high upstream during sampling that was performed to assess the ecological status of the basin in the framework of this plan (see Part C Water Resources Management – Situation Analysis).

10.3 Climate change

Climate change is an increasing threat to both natural biodiversity and agrobiodiversity which have narrow variation of the amplitude for, particularly temperature and water regime. For example, the appearance of the alien fish species *lessepsian migrant* and *Fistularia commersonii* (Joksimović et al., 2008) in the Adriatic Sea (2007 near Bar) is an indicative of changes attributed to climate change.

Potential impacts from climate change in the Plan area in the period up to 2050[47] may include the following:

- *Increase of temperature* especially during the summer and with a notable difference between the temperatures of land and the sea
- *Reduction of precipitation* – especially during summers, with reduction of relative humidity in air and land and increase in evaporation
- *increased frequency of extreme weather conditions*
- *sea-level rise*.

Temperature

According to the Initial National Communication of **Montenegro** on Climate Change to the United Nations Framework Convention on Climate Change (UNFCCC), respecting regional climate model EBU-POM, existing changes in temperatures are ranging in the interval (0.1-1.0)ºC, while some scenarios for the period up to the year 2100 predict changes up to 4.8ºC. The Second National Communication of Montenegro on Climate Change to UNFCCC indicated that according to A1B scenario heat waves will be on average about 2 times longer lasting in the coastal region, while there will be three heat waves during the year.

Results of the analyses developed for the purpose of development of the Third National Communication of **Albania** to UNFCCC (UNDP, 2014), show that the Albanian Costal Area is likely to become warmer. The annual average temperature for the northern part of the coastal area is 14.3 °C. It is expected to increase up to 1.8°C (15.6-16.1°C) in the north by 2050 and up to 4.2°C (17.1-18.5°C) by 2100. Temperature increase in all seasons is expected, but summer projections seem to be extremely problematic. The highest warming with the greatest contribution in annual temperature change is likely to reach up to 5.3°C (4.6 -6.0°C) by 2100. The number of days with the temperature above 35°C is expected to increase 7-14 days by 2050 along with the number of heat waves (UNDP, 2014).

Precipitation

In terms of annual precipitation and rainfall, the World Bank document (Pollner et al., 2008) notes that the north western tip of South East Europe will see an increase of rainfall by 5 per cent in 2071-2100 relative to 1961-1990. However, the rest of the Adriatic coastline and Western Balkans region (including Albania), annual mean precipitation is expected to decrease by 10-20 per cent over the same period (European Commission, 2007, see Figure 33 below). Moreover the World Bank document notes that annual runoff is expected to fall sharply by 25 per cent.

[47] According to the National Overview: Vulnerability and Impacts of Climate Change on Marine and Coastal Biodiversity in Montenegro

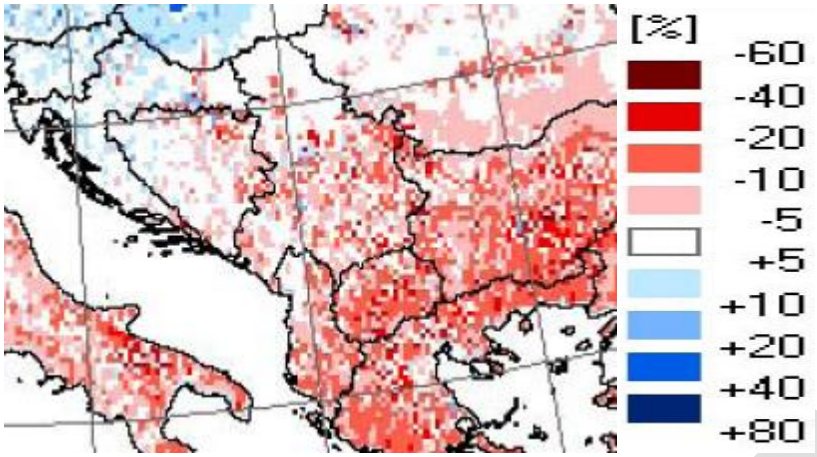


Figure 33: Change in mean annual precipitation in 2071-2100 relative to 1961-1990 (%)

Source: European Commission (2007)

Projected changes in precipitation show a change in the seasonal distribution of rainfall, with the most significant changes being in summer months (JJA).

In relation to the rainfall model for **Montenegro**, results show negative and positive changes in precipitation, depending on the part of country and the season[48]. Negative changes, according to the A2 scenario, go even up to -50% in the southern part of Montenegro during the JJA season (June-July-August). Considering the scenario for the changes in precipitation and temperature until 2100, a strong disturbance in the balance of water resources is expected. Given that there is a high degree of correlation between precipitation and the volume of flow and yield, in accordance with future climate scenarios, in which the precipitation is expected to decrease by different percentages ranging up to 50% in certain period (A2 scenario for the period 2071-2100), it can be expected that an overall water balance (water potential) will be reduced in certain areas even by as much as 50%.

For **Albania**, annual reductions in precipitation of up to -8.5% (from 47.4 to -64.4%) by 2050; -14.4% (from 81.1 to -109.9%) by 2080 and -18.1% (from 99.0 to -135.5%) by 2100are anticipated. The demand for water could increase, especially in summer (UNDP, 2014).

Impacts related to sea level rise and extreme events are further elaborated in following chapters.

10.3.1 Sea level rise

The sea level rise has a special significance because it highly contributes to factors that cause flooding, coastal erosion and the disappearance of the flat surface of the coastal area, what is the case with Ada Bojana in the southeastern coast of Montenegro. Also, the sea level rise increases the intrusion of salt water into the mainland and causes the threat to coastal ecosystems and wetlands. In addition to natural systems, a high risk of flooding poses a threat to human life, property, tourism, infrastructure, transport etc. On a global level, sea level rise projections for the 21st century, mainly due to thermal expansion of the ocean, is in the range (9-88) cm.

[48] The Initial National Communication of Montenegro on Climate Change to UNFCCC

The Albanian Costal area is prone to subsidence that might intensify the impact of sea level. By averaging the results for Albanian coastal area results that sea-level is likely to increase averagely up to 40cm, reaching the maximum level of 73 cm by 2100 (UNDP, 2014).

Table 10: Projection of changes in annual sea level (cm)

	Sea level rise (cm)	
years	2050	2100
aver	14.6	37.8
max	26.4	72.6
min	7.2	15.2

The below figure 34 shows the flooded area due to maximum projected sea level rise. Combined effect of sea level rise and storm surges may cause even more extensive flooding in the area.

Figure 34: Sea Level Rise in Plan area in Albania

The analysis of the sea level rise in the Montenegrin coastal area was done within the CAMP Montenegro[49]. The analysis was conducted to determine the zone of flooding or vulnerability of the coast to sea level rise.

Projections derived from climate models recommended by the International Panel on Climate Change (IPCC) as well as projections based on semi-empiric methods of certain authors have been taken into account in the analysis of the sea level rise in the Montenegrin coastal zone. Transference of the projected sea level rise for the Montenegrin coastal zone into space was done only through application of the digital terrain model (DTM), without using techniques to downscale global models to regional level and by taking into account changes of the sea level in the Adriatic basin. Effects caused by strong winds and waves have not been considered in the assessment of the seal level rise for Montenegro's coast. Thermic expansion of the sea, glacier melting and the highest local sea level rise in the period 1978 – 2013 have been taken into account in making sea level rise projections.

[49] Vulnerability Assessment of the Narrow Coastal Zone-Sea Level Rise

Having in mind the above, four scenarios with projections of the sea level rise (0.6 – 2 m) by 2100 were proposed in the analysis of the seal level rise in the coastal zone of Montenegro. Graphic presentation of all the four scenarios is provided on Figure 35.

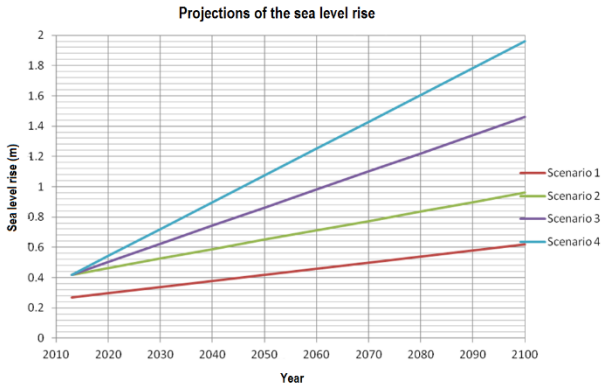


Figure 35: Linear interpolation of the sea level rise projections under scenarios 1 – 4

Considerations and conclusions pertaining to the application of the four sea level rise scenarios (which are based on the analysis of literature data and in line with IPCC projections and relevant semi-empirical methods) for the Montenegrin coastal zone have been mapped with precision through the use of high resolution LiDAR data and an estimation of the sea level rise implications for space has been made. Given the fact that sea level rise estimates are of long-term nature (they refer to the year 2100), an assessment of probability of their realization at present and in the near future was made, based on application of assumptions above presented.

With these in mind, two most important recommendations for the size of flood zones and vulnerability of the Montenegrin coast are stemming:

- Results of the first scenario (sea level rise of +0.62 m in the DTM) should be integrated in each future spatial plan should take into account
- As well as the results of the second scenario (sea level rise of +0.96 m in the DTM), which correspond with maximum sea level rises in the current, still rare, emergency situations of coastal zone flooding due to impacts of strong winds. This is especially important in the context of application of data on projected impacts of sea level rise in the Montenegrin coastal zone within the time horizon of developing the Special Purpose Spatial Plan for the Coastal Zone of Montenegro. Already now, according to the data of the Institute of Hydrometeorology and Seismology of Montenegro (data acquired over a longer period of time on tide gauge stations along Montenegrin coast and estimations of the existing impacts of tide, as well as data that refer to meteorological factors), sea level rise of 0.69 m is happening during storms (0.69 m is value without calibration of the sea level in relation to Trieste vertical datum – 0.27 m)

Sea level rise will have probably significant effects particularly to coastal lagoons and estuaries. With increasing salinity, there may be shifts in the nature of the ecosystems (Figure 36).

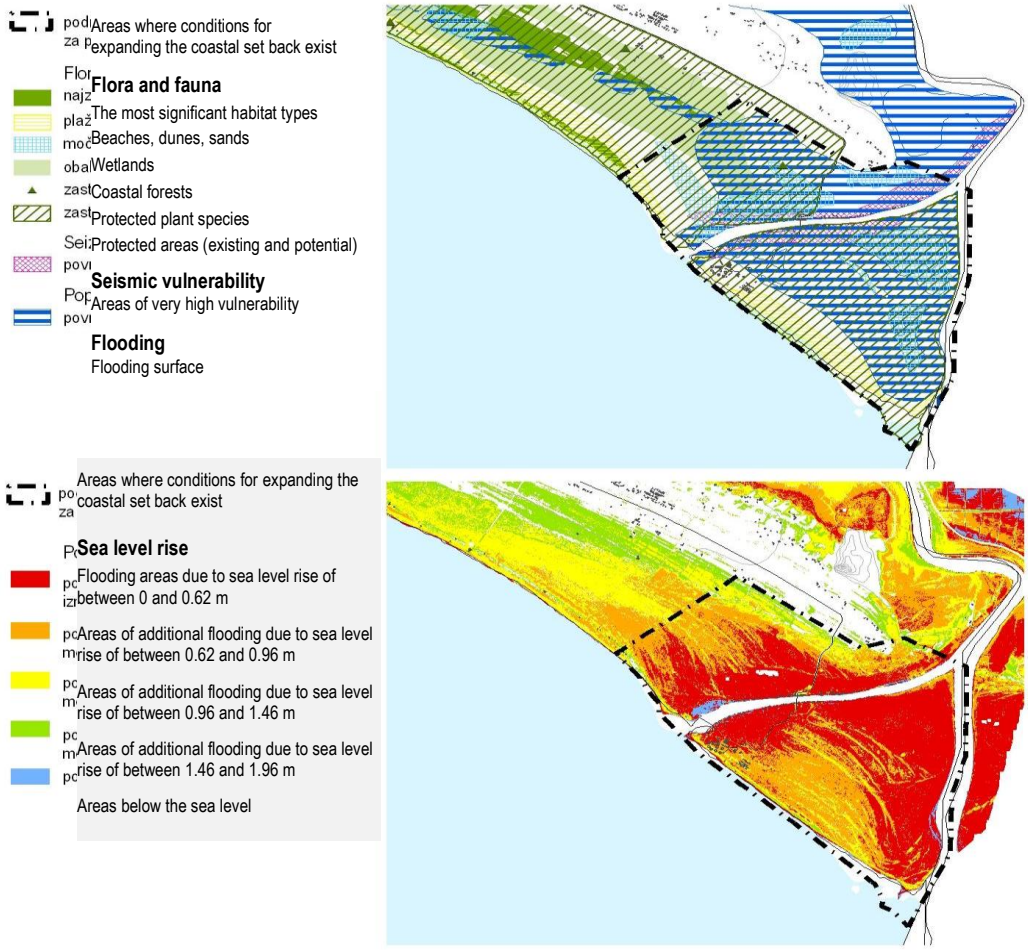


Figure 36: Elaboration of storms and sea level rise impacts – Ada Bojana

Thus **the possible ranges of SLR projections for the Buna/Bojana region vary (based on methodology applied) but could range from 7 – 26 (Albania) for the 2050s, and (15 -73 Albania) for the 2100s with 62 being the most likely scenario (as applied for Montenegro).**

Combined effect of sea-level rise and storm surges could lead to flooding of the coastal environment, which is not able to adapt to the predicted changes, in particular if the natural assets are irreversibly altered (UNDP). The final report of the PESETA study (Ciscar, 2009) estimates of the number of people who are expected to be affected by coastal floods due to sea level rise are presented for different regions in Europe for different climate change scenarios. Without adaptation, the number of people expected to be annually flooded in Southern Europe are estimated to be 456,000 in the A2, 3.9˚C temperature increase during 2071-2100 and high sea level rise scenario. For the same scenario, land loss as a percentage of the regional total for Southern Europe is estimated to be 0.783 per cent, which is valued at 307.42 million USD when no adaptation is considered.

10.3.2 Extreme weather events

Climate change is expected to have significant impacts on extreme weather events in Europe (IPCC, 2007). ***These*** are likely to increase, resulting in significant damages if no action is taken. Hence, adaptation to such events needs to be planned, including future infrastructure design and changes in

land use. Changes in the hydrologic regime of the river under different climate change scenarios should be assessed and quantified in this regard.

Water demand management measures should be designed and implemented in the short term as future water demands are expected to grow as a result of economic development (e.g. tourist industry) while the potential increase in air temperature will enhance also the water losses (due to increased evapotranspiration).

The World Bank (Pollner et al., 2008) note that South East Europe (which includes Albania and Montenegro) will be one of the European regions that will be hardest hit by global warming. The same document also notes that temperatures are expected to increase by 1.8˚C for the years 2030-2049 and that the highest increases will be in Albania and Montenegro among other countries.

According to the Second National Communication of Montenegro on Climate Change to UNFCCC it is expected that climate change will increase the frequency and severity of many types of extreme events, including floods, droughts, forest fires, storms (i.e. extreme cyclone), wind storm, etc. and the nature of many other hazards that are not directly related to weather conditions (i.e. landslides), in relation to the analysis of the observed extreme events on the Montenegrin coast by 2010. Thereby trends of the observed and trends of the projected changes in climate extremes coincide.The World Bank (Pollner et al., 2008) notes that for South East Europe, the decrease in precipitation and the increase in temperature will lead to greater frequency and severity of drought. UNDP notes that the occurrence of severe, moderate and dry droughts are expected to increase in Albania by 2100. The display in decades of the highest maximum temperatures in Montenegro indicates that in the region of the Montenegrin coast higher maximum temperatures were recorded during the decade (1981-1990)[50]. The drought of 2003 has evolved to agricultural droughts and among other areas mostly affected the coastal region. The drought of 2007 was very long, so additional to the agricultural drought it developed into hydrological drought, and affected all regions of Montenegro. The drought of 2011, which in type was meteorological, lasted a long period of time, so in addition to agricultural and hydrological it developed into socio-economic. Monitoring and assessment of climate in Montenegro shows that heat waves are occurring more frequently and that their length shows great variability from year to year. Looking in longer terms, there is a trend of successive increase in the duration of heat waves. Analyses for Montenegro shows that long lasting heat waves are dominant during August, while in June and July the heat waves are short in period. Frequent and long lasting heat waves have contributed to a greater frequency of extreme temperatures, and therefore warmer climate in Montenegro.

Also, despite the overall decrease in rainfall in South East Europe, the increase of storm days, with about 3-5 days of hazardous rainfalls, can be expected by 2100 (UNDP, 2014). Through research done within CAMP Montenegro[51], in terms of observed data and damage done due to storms, it can be concluded that storms (well developed cyclones) occur more frequently and more intensively since 1998 bringing to the coastal area heavy rains, storm to hurricane-force winds, high waves and flooding of wider areas along the coast. From the point of maximum daily rainfall (an absolute record) the results show that in the coastal area it's the decade '01 -'10 the second largest in extreme rainfall[52]. Heavy rains may occur either within a well-developed cyclone (ie. storm) or as a result of strong local instability of air.

Despite the fact that decrease in total precipitation combined with higher evaporation would probably result in overall lover run-off, extreme changes in weather conditions (drought and severe storms, could lead to overall increase of flooding in Buna/Bojana area. In terms of river floods in

[50] The Second National Communication of Montenegro on Climate Change to UNFCCC, 2015
[51] CAMP-Coastal Area Management Programme of Montenegro, 2011-2014
[52] The Second National Communication of Montenegro on Climate Change to UNFCCC , 2015

Europe, the PESETA project gives the relative change in the river discharge for flood events that have a probability of occurring once every hundred years between the scenario run (2071-2100) and the control run (1961-1990) for Europe[53]. This is shown in Figure 37 below.

Also, Pasari et al. (2004) predict that the northern Adriatic coast will be prone to more severe and longer lasting floods due to higher wind speeds, which will intensify storm surge. The World Bank (Pollner et al., 2008) suggests that evidence shows that when the South East of Europe does receive rain, the precipitation intensity will increase. They also note that drought conditions combined with intense bursts of precipitation may lead to flash floods. Moreover, this could also lead to greater soil erosion rates and increase in risk of landslides.

For the Buna/Bojana region (indicated with pink circle in the figure 4 bellow) there **appears to be a 20-40 percent increase in the river discharge** for flood events that have a probability of occurring once every hundred years between the scenario run (2071-2100) and the control run (1961-1990). **This implies that 100-year flood events in this region will become more severe**. To quantify the impacts of this would require detailed modeling at catchment level, which was beyond the scope of the current research. Given the importance of flooding in the coastal zone in question this is an area that needs further investigation.

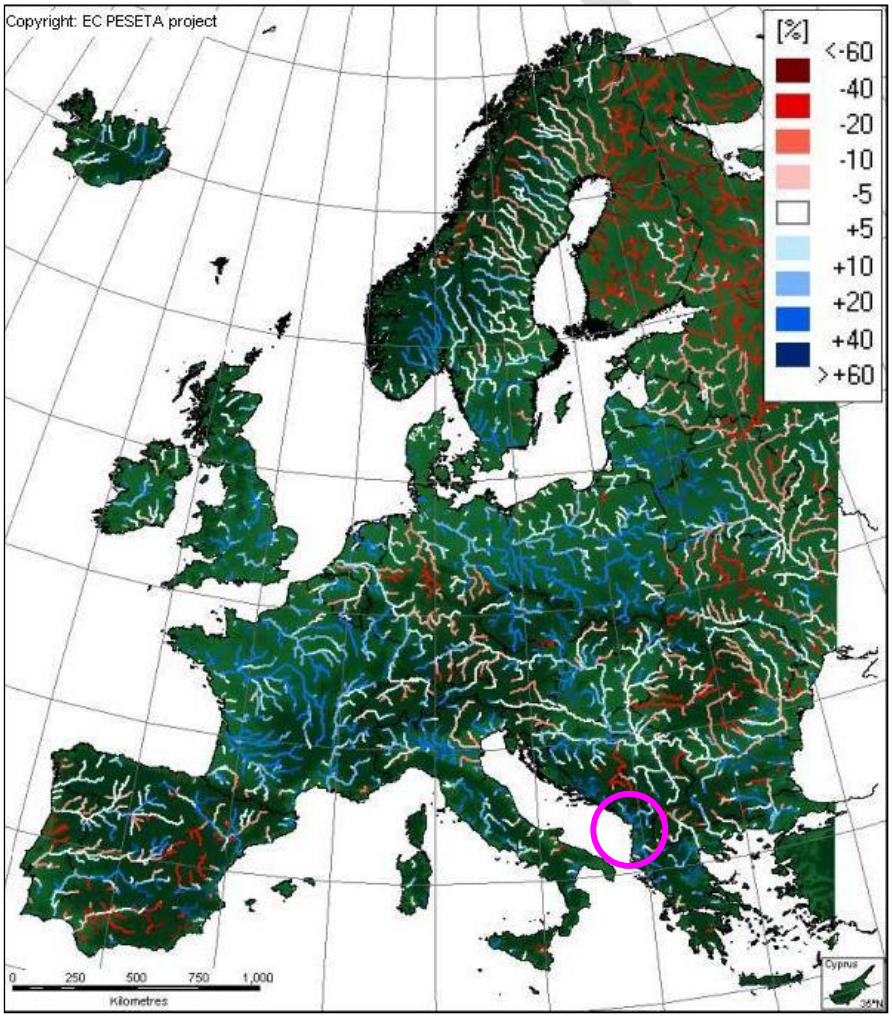


Figure 37: River discharge for flood events: change in 100-year return level (%)

[53] See http://peseta.jrc.ec.europa.eu/docs/Riverfloods.html

Source: PESETA project

The PESETA study estimates the physical impacts of river floods in terms of the additional expected population affected to be about 49,000 people per year for Southern Europe for the A2, 3.9˚C temperature increase during 2071-2100 scenario from the baseline period (1961-1990), which translates into additional expected economic damages to the tune of 2,122 million Euros per year (Ciscar, 2009).

The Vulnerability analyses on climate change and extremes within the Second National Communication of Montenegro to the UNFCCC indicated that reduction in number of days with heavy rains (over 20mm) is the largest in the coastal area of Montenegro (Figure 38). Reduction in number of days with heavy precipitation and increased precipitations in those days indicates a higher intensity of rainfall in the future, and intensifying weather events such as convective storms, which can lead to i.e. flooding. According to the A2 scenario, there are intensive local summer storms with heavy winds and heavy brief rainfall in Ulcinj, Bar and Herceg Novi. It also points to the high degree of vulnerability of this area to damage caused by stormy winds and heavy rains. The area of Skadar Lake and the river Bojana is highly vulnerable **flooding** since it can threaten important agricultural area, material goods and the urban zone.

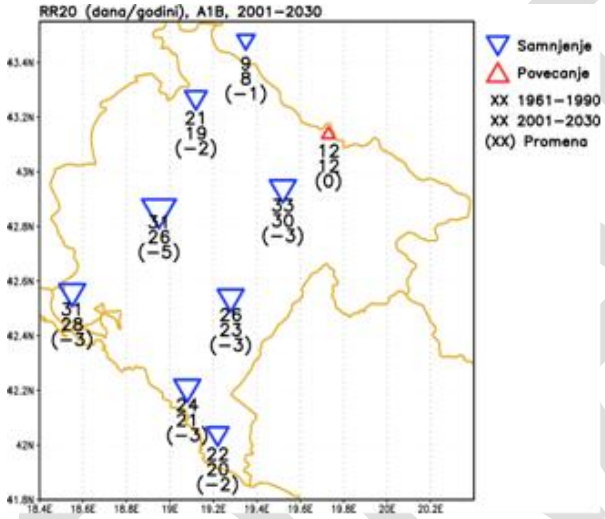


Figure 38: Days with heavy rains

Source: the Second National Communication of Montenegro to the UNFCCC

Leckebusch and Ulbrich (2004) find a 20 per cent increase in the maximum track density of extreme cyclones for Europe in the A2 2070-2099 scenario compared to the control period of 1960-1989. In other words they find a 20 per cent increase in the frequency of top 5 per cent of winter storms (October-March) for Europe. From the figures presented in Leckebusch and Ulbrich's paper (2004; pp. 189-191) it appears as though the control period (1960-1989) daily maximum wind speed for the Buna/Bojana region falls within the range of 11-14 meters per second (m/s) (see Figure 39).

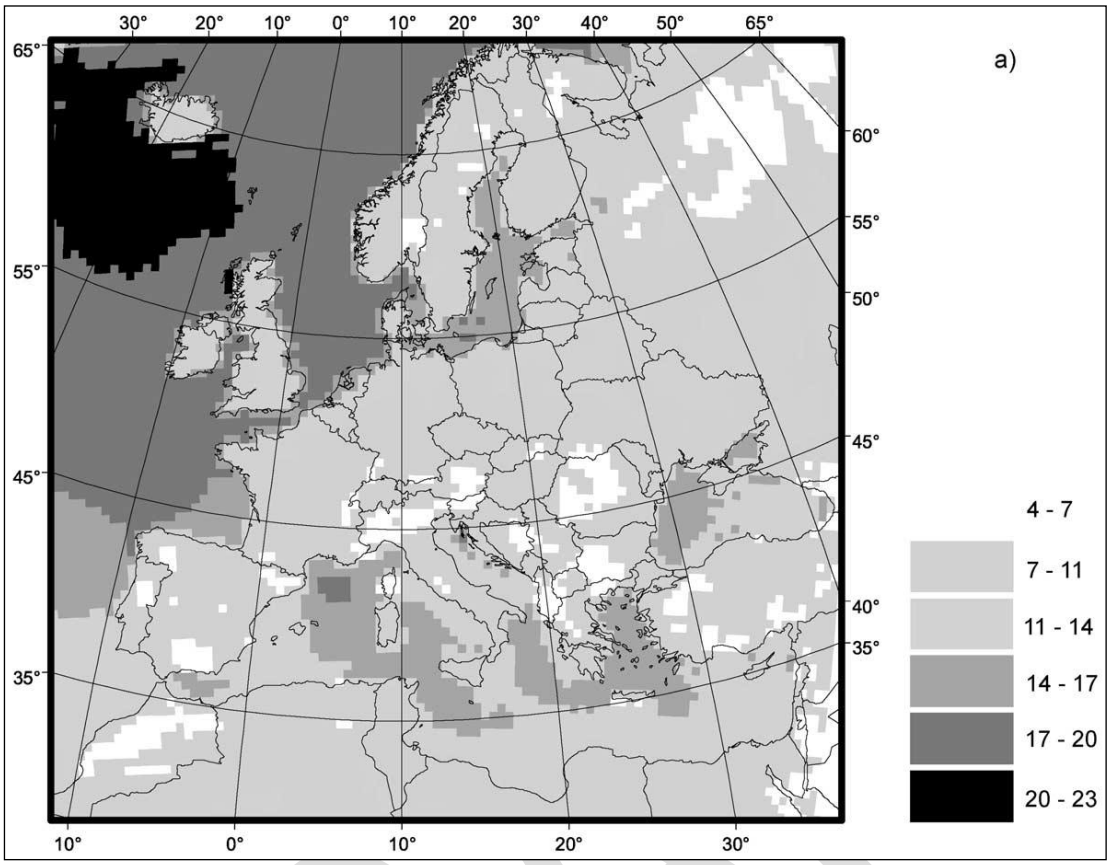


Figure 39: HadRM3H, 95th percentile of the winter (Oct.-Mar.) 10-m daily maximum wind speed in meters per second (m/s) for the control period (1960-1989)

Source: Leckebusch and Ulbrich (2004)

Figure 40 shows that the difference in the daily maximum wind speed between the A2 (2070-2099) and the control period for the Buna/Bojana region is in the range of -0.4 to 0.1 m/s. Taking a mean daily maximum wind speed of 12.5 m/s in the control period and a mean difference in the daily maximum wind speed of -0.15 m/s between the A2 (2070-2099) and the control period gives a daily maximum wind speed of 12.35 m/s for the Buna/Bojana region in the A2 (2070-2099) scenario, which translates into a 1.2 per cent decrease in daily maximum wind speed for the A2 (2070-2099) scenario from baseline levels.

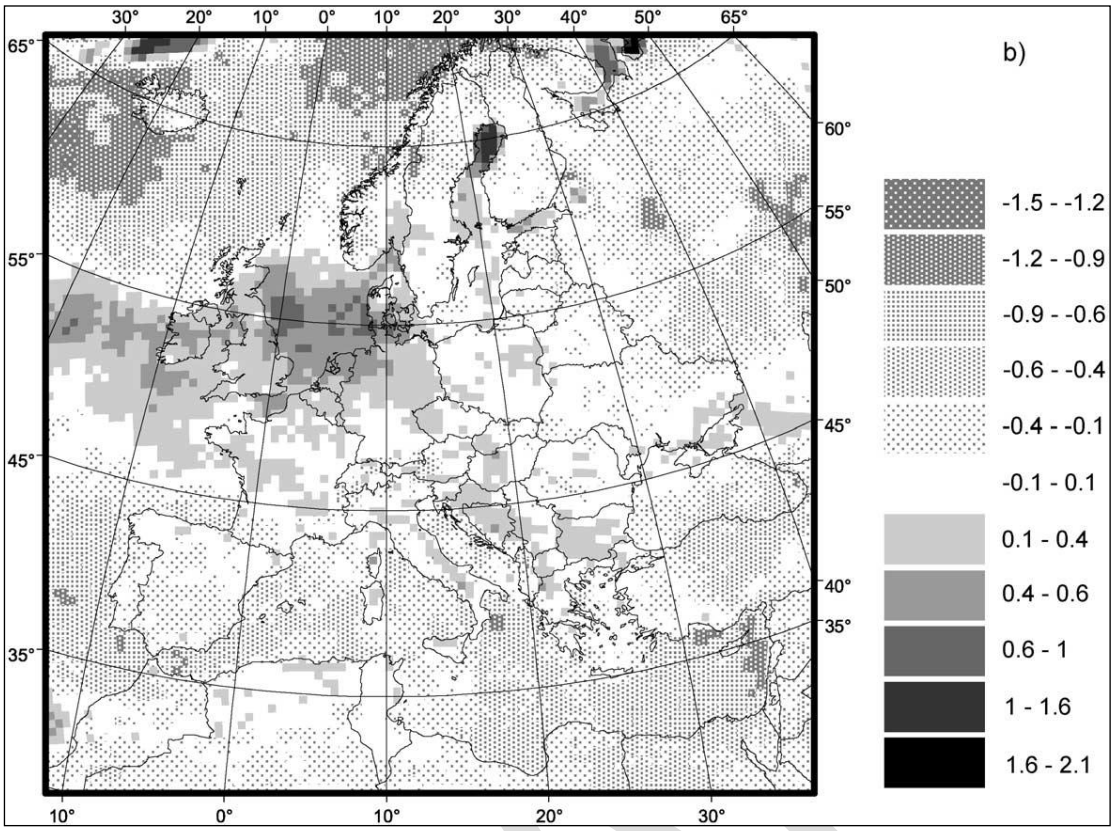


Figure 40: HadRM3H, 95th percentile of the winter (Oct.-Mar.) 10-m daily maximum wind speed in m/s: difference A2(2070-2099) - Control

Source: Leckebusch and Ulbrich (2004)

Figure 41 shows that the difference in the daily maximum wind speed between the B2 (2070-2099) and the control period for the Buna/Bojana region is in the range of 0.1 to 0.4 m/s. Taking a mean daily maximum wind speed of 12.5 m/s in the control period and a mean difference in the daily maximum wind speed of 0.25 m/s between the B2 (2070-2099) and the control period gives a daily maximum wind speed of 12.75 m/s for the Buna/Bojana region in the B2 (2070-2099) scenario, which translates into a 2 per cent increase in daily maximum wind speed for the B2 (2070-2099) scenario from baseline levels.

ABI (2005) note that a 20 per cent increase in the frequency of the top 5 per cent of storms' windspeed increases average annual total financial losses by 35 per cent for Europe. This implies that a 2 per cent increase in the frequency of the top 5 per cent of storms' wind speed in the B2 (2070-2099) scenario would increase average annual total financial losses by 3.5 per cent for the Buna/Bojana region in that period[54]. Similarly, a 1.2 per cent decrease in the frequency of the top 5 per cent of storms' wind speed in the A2 (2070-2099) scenario would decrease average annual total financial losses by 2.1 per cent for the Buna/Bojana region in that period.

[54] Average annual total financial losses in the Buna/Bojana region are calculated as a proportion of the ABI (2005) results, i.e. 2*35/20 = 3.5 percent.

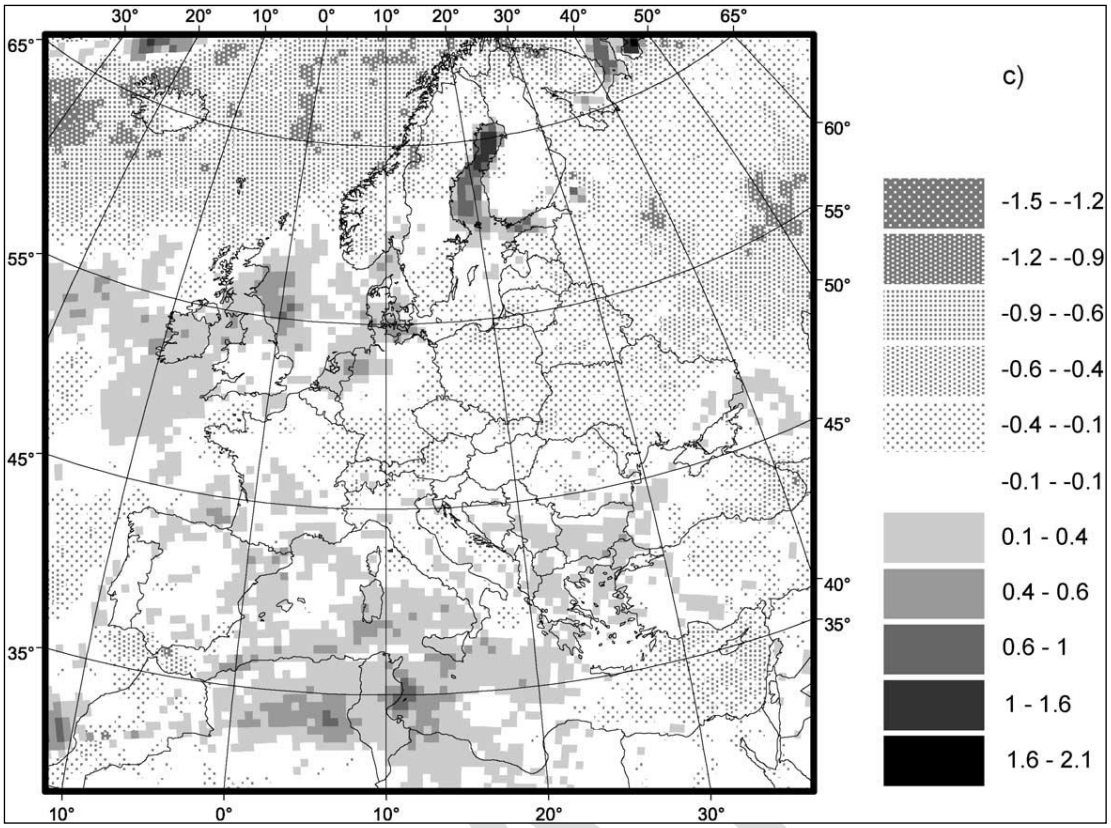


Figure 41: HadRM3H, 95th percentile of the winter (Oct.-Mar.) 10-m daily maximum wind speed in m/s: difference B2(2070-2099) - Control

Source: Leckebusch and Ulbrich (2004)

The Vulnerability analyses on climate change and extremes within the Second National Communication of Montenegro to the UNFCCC indicated that according to A1B scenario in the summer period (2001-2030) the maximum wind speed growth in average will be more than 2% in the coastal region, while in other regions and seasons it will reduce. During the summer period (2071-2100) and considering both scenarios, zone of larger maximum wind speed is narrowed and shifts more towards the south-east coast (Figure 42). The highest wind speeds are in the case of A2 scenario, even up to 3% increase in the area of Skadar Lake and Bun/Bojana in respect to the period 1961-1990.

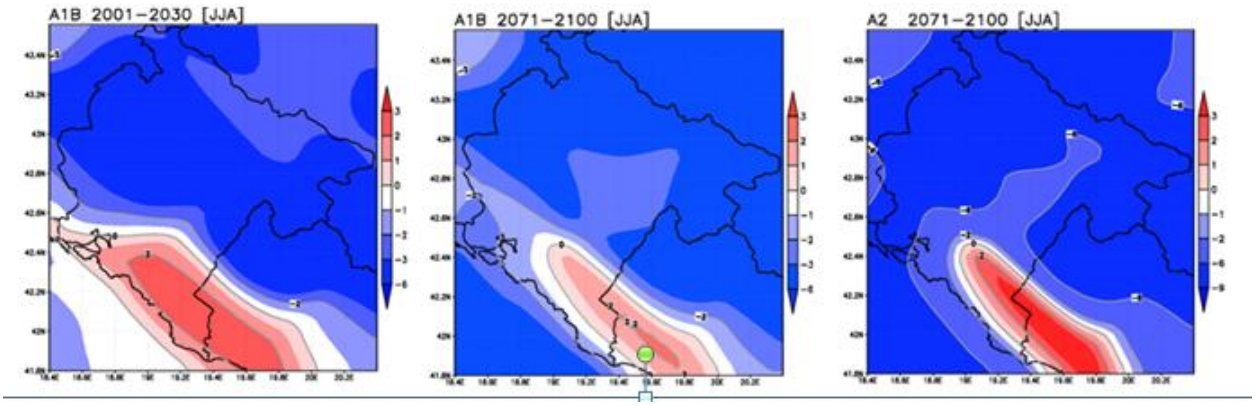


Figure 42: Change in mean daily maximum wind speed in summer

Source: the Second National Communication of Montenegro to the UNFCCC

The economic losses from natural disasters in Albania and Montenegro (and Serbia) during the period 1974-2006 are presented in Table 11.

Table 11: Economic losses from natural disasters in Albania and Montenegro, 1974-2006

Number of years taken for average	Country	GDP PPP per capita ($/inh.) 2005	Annual average economic loss due to all perils (in million US$)	% GDP	Economic loss (in million US$)		
					Drought	Earthquake	Flood
1974-2006	Albania	2,755.3	68.67	2.49	2238	2 to 5	24.67
1989-2006	Serbia and Montenegro	4,936.0	82.00	1.66	-	2705	0

Source: World Bank (Pollner et al., 2008)

The above figures illustrate the negative impact natural disasters can have on the economy and with the potential increase in windstorms and floods in the future due to global warming, this issue becomes more acute. Moreover, Albania and Montenegro have insufficient annual budget o to finance large losses from extreme events (Pollner et al., 2008).

In addition to the above information on economic losses from natural disasters in Albania and Montenegro, The International Disaster Database[55] records information on natural disasters by country including the number of events that have occurred in a given time period, the number of people affected and damage estimates in dollar terms where available. This information for Albania and Montenegro is summarised in Table 12.

Table 12: Summarised table of natural disasters in Albania and Montenegro from 1900 to 2011

		Number of Events	Persons Killed	Total Persons Affected	Damage (000 US$)
ALBANIA					
Drought	***Drought***	1	-	3,200,000	-
	avg. per event		-	3,200,000	-
Extreme temperature	***Extreme winter conditions***	1	68	7,085	-
	avg. per event		68	7,085	-
	Heat wave	2	3	150	-
	avg. per event		2	75	-
Flood	***Unspecified***	1	4	1,500	-
	avg. per event		4	1,500	-
	Flash flood	1	11	35,000	7,000
	avg. per event		11	35,000	7,000
	General flood	6	4	92,484	17,673
	avg. per event		1	15,414	2,946

[55] See http://www.emdat.be/

	Storm surge/coastal flood	1	-	8,000	-
	avg. per event		-	8,000	-
Mass movement wet	***Landslide***	1	57	26	-
	avg. per event		57	26	-
Storm	***Local storm***	2	8	525,000	-
	avg. per event		4	262,500	-
Wildfire	***Forest fire***	1	-	75	-
	avg. per event		-	75	-
MONTENEGRO					
Flood	***Flash flood***	1	-	1,086	-
	avg. per event		-	1,086	-
	General Flood	3	-	6,800	-
	avg. per event		-	2,267	-

Source: EM-DAT, http://www.emdat.be/

The above information shows that floods, storms and droughts seem to occur most frequently in this region and also seem to affect the most number of people.

10.4 Hydro-morphological issues

The construction of a cascade of dams on Drin River in Albania and their operation for hydropower generation have had effects to the natural environmental processes hence, have resulted in a number of impacts not only to the Drin but also to the Buna/Bojana catchment.

Box 5: Hydropower in the Drin River Basin in Albania

Hydropower is the main source of electrical energy in Albania; 95% of the country's production derives from HPP. Electrical energy generated in Drin River basin accounts for 93% of the Albania's total hydropower production.

The characteristics of the three large Drin River HPPs, the Fierza HPP, the Koman HPP and the Vau Dejes HPP are presented in the table below. The respective reservoirs are used only for hydropower generation purposes. An additional HPP was constructed on the Drin River at Ashta area a few kilometers away from the Skadar/shkoder Lake. There are also 40 dams serving irrigation purposes.

Basic characteristics	**HPP Fierza**	**HPP Koman**	**HPP Vau Dejes**
Construction year	1973-1979	1980-1988	1971-1973
Plant Flow (m^3/s)	4 x 123,5	4 x 180	5 x 113
Nominal Head (m)	118	96	52
Number Type of turbine	4 x Francis	4 x Francis	5 x Francis
Capacity (MW)	4 x 125	4 x 150	5 x 50
Annual production (GWh)	1138	1500	878
Reservoir total storage (mi. m^3)	2700	430	623
Reservoir active storage (mi. m^3)	2350	250	310
Type of dam	Rockfill	Rockfill, concrete facing	2 Rockfill, 1 earth
Water level (a.s.l.)	295	172	76

Source: (adapted from) Drin River Hydropower Plants, KESH 2006

Adverse effects include the following:

- Severe perturbation of the flow regime and disturbance of the sediment distribution regime. These have caused severe disturbances to the river, deltaic and coastal ecosystems.
- There was a 13-fold sediment load reduction; this was due to the sediment retention in reservoirs, combined with the long-term decline in Drin river runoff. Nevertheless the increase of the erosion processes in the Drin's tributaries continue to provide sediment inputs to the Buna/Bojana River. The material that is currently transferred into the Adriatic Sea corresponds to remnant sediments which the Drin brought in before the dam construction.

Other morphological alterations concern the extraction of inert materials from the riverbanks, damage of island barriers and construction of dikes along the Buna/Bojana River for flood control. Sedimentation in the Buna/Bojana River and manmade barriers for fishing purposes along the migration routes to the Adriatic Sea may cause fish stock degradation in Lake Skadar/Shkoder.

River bank reinforcements, and a system of dikes have been built since the 1960s to protect the Buna/Bojana area from floods and to increase the agricultural land. Experience has shown that those

structures haven't always been effective. Hydromorphological constructions have been deemed necessary by the authorities as emergency measures responding to the December 2010 floods.

Image 5: The dams in Fierza (up) and Koman (down)

10.4.1 Floods

The Lower Drin – Buna/Bojana River and Lake Skadar/Shkoder watersheds are subject to a high risk of flooding. Floods in Albania have been common and known from historical times, as described by Romans and Turks. Major floods in the Drin-Buna/Bojana Basin were reported in the 1850's, in 1905, 1962-63, 1970-71 (Bodgani, 2011). Floods have, in general, a pluvial origin, hence observed during the period of November-March, when 80-85% of the annual runoff is generated. Figure 33 presents a flood risk and a flood potential map of Albania showing the high risk and potential for floods in the lower Drin and Buna/Bojana basins.

Figure 43: Flooded areas in Buna/Drin River area before the construction of the cascade of dams on Drin (1963). -Source: K. Zaimi

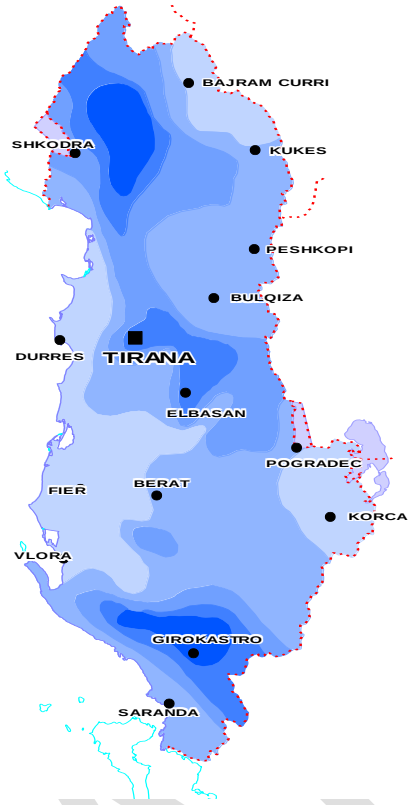


Figure 44: Flood Risk Map according to flooded areas in winter 1962-3 and Flood Potential Map 100 Years Return Period (Selenica et al., 2011)

Floods occured also after the construction of the Drin-reservoirs in 1979, 1992, 2003-2004 and 2010.

There were two floods in 2010, on January -an 80 years return period flood- and on December. While there are opposite opinions, there are experts that have documented[56] that the intensity of the January 2010 flood was augmented due to the mode of the operation of the cascade of floods in Albania; the flood was caused by snow melting and heavy precipitation combined with strong winds that resulted in unusually high tides that impeded the outflow from the Skadar/Shkoder Lake. More details for both floods are given in Part C - Water Resources Management – Situation Analysis.

[56] Lake Skadar/Shkoder Integrated Ecosystem Management Project (2008-2012) developed a Predictive Hydrological Model for the SS-LBA and analyzed the extreme flooding events occurred in January 2010.

Image 6: Outflow of the Vau-I-Dejes dam in January 2010

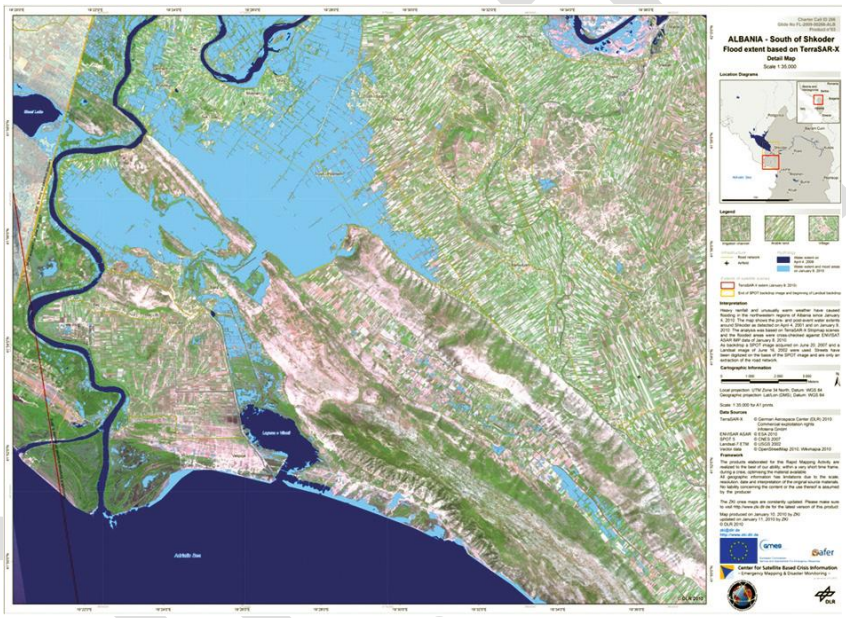


Figure 45: Flooded areas in the Buna basin on 13.01.2010 (Bogdani, 2011)

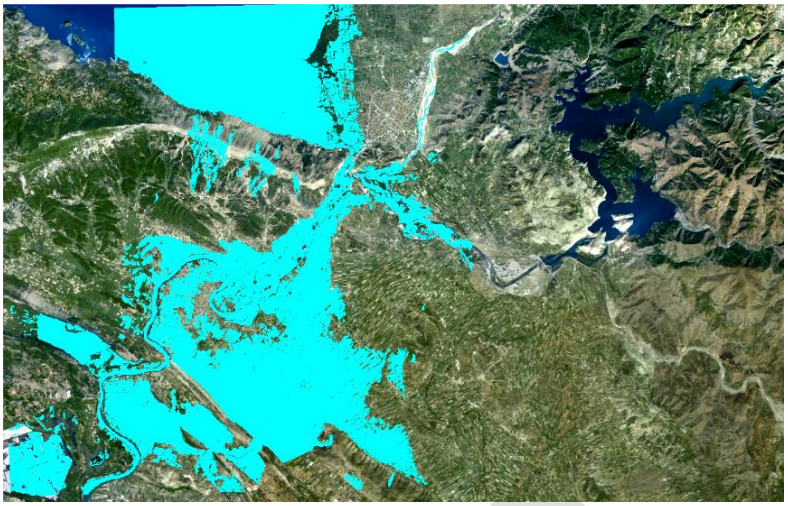


Figure 46: Flooded areas in Buna – Drin – Shkoder/Skadar area in Albania - 08.12.2010

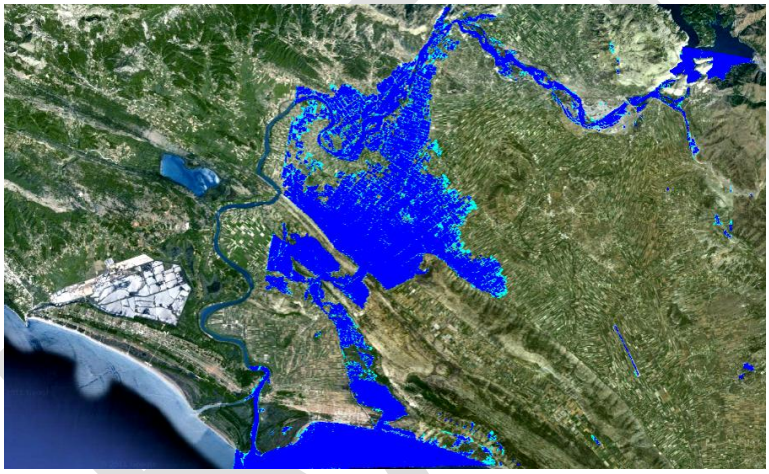


Figure 47: Flooded areas in Buna – Drin – Shkoder/Skadar area in Albania - 12.12.2010

Floods in the Skadar/Shkoder and Buna/Bojana area have detrimental socioeconomic effects. While there is a need for these phenomena to be further studied there are indications that they come as a result of the combined effect of the following:

- Flow variability due to both natural (once every 10 years the flow in the lower part of the Drin-Buna/Bojana River system reaches about 13 times the river module) as well as anthropogenic factors such as water releases from the dams on Drin River.
- High sediment input through the tributaries of Drin downstream the dams due to erosion caused by gravel extraction and loss of plant coverage.
- Accumulation of alluvium in the tributaries of Drin, Drin itself and Buna/Bojana. In the case of Drin this is due to the decreased sediment transport capacity as a result of the controlled outflow from the artificial lakes; in the case of Buna/Bojana the latter is combined with the low gradient of the riverbed.
- Blockage of the natural secondary channels of the Buna/Bojana River that existed in the past in the delta area; the pick flows exceed the capacity of the main (existing) channel.
- Poor maintenance of the drainage channels and flood preventing constructions in the Albanian side and of the embankments on Montenegrin side.

Figure 48: Direction of the water during the floods in the Albanian part of the Buna Basin.

Plans to dredge the Buna/Bojana River, as a flood prevention measure benefiting navigation, will have severe effects to the riverine ecosystem and the delta. It is questionable whether this measure will sufficiently reduce the flood risk since fresh sediment coming from the Drin River, as a result of erosion in its lower part, may cause new sediment depositions to the river bed.

Deposition of sediment at the mouth of the River Buna/Bojana influences also navigation.

10.4.2 Coastal dynamics

Buna/Bojana influences the wider coastal area in the zone of its mouth. Velika plaža (Great beach) in Ulcinj and Ada Bojana -among the areas in Montenegro with significant touristic development potentials- are created by the Buna/Bojana sediment deposits. The morphology, hydrography and the related values of the Buna/Bojana deltaic complex are defined by the balance among the following:

(i) accumulation of sediments in Drin and Buna/Bojana;

(ii) reduced sediment load[57] reaching the mouth of the Buna/Bojana in the Adriatic Sea;

(iii) water flow regime in the Skadar/Shkoder – Drin –Buna/Bojana system and;

(iv) variability of the wave activity and sea level in combination with short-term events (storm waves and tides) and long-term processes (sea transgressions).

Information and data regarding the coastal dynamics are limited; additional research is necessary in this regard. The available information (Adricosm Project) indicates that the coastal area in front of the right branch of the delta is a sediment accumulation area. The coastal area in front of the left branch, on the contrary, is an area of erosion. During the autumn and winter the quantity of sediment from the river and from advection in the sea is not high enough to balance the erosion effect of the combined activity of waves and currents. As a result, the sediment material is carried by the currents and waves away from the river mouth along the coastline. The period May - October, on the contrary, there is a balance between erosion and deposition. Simulated interaction between Buna/Bojana River plume and waves at the mouth of the river, shows that sediments tend to be deviated and accumulated south-east of the Buna/Bojana.

Overall, there is erosion in some parts of the Buna/Bojana Delta while there are depositions in other parts (see Figure below).

Figure 49: Buna delta change between 1971 and 2007. Note: Eroded areas are shown in red color areas; depositions and advancement of land towards the sea is colored in green. - Source: K. Zaimi.

[57] According to some authors there is a 13 fold reduction compared to 1854, when the Drin River was naturally diverted to Buna/Bojana River.

According to EuroNatur, 2009, during the past twenty years there has been extensive erosion in the Ada Bojana and the sea advanced inland 2.5 m/y; it is estimated that since 1936 the sea line has progressed 400 m.

Image 7: Coastal erosion in a ten years period (~1985 - ~2005) at the Ada beach at the main delta island of Bojana-Buna in Montenegro - Source: EuroNatur, 2009

10.5 Pollution

KEY HIGHLIGHTS

- **The main pressures in terms of N and P pollution come from outside the Plan area and therefore specific measures should be taken in this regard i.e. reduce these pollution levels.**
- **The amount of N and P pollution deriving from urban waste -from the municipalities in the Buna/Bojana area and from Shkodra city- is significantly less than the respective amounts deriving from agriculture and livestock operations in the Buna/Bojana watershed, nevertheless, the pressure exerted to the system is comparable.**
- **The overall assessment of the groundwater bodies is not currently possible to be realised according to the requirements of the WFD because of the almost complete absence of necessary data.**
- **The areas of high and very high groundwater pollution risk cover only 4.6% of the Plan area. The high/very high and moderate pollution risk areas are mainly calcareous dominated zones.**
- **The biological status of surface water bodies in all stations for which data has been available was assessed as poor.**
- **Buna/Bojanariver chemical status is "lower than good" and this results in its overall status to be characterized as "bad". There is heavy metal pollution and the mean concentration of some metals are above Environmental Quality Standards at one or more sampling stations: Mercury in all stations; Nickel in Dajc and Bojana Left Branch; Cadmium in Fraskanjel and; Lead in Dajc and Fraskanjel.**
- **The chemical – physicochemical quality of Buna/BojanaRiver, deteriorates from its sources to its mouth, ranging from "moderate" to "poor", due to elevated ammonium and BOD_5 concentrations.**
- **Special attention must be given to the addressing of the issue of invasive species (e.g. Dreissena spp) as well as for the conservation of threatened species, such as Valvata montenegrina[58].**
- **The concentrations of Mercury are elevated in Lake Shasko and Viluni lagoon.**
- **The ecological quality of the coastal zone waters is classified as "bad".**

10.5.1 Pollution in the Drin River and Lake Shkoder/Skadar

As Buna/Bojana is under the direct influence of the Drin River and the Lake Skadar /Shkoder, understanding the level of pollution in these two water bodies is significant. The main conclusions of

[58] IUCN Red List of Threatened Species - http://www.iucnredlist.org/details/164824/0

a review of the available bibliography regarding the pollution in these two bodies is presented in Box 6.

Box 6: Levels of pollution in lower part of the Drin River in Lake Skadar/Shkoder[59]

Lower part of the Drin River

- Oxygenation conditions, BOD_5, COD and phosphorous compounds were at satisfactory good levels (available data and studies used are for the years 2004-2005 and 2008-2012). Concentrations of nitrogen compounds were relatively high.
- The lower part of the Drin River is affected by high geochemical background for Cr, Cu, Fe, Ni, and respective mining activity, resulting in elevated heavy metal concentrations in river sediments.[60]
- Concentrations of dissolved metals are lower hence water quality is satisfactory in this regard.
- The total pesticide concentrations were higher at the downstream portion of the river[61], i.e. between Vau i Dejes (with maximum levels of 8,389 ng/l) and at the mouth of the Drin River.
- The same was true for DDT and its metabolites (maximum concentration of 91 ng/l was found though in Vau i Dejes). The levels of lindane, DDTs and metabolites, HCHs and methoxychlor in some cases exceeded the maximum permissible values set in the Directive 2008/105/EC for surface natural waters.

Lake Skadar/Shkoder

- The quality of the lake waters, regarding physico-chemical parameters, BOD_5, COD and nutrient compounds, was at satisfactory good levels (2004-2010)[62]. The same good levels were indicated in a study that looked into nutrient pollution; nevertheless, microbial pollution at the outflow of the lake in Buna River was found to be an issue[63].
- According to a study[64], the concentrations of dissolved heavy metals (Cr, Co, Ni, Cu, Zn, As, Cd, Sn, Hg and Pb) in lake water were (in 2006) generally lower than those in the Drin and Buna Rivers. Elevated heavy metal concentrations in the mouth of the lake were attributed to the inflow of the Drin to the lake that usually takes place during December to February[65], but also when dams release water into the Drin River. The concentrations of lead and cadmium[66] were lower than the Environmental Quality Standards (EQS) for priority substances according to Directive 2008/105/EC).
- The presence of PAHs in the lake (concentrations ranged from 0.025 to 1.65 ng/SR during the years 2007-2008) indicated the influence of anthropogenic pollution[67].
- The levels of DDT-total, HCB and HCHs exceeded the EQS of the Directive 2008/105/EC for surface natural waters[68].
- Concentrations of total PCBs in Lake Skadar/Shkoder were lower than the norms of EU[69].
- Differently to the sediments, relatively high values of Lindane -compared to other HCH isomers- were found in fish[70] .

[59] Tables with concentration of pollutants can be found in (Part C)
[60] Neziri and Gössler, 2004
[61] Neziri and Shabani, 2013
[62] According to data reported by Albanian authorities to the European Environmental Agency for 2004-2010
[63] Bushati et al. 2010
[64] Neziri and Gössler, 2006
[65] Bushati et al., 200
[66] Neziri & Laso, 2009
[67] Neziri et al., 2011
[68] Total organochlorinated pesticides in the water column of Lake Skadar/Shkoder varied, according to Nuro & Marcu (2011), between 0.0176 and 0.0834 μg/l; according to Neziri & Gjini (2011), the levels of total organochlorinated pesticides in water were two orders of magnitude higher ranging from 1.05 to 10.2 μg/l.
[69] Neziri et al., 2012
[70] Maximum concentration (80.5 ng/g f.w.) was detected in Allosa agone. Maximum values of ΣDDTs' was found in Carp (Cyprinos carpio), which is the famous characteristic non migratory fish of Shkodra Lake (Nuro & Marcu, 2011).

- A total of 39 compounds of toxic hydrophobic organic pollutants (HOPs) were identified in six sampling sites in the lake. Alkylated PAHs were the most abundant compounds present along with various sterols and sterol derivatives. Numerous other compounds found, remain unidentified. 15 of the 16 targeted PP-PAHs, mainly originating from oils and hydrocarbon fuels, were present in the lake. Bioassays indicated that toxicologically relevant compounds are readily available for uptake by aquatic biota. [71]

10.5.2 Estimation of point source and diffuse pollution loads in the Buna/Bojana catchment

The characterization of the surface waters and groundwater as described at Article 5 of WFD is a premise that requires the review of the environmental impacts of human activities and the identification of pollution pressures (EC, 2003). Registering and understanding the pollution pressures as well as their magnitude provides part of the information necessary to design the necessary measures for achieving a good ecological status.

The pollution loads from the three major economic activities in the Plan area were calculated (details are given in Part C Water Resources Management – Situation Analysis): **Urban wastewater[72]; Agriculture[73]; Livestock[74].** The data that were available/used for the calculations -the results of which are presented below- were of inefficient quantity and of low quality[75]. This is not unusual when management plans are prepared for the first time in a given area. As an outcome there is high level of uncertainty with regard to the actual situation in terms of pollution sources and loads generated.

According to the results of the analysis, stockbreeding is the main source of total N in the Buna / Bojana watershed; urban wastewater from settlements in the Buna/Bojana area contribute the least. The biggest quantity of total N in the basin is produced at Berdice, Ulcinj, Velipoje and Dajc municipalities. The biggest quantity of total N per km^2 is produced at Berdice, while the least

[71] Rastall et al., 2004

[72] Statistical data regarding water consumption (Van den Berg & Danilenko, 2011; IBNET; Statistical Office of Montenegro) and bibliography regarding the composition of untreated urban wastewater *(Metcalf and Eddy, 1991)* were used for the calculation of the nitrate and phosphate loads per municipality / commune: the volume of domestic wastewater produced in one year period was calculated based on the average water consumption per capita and the population of each settlement.

[73] Statistical data about the agriculture activities in the municipalities/communes at Buna/Bojana watershed (from bibliography, municipal/regional statistical offices and EEA - CORINE Land Cover 2006, 2011) as well as bibliography regarding the amount of fertilizers applied in cultivations, were used for the calculation of the nitrate and phosphate loads per municipality / commune.

[74] Statistical data regarding the number of breeding animals (Statistical Yearbook 2012 of the Statistical Office of Montenegro concerning the municipality of Ulcinj, the Regional Council of Shkoder concerning the municipalities/communes Bushat, Berdice, Rrethine, Velipoje, Ana e Malit and Dajc and the Regional Council of Lezha (REC, 2005) concerning Balldre commune) and the specifications of livestock waste production proposed by WHO (1982) were used for the calculation of the nitrate and phosphate loads per municipality / commune. A correction factor was applied in order to estimate the actual livestock activities that take place in the municipalities. The spatial distribution of these activities was based on data concerning the ecosystems / habitats of the Plan area and CORINE data (EEA - CORINE Land Cover 2006, 2011).

[75] The CORINE 2006 was used; the statistical data were not adequate. Furthremore, it was not made possible to have and use information related to a number of other pollution sources such as municipal solid waste, hazardous industrial waste, dairies and fuel storage installations for the entire Plan area (including Albanian part). These were considered in a recent, relevant study in Montenegro (NBB 2013) that includes estimates about the respective pollution loads. According to NBB (2013) the most significant pollution pressures in the Montenegrin study area are municipal urban waste, followed by tourism. Agiculture, dairies and municipal solid waste are not considered equaly significant pollution pressures in the specific area.

quantity is produced at Rrethina and Balldre and can be attributed mainly to urban wastewater and livestock respectively. The inclusion of urban liquid waste generated by the tourism in the calculations was not possible since there were no relevant data available for the entire Plan area. If calculations include this sector, some of the estimated figures (e.g. TN and TP) may increase significantly[76].

Table 13: Estimation of total N produced per municipality / commune (2011)

Municipality/ Commune	Area (km^2)	Total N (ton/year)				Total N (ton/year/km^2)
		Urban	Agriculture	Livestock	Total	Total
Ana Malit	48.9	6.46	220.33	273.60	**500.39**	**10.23**
Balldre	9.3	-	3.10	62.26	**65.36**	**7.05**
Bar	38.4	3.07	33.93	11.31	**48.31**	**1.26**
Berdice	29.6	7.52	133.78	1,001.74	**1,143.04**	**38.66**
Bushat	24.5	4.60	57.60	424.57	**486.77**	**19.90**
Dajc	50.8	8.96	212.15	726.38	**947.49**	**18.64**
Rrethina	1.8	0.80	0.23	0.00	**1.03**	**0.58**
Ulcinj	241.4	46.78	339.54	618.65	**1,004.96**	**4.16**
Velipoje	63.5	8.37	149.82	913.72	**1,071.91**	**16.89**
Total	**508.11**	**86.56**	**1,150.49**	**4,032.22**	**5,269.27**	**117.38**

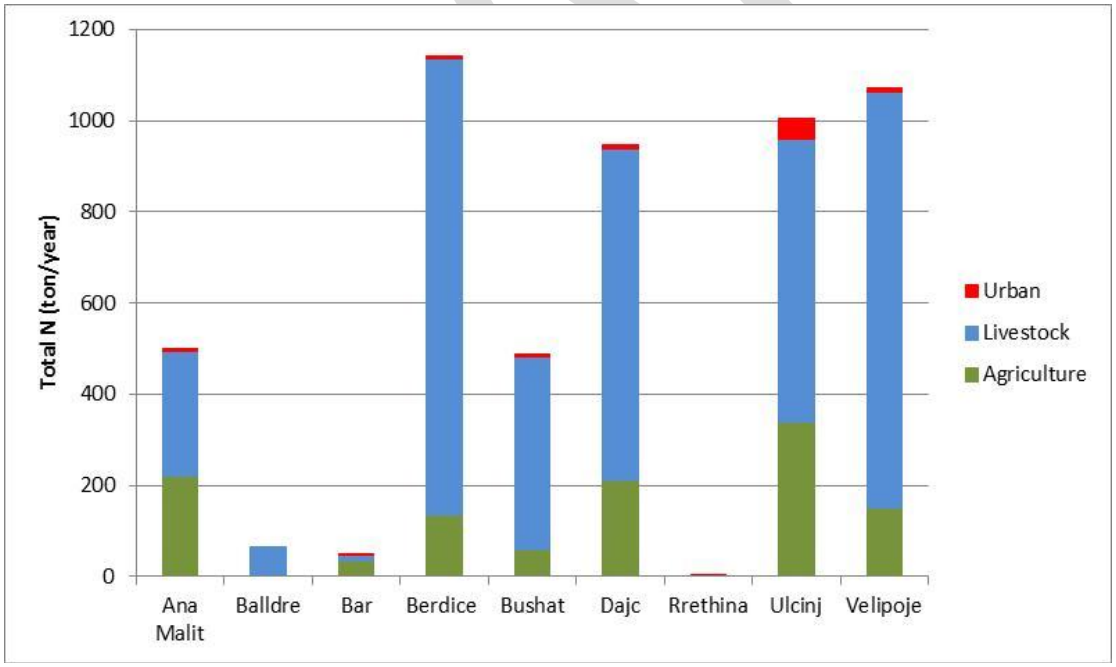


Figure 50: Distribution of total N per municipality / commune of Buna/Bojana watershed

[76] This is accredited by NBB (2013) that estimated TN and TP values for urban and tourism sector for Ulcinj at about 87 t/yr and 22 t/yr respectively (not the entire Ulcinj area is included in the Buna/Bojana catchment).

The main pollution source regarding total P is agriculture. The biggest load of total P is produced at Ana Malit, Velipoje, Dajc and Ulcinj municipalities. The biggest produced quantity per km^2 is produced at Ana Malit and Berdice while the least is produced at Rrethina and Balldre and can be attributed mainly to urban wastewater and livestock respectively.

Table 14: Estimation of total P produced per municipality / commune (2011)

Municipality/ Commune	Area (km^2)	Total P (ton/year)				Total P (ton/year/km^2)
		Urban	Agriculture	Livestock	Total	Total
Ana Malit	48.9	1.29	144.13	8.93	**154.35**	**3.16**
Balldre	9.3	-	1.07	2.33	**3.40**	**0.37**
Bar	38.4	0.61	14.59	0.73	**15.93**	**0.41**
Berdice	29.6	1.50	60.61	29.94	**92.06**	**3.11**
Bushat	24.5	0.92	21.81	16.28	**39.00**	**1.59**
Dajc	50.8	1.79	90.52	26.97	**119.28**	**2.35**
Rrethina	1.8	0.16	0.11	0.00	**0.27**	**0.15**
Ulcinj	241.4	9.36	70.06	22.41	**101.82**	**0.42**
Velipoje	63.5	1.67	53.77	72.93	**128.38**	**2.02**
Total	**508.11**	**17.31**	**456.67**	**180.52**	**654.50**	**13.59**

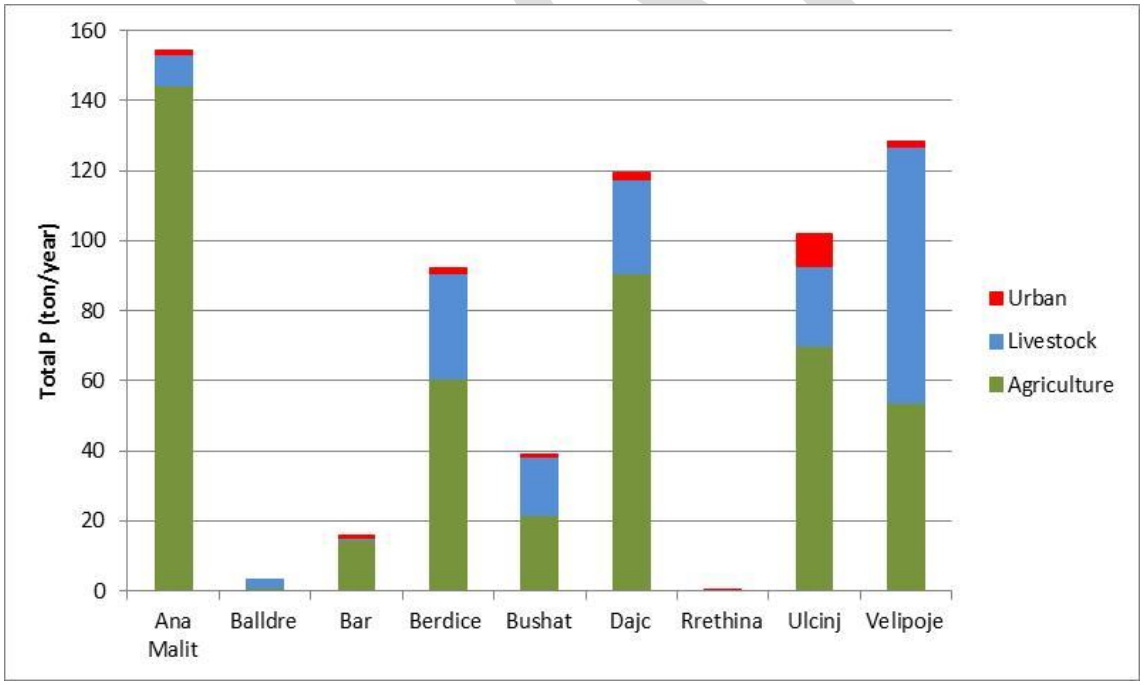


Figure 51: Distribution of total P per municipality / commune of Buna/Bojana watershed

In order to have a more complete picture with regard to the pollution sources and loads, one should take into consideration pollution that enters the Buna/Bojana River from the tributaries, mainly Skadar/Shkoder and Drin. There are indications that pollution entering Buna/Bojana is considerable and the loads of some pollutants, e.g. from Drin regarding nutrients, are higher than these generated

in the Buna/Bojana area. Nevertheless, dataseries available are not adequate to reach safe conclusions.

Although not within the Plan area, Shkodra city is a significant point source of pollution[77]. Total N and total P produced in Skhodra city are estimated to be 98 tons/year and 19.6 tons/year respectively. Considering that approximately 60% of the total urban wastewater is collected (after the construction of the sewage network; related work is about to finish), about 59 tons/year of N and 12 tons /year of P are discharged directly from Skhodra city to the Drin (extremely close to the confluence with Buna/Bojana), hence the Buna/Bojana River.

These loads are similar to and add to the pollution loads from urban liquid wastes generated in the Buna/Bojana watershed. It is important to mention that the pollution loads from Shkodra city enter directly the river while this is not the case with the majority of the urban wastewater from the municipalities in the Buna/Bojana area (the same is true regarding the diffuse pollution from agriculture and livestock). With regard to the latter according to bibliography about 20% of the pollution loads reach the water body.

In this regard, the pressure deriving from urban wastewater in terms of N and P pollution is significantly less but comparable to the pressure deriving from agriculture and livestock generated in the Buna/Bojana watershed.

10.5.3 Groundwater Pollution

10.5.3.1 Pollution in the aquifer system of Buna/Bojana Delta

While the annual average flow of the coastal aquifer systems in the part of Buna/Bojana Delta is much less than that of the river (about 0.1 %), very limited data related to NO_3 concentrations indicate that nitrogen levels in the alluvial aquifer can reach 13.9 mg/l (see Table 15 – AQMOD, 2010). While this is still well below the maximum allowable concentration of nitrate (50 mg/l) set by the Drinking Water Directive (98/83/EC), it should be noted that this is several times the concentration in the Buna/Bojana River. This could become more of a concern in the future, especially if there is intensification of agricultural activities. The PO_4 values from the specific field campaigns are quite low.

Table 15: Nutrient Load of Aquifer System

System	Nitrogen as mg/l of NO_3	Phosphorus as mg/l of PO_4	Comments
Alluvium	13.9 8.2	<0.03 0.08	Analysis results of water samples taken from the 2 drilling sites
Flysch	No data	No data	
Karst	0.23	No data	From Gac Water Supply Well/Spring

Source: AQMOD Final Report, 2010

[77] As mentioned, part of the untreated urban wastewater from Shkodra city area -those collected by the sewage network- including hospital wastewater, reach Buna/Bojana River; these are discharged into the Drin River after Bacalek bridge and sometimes in Lake Skadar/Shkoder (due to power failures that renter the pumps used to transfer wastewater to Drin ineffective).

10.5.3.2 Hazard and Risk

10.5.4.1 Groundwater Hazard

The groundwater hazard[78] map was produced using data from the CORINE 2006 database[79] (for more information see Part C Water Resources Management – Situation Analysis).

Based on the results[80] (Table 16, Figure 52), the areas assessed as having cover/land uses of "very high" and "high hazard" (17.3% of the total area) are located sporadically at urban areas that are not covered by a sewerage system and at intensively cultivated and irrigated areas. "Low" and "very low hazard" is encountered in the natural areas such as forests, wetlands and abandoned areas.

Table 16: Hazard classes and extent (waterbodies and wetlands not included)

Vulnerability classes	Area (km^2)	Area (%)
Very low	29.2	6.2%
Low	60.4	12.8%
Moderate	300.3	63.7%
High	65.7	13.9%
Very high	16.0	3.4%

[78] A hazard assessment considers the potential degree of harmfulness for each type of land use. It is determined by both the toxicity and the quantity of harmful substances, which may be released as a result of a contamination event. Of course, the likelihood of such an event, in which contaminants are actually released into the environment, depends on many factors (Zwahlen 2004).

[79] Under this scope a weighing factor (Hazard index) was given, for each documented land use in the Plan area, based on the hazard intensity of each specific land cover type regarding water pollution (Andreo et al. 2006). In order to assign a hazard value to each land cover unit, the information related to the area's pollution pressures were compared to a relevant reference table provided by the above mentioned methodology.

[80] There is inadequate information regarding the location and intensity of point pollution sources; in this regard only the Corine 2006 database and map was used to assign hazard values to each land use category and create the hazard map. As a result the urban and touristic areas are characterized by a very high pollution risk and the agricultural areas of a moderate pollution risk.

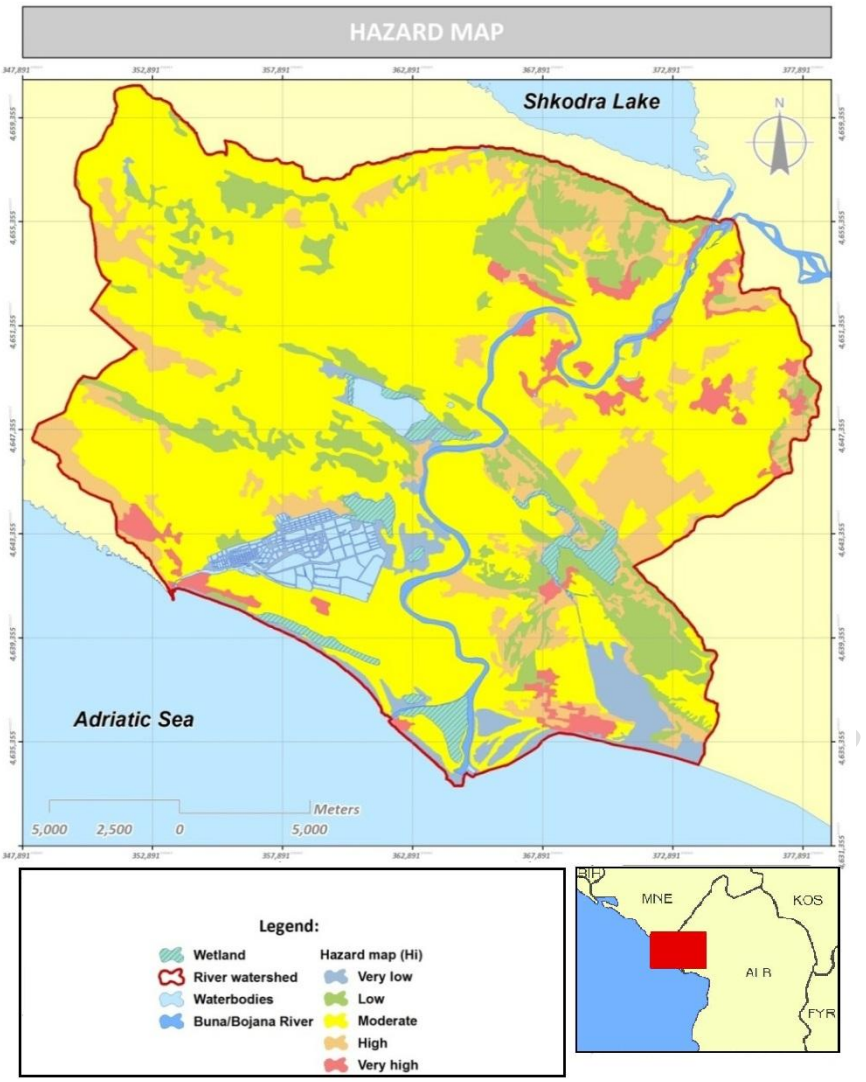


Figure 52: Hazard map of Buna/Bojana watershed

10.5.4.2 Groundwater Pollution Risk [81]

The pollution risk map was developed based on the vulnerability and the hazard assessment and maps[82]. Most of the area is assessed as of "moderate" pollution risk (48%). The areas assessed as of

[81] The results should be treated with caution as there is weak information base for the application of groundwater pollution risk assessment method. The land use data utilised are old (2006) and there is not enough information regarding pollution sources, both of point and diffuse nature. In this regard these results are mostly indicative regarding the situation in the area; the effort should be repeated using more adequate information.

[82] The attempt to assess the groundwater pollution risk of Buna/Bojana watershed was based on the methodology developed under the COST Action 620 project, targeting in the protection of carbonate aquifers (Zwahlen, 2004). Based on Morris & Foster (2000), the groundwater pollution risk can be defined as "the probability that groundwater in the aquifer will become contaminated to an unacceptable level by activities on the immediately overlaying land surface". This approach uses the interaction between the infiltrating contaminant load and the vulnerability of the aquifer at the location concerned. According to Morris & Foster

"high" and "very high" pollution risk cover 10.3% whereas the zones of "low" and "very low" pollution risk cover 41.6% of the Plan area. The "high", "very high" and "moderate" pollution risk areas are dominated by calcareous zones. The forested areas on flysch formations (as expected since flysch is an aquiclude) and the cultivated sedimentary areas at the central, north and northeast part of the catchment are assessed as of "low" risk, while the agricultural areas in the lowland, porous formations as of "moderate" risk.

Table 17: Groundwater risk classes and extent (waterbodies and wetlands not included)

Risk classes	Area (km^2)	Area (%)
Very high	0.4	**0.1%**
High	48.0	**10.2%**
Moderate	226.6	**48.1%**
Low	169.9	**36.0%**
Very low	26.6	**5.6%**
Total	**468.5**	**100.0%**

(2000) and Foster & Hirata (1988), the proposed risk assessment is calculated by overlaying the intrinsic vulnerability map and the hazard map.

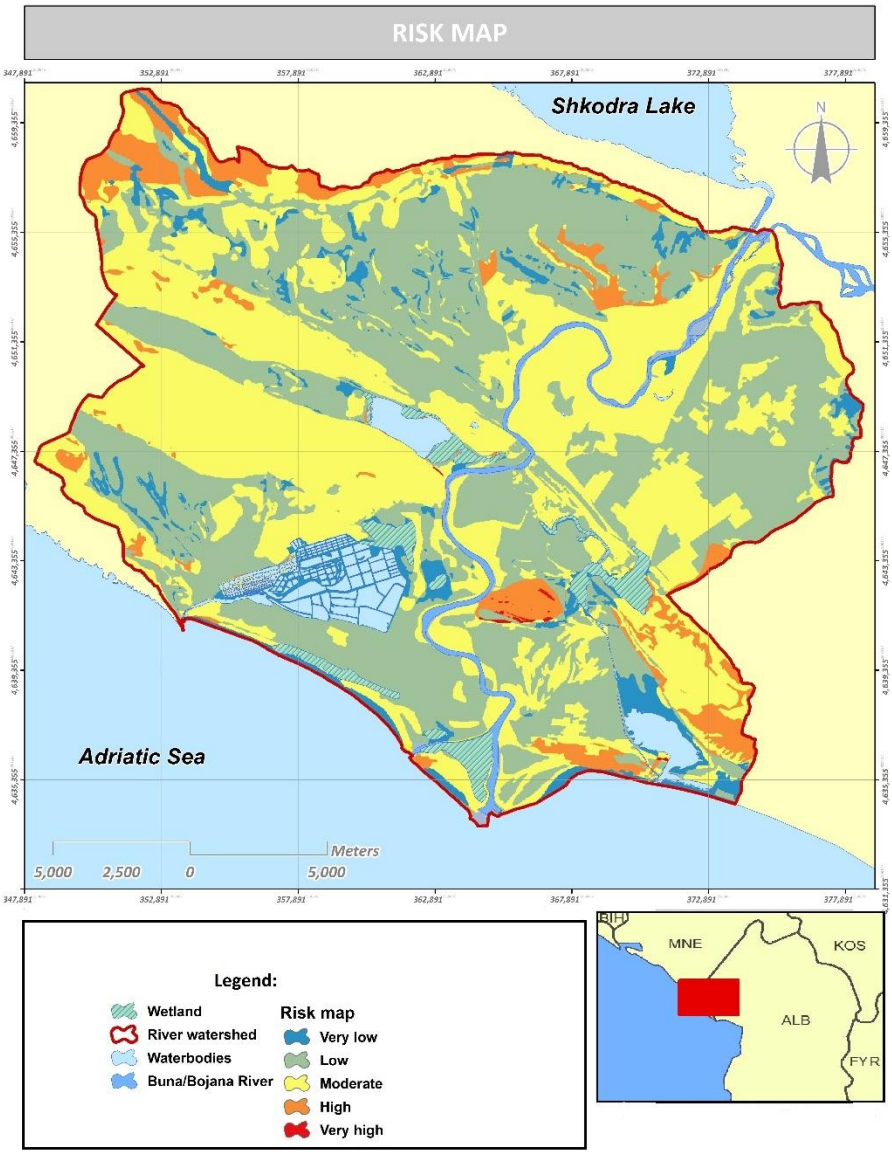


Figure 53: Groundwater pollution risk map

10.5.4 Status of the Water Bodies

The status of the water bodies in the Buna/Bojana River Basin is assessed in order to extract information that is used, in combination with the information regarding the pressures (see chapters above) as well as ICZM related information including socio-economic and environmental data to define (i) whether measures are necessary to be applied in order to preserve or improve the status of the system (ii) the nature and level of the measures necessary.

The assessment was done in accordance to the Water Framework Directive (WFD). The WFD requires surface water classification, through the assessment of the ecological status or ecological potential and surface water chemical status, into five quality classes. The boundary between good and moderate ecological status is critical, since water bodies with moderate quality should be considered within integrated river basin management plans to improve their status at least to good.

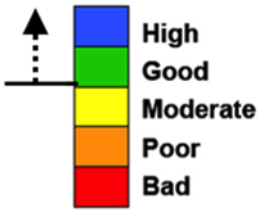


Figure 54: The five quality categories and the boundary between good and moderate ecological status

Box 7: Defining the status of the water bodies in accordance to the WFD

The ecological status derives from hydromorphological, chemical-physicochemical and biological quality elements and the resulting respective status, by applying the one-out all-out principle. The hydromorphological status classifies a water body as reference or not; the chemical-physicochemical status classifies a water body as of high, good or moderate status; the biological status classifies a water body under all five quality categories as bad, poor, moderate, good and high status (*Figure 55*). More information about the methodology for the assessment of the status of the water bodies in accordance to the WFD is given in Part C Water Resources Management – Situtaion Analysis.

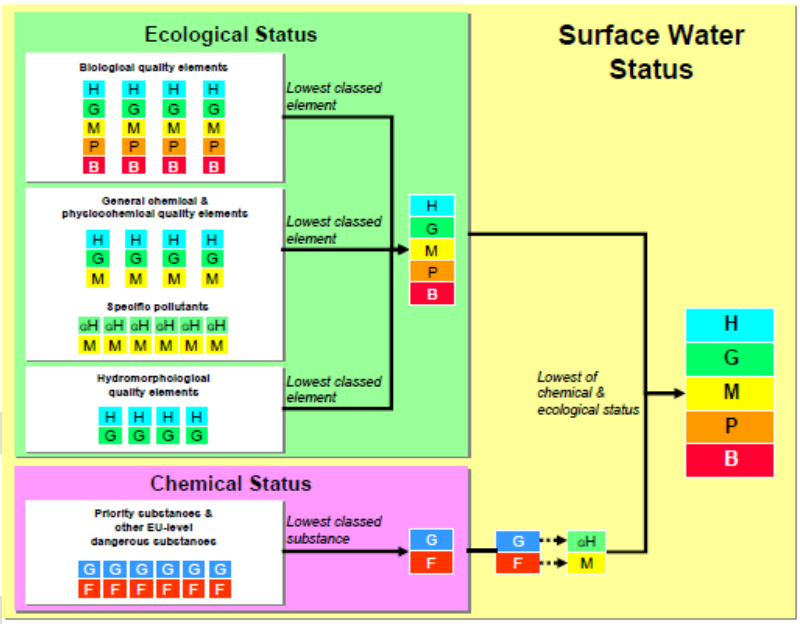


Figure 55: The procedure of the assessment of the status of a Water Body and the relative roles of hydromorphological, chemical-physicochemical and biological quality elements in ecological status classification

To assess the effects of various categories of pollutants emanating from human activities on the quality of rivers and streams, some impacts should be considered – either isolated or in combinations. There is a wide array of factors that should be taken into consideration including the:

- different **types** of pollution (indicative list of the main pollutants in Annex VIII of the E.U., 2000, WFD);
- **periodicity** concerning the time and the seasonality of pollution period, its magnitude, the point or non-point pollution sources, the river bed modifications, the alterations of the river basin;

- **relation with other natural environmental variations and different scale characteristics** as climatethe water discharge, geology, topography, diversity of flora and fauna, etc.

Taken together, the consideration of all these factors constitutes a very complex issue. **It has not been possible to take into consideration all the aforementioned parameters, as data available was restricted**; information on the parameters that are used for the assessment of status of the different parts of the system is given in the detailed analysis included in Part C Water Resources Managemen – Situation Analysis.

9.6.4.1 Designation of water bodies in accordance to the WFD

Water Bodies are the spatial units for which the status is assessed with the aim of identifying environmental objectives and defining measures as means to: a) prevent further deterioration, and b) protect and enhance the status of aquatic ecosystems, as well as the terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. Water Bodies are therefore the units that are being used for reporting and assessing compliance with the Directive's principal objectives.

The surface water bodies (SWBs)[83] are identified as falling within one of the following surface water categories: rivers, lakes, transitional waters or coastal waters, or as artificial surface water bodies or heavily modified surface water bodies. Details on the methodology followed for the identification of the water bodies is given in Part D "Analysis of the State of the Water Resources"

The following Surface Water Bodies are identified:

WB 1. *The Buna/Bojana River* i.e. from the confluence of Drin River with Lake Skadar/Shkoder outflow up to the river delta.

WB 2. The Lake Shasko

WB 3. *The Viluni Lagoon*; it is a transitional WB

WB 4. The Wetlands

WB 5. The coastal zone

[83] According to Article 2.10 of the WFD a "Body of surface water" is a discrete and significant element of surface water. The water category and type as well as geographical and hydromorphological elements etc. are considered for the identification of water bodies. An initial identification of water bodies in Buna/Bojana basin was made on the basis of the typological characterization of the basin as well as on a preliminary assessment of pressures and impacts. The identification was revisited after the assessment of the status of each one of the water bodies; no alterations were deemed necessary. The hydrogeological information of the dominant formations have been taken into account for identifying the area's groundwater bodies, together with the potential pressure and impact analysis. More information regarding the designation of the Water Bodies in the Plan area is given in Part C.

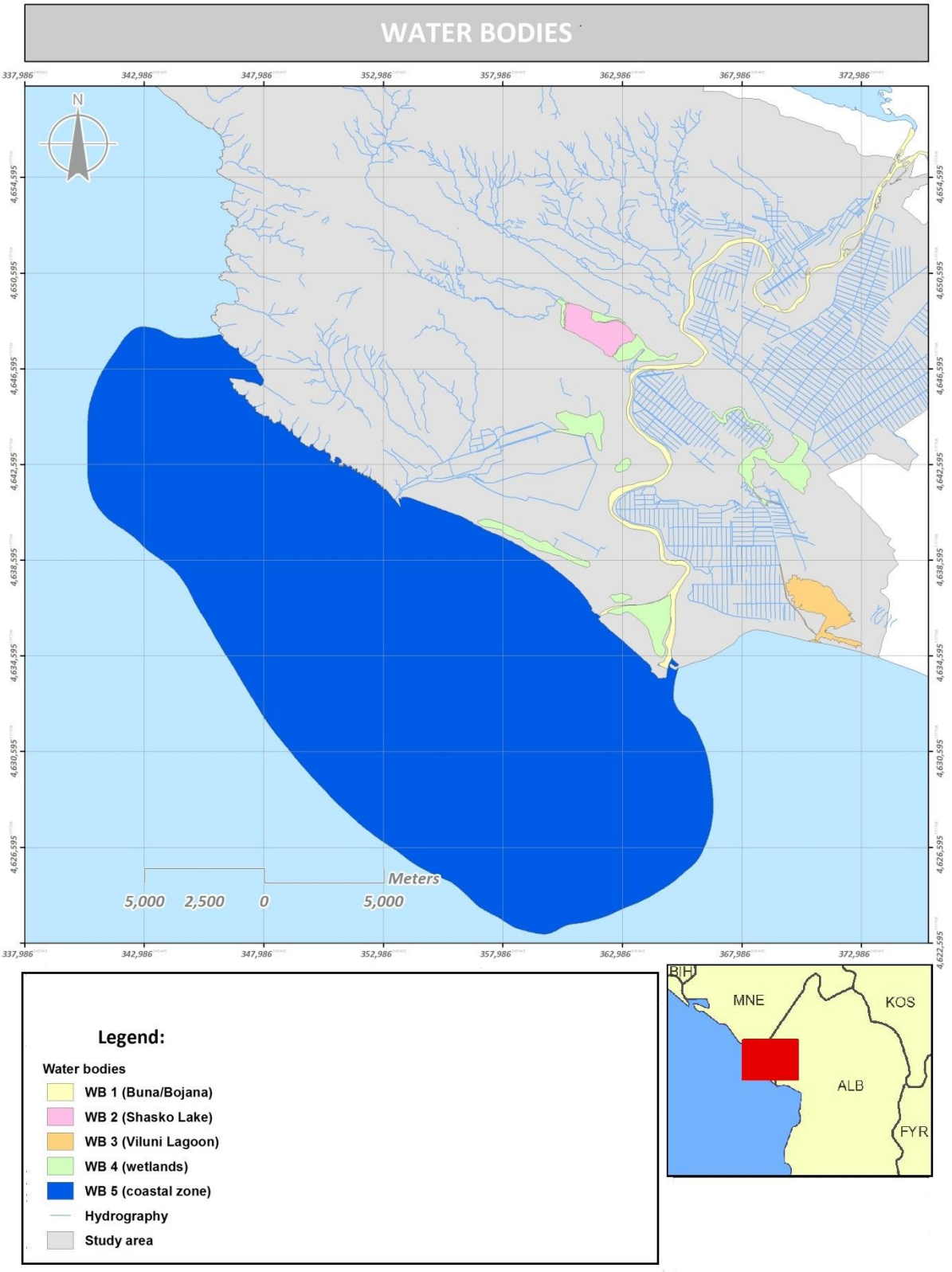


Figure 56: Surface water Bodies in the Buna/Bojana watershed

Six (6) different groundwater bodies have been identified:

- **Impermeable rock formations**. It is the largest but not the most important aquifer though, in terms of hydrogeology and socio-economy.
- **Karstic rocks in Montenegro**. It is the second largest formation of karstic rocks located in the Montenegrin part of the catchment, being important for the water balance in the area.
- **Coastal intergranular aquifer**. It is the next most important groundwater body; characterized by moderate productivity, it sustains important wetlands.
- **Upstream intergranular aquifer**. It is a groundwater body of high productivity.
- **Karstic formations in Albania**. It is characterized by high productivity and vulnerability.

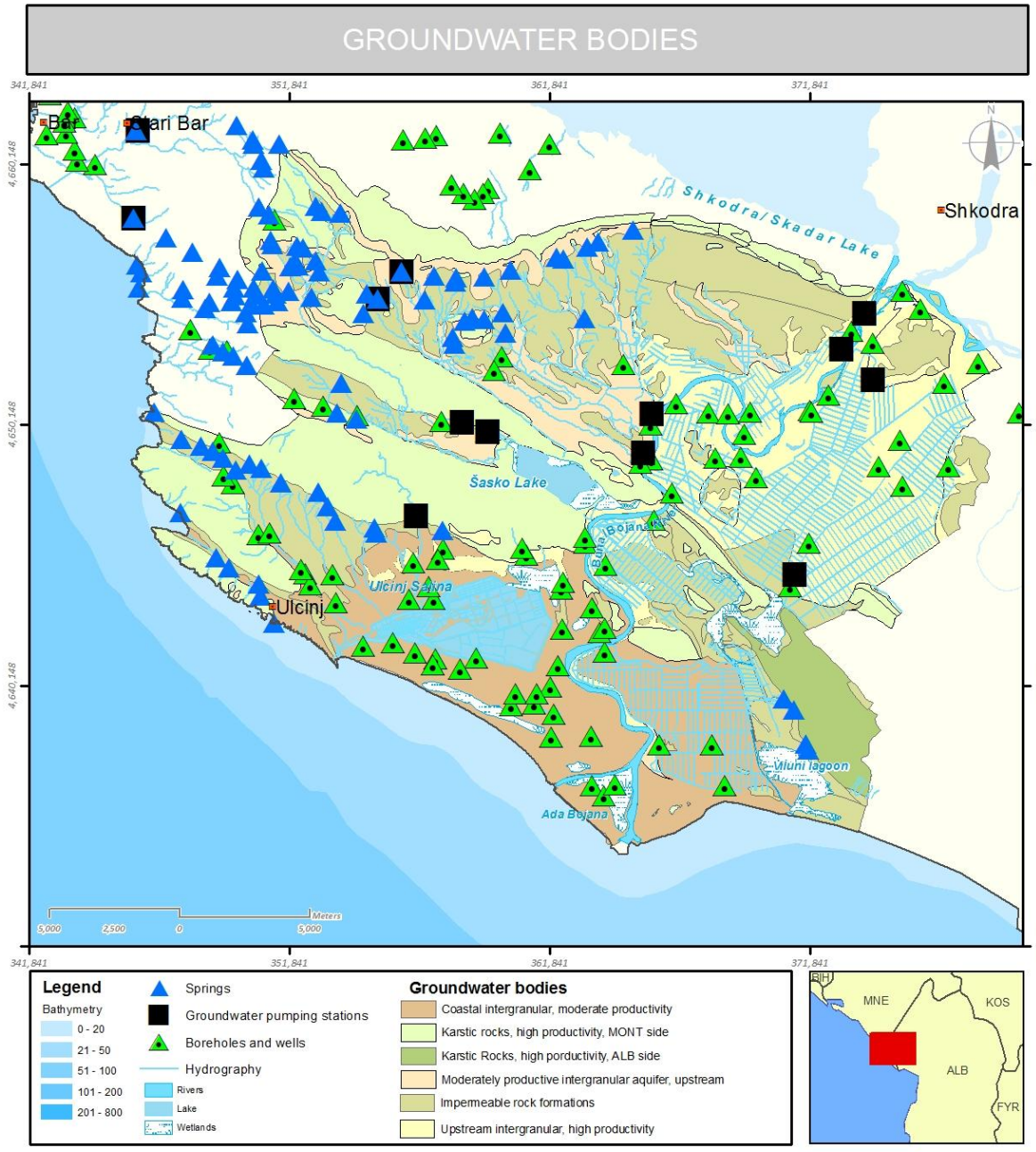


Figure 57: The groundwater bodies of Buna/Bojana lower catchment

Table 18. Extent of the groundwater bodies in Buna/Bojana lower catchment

Groundwater Bodies	Area (km^2)	% of total
Coastal Intergranular, moderate productivity	100.98	19.36
Impermeable rock formations	134.41	25.76
Karstic Rocks, high productivity, Albanian side	22.88	4.39
Karstic rocks, high productivity, Montenegrin side	113.42	21.74
Moderately productive intergranular aquifer, upstream	48.50	9.30
Upstream intergranular, high productivity	101.48	19.45

Based on McLusky & Elliott (2004) estuaries, the transition zones between rivers and the sea, can be classified based on salinity (*Table* 19), while the average sea surface salinity is approximately 35 PSU.

Table 19: Classification of estuarine divisions

Estuary division	Tidal	Salinity(PSU)	Venice system (1959)
River	Non-tidal	<0.5	Limnetic (freshwater)
Head	The highest point to which tides reach		
Tidal fresh	Tidal		
Upper		0.5-5	Oligohaline
Inner		5-18	Mesohaline
Middle		18-25	Polyhaline
Lower		25-30	
Mouth		30-40	Euhaline
		>40	Hyperhaline

The average sea surface salinity in the coastal area is not stable and depends on river fluxes. The salinity levels present the lowest values at the area between Buna/Bojana River and Solana Ulcinj. This could be an indication that in addition to river fluxes, groundwater discharges of freshwater towards the sea also occurs; it may be also that the decrease in salinity is caused by sea currents. The boundary of Buna/Bojana system towards the marine area is defined through an estimate of the influence of the surface water flows on inshore marine waters as indicated by the levels of salinity; the combinations of the monthly isolines of 35 PSU average sea surface salinity was used in this regard (see chapter 7).

9.6.4.2 Assessment of the status of Buna/Bojana watershed

As presented above, the status of a WB derives from the combined assessment of its ecological and its chemical status.

Lake Skadar/Shkoder and the Drin River may be considered as point sources of pollution for the Buna/Bojana River system as they affect its quality, among others, through the pollutants they bring into the system. In this regard the status of the Drin River in its lower part before the confluence with the Buna/Bojana River as well as the outflow of the Lake was assessed in addition to the Water Bodies in the Buna/Bojana watershed.

The data used for the assessment of the status of the different parts of the Buna/Bojana system and their sources are presented below:

(a) The chemical-physicochemical status and the chemical status for the outflow of the Lake Skadar/Shkoder and the Drin River at its most downstream part prior its confluence with the Buna/Bojana River, were assessed using a combination of data sources:
    a. Available research studies and papers.
    b. Data generated for the purposes of the present study, through analysis of samples from monitoring stations at the two bodies collected during two sampling expeditions (July and November/December 2012)[84].
    c. Data from the State of Environment Report (published in 2013, including 2012 data) of the Albanian National Agency of Environment.

(b) The chemical-physicochemical status and the chemical status of the Buna/Bojana River were assessed using a combination of data sources:
    a. Data reported by the Albanian authorities to the EEA;
    b. Data provided by the Montenegrin Ministry of Sustainable Development and Tourism;
    c. Data generated for the purposes of the present study through analysis of samples collected during two sampling expeditions (July and November/December 2012) from stations along the Buna/Bojana River, Lake Shasko and Viluni lagoon[85].
    d. Data from the State of Environment Report of the Albanian National Agency of Environment (published in 2013, including 2012 data).

(c) The biological status of the (i) outflow of the Lake Skadar/Shkoder (ii) the Drin River at its most downstream part prior its confluence with the Buna/Bojana and (iii) the Buna/Bojana River, were assessed (in the absence of other related – comprehensive - biological data i.e. fish, aquatic flora and phytoplankton the biological status) using exclusively data related to macro-invertebrates. The latter were generated for the purposes of the present study through analysis of samples collected during three sampling expeditions (November 2012, March 2013 and June 2013)[86]. There were no available data regarding fish, aquatic flora and phytoplankton to use.

The monitoring stations used for the purpose of the study are indicated below:

[84] The sampling and the analysis of samples were performed by the Centre for Ecotoxicological Research of Montenegro (CETI).

[85] The sampling and the analysis of samples were performed by the Centre for Ecotoxicological Research of Montenegro (CETI)

[86] Samples were collected and analyzed by Albanian and Montenegrin experts. Respective indices were selected -the most appropriate internationally to assess the impacts of pollution on biota- and applied; the calculation of biotic indices was performed by Dr. Konstantinos Gritzalis, Hellenic Centre for Marine Research (HCMR - http://www.hcmr.gr/en/)
Details on the procedure for site selection, sampling procedures and the assessment of biological status are presented in Part C Water Resources Managemetn – Situation Analysis.

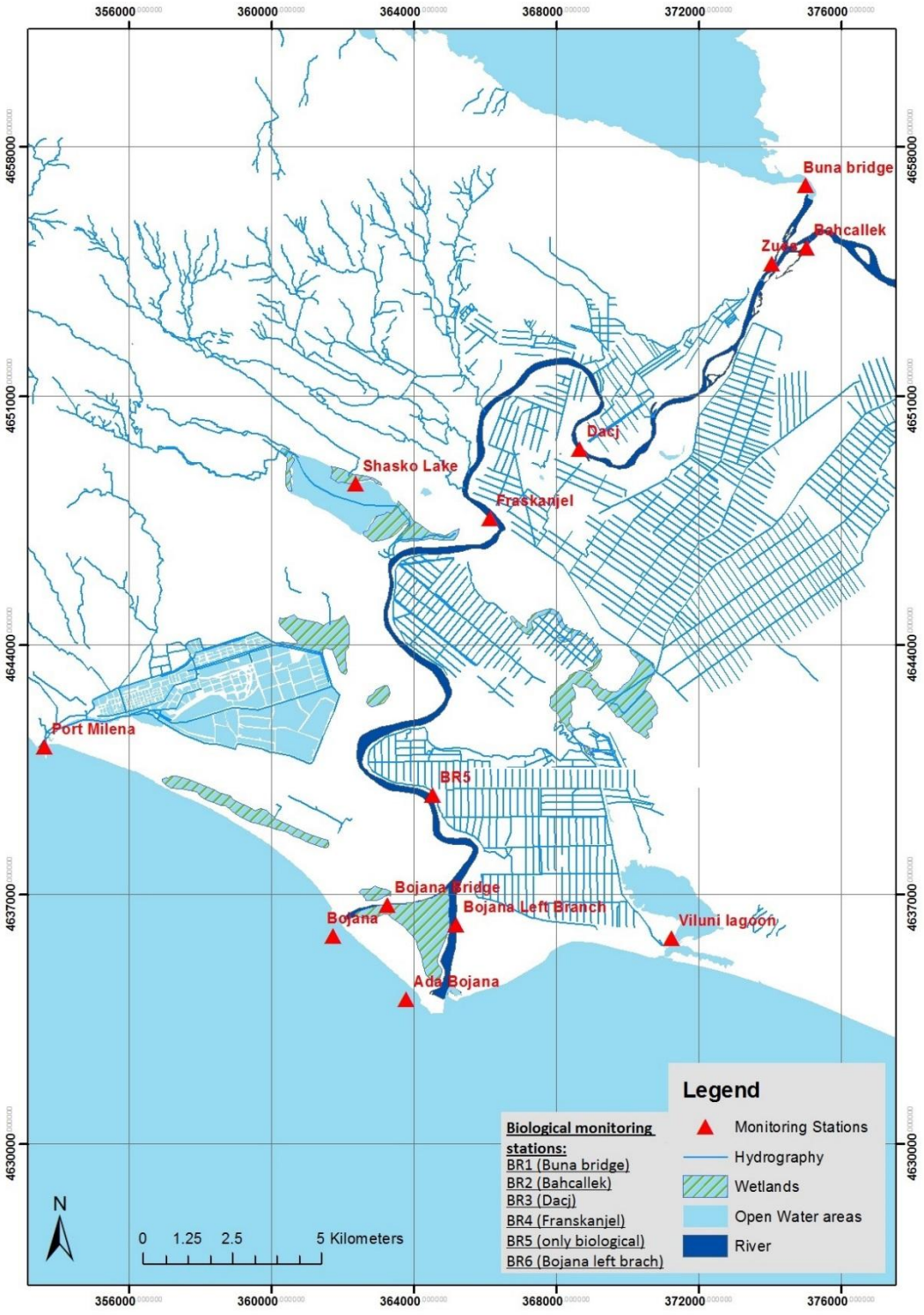


Figure 58: Monitoring stations for abiotic and biotic parameters in the Plan area.

The methods, classification systems, metrics and indices used for the ecological and chemical status characterization of the Buna/Bojana system are presented in Part C Water Resources Management – Situation Analysis.

9.6.4.3 Surface water bodies

The key quality element of the WFD, i.e. the biological status, was assessed as poor in all stations for which data was available except the Viluni Lagoon where the status was moderate [however this result is based on only one biological element (Chlorophyll-α)]. It should be mentioned that in most of the cases e.g. the lower Drin River, Lake Skadar/Shkoder outflow, Bojana Bridge and Bojana Left Branch, taking into account the available data and using expert judgment, the biological status may be considered worse than poor; the richness and abundance of the macro-invertebrate fauna in the river system was found to be low when compared with similar river types and conditions. A remarkable finding is the existence of **marine species, even at the upper part of the river**. This could be attributed to the fact that under specific conditions tidal phenomena can result in seawater reaching the upper parts of the river. Special attention must be given to addressing the issue of invasive species (e.g. Dreissena spp) as well as for the conservation of threatened species, such as Valvata montenegrina[87].

The lower Drin River is assessed as of moderate physicochemical quality due to elevated mean nitrate and nitrite concentrations. Besides Cu, the levels of specific pollutants are below the EQS. The ecological status is poor, as a result of the poor biological status. With regard to the chemical status of the lower Drin, the mean concentrations of cadmium, lead, mercury and nickel (Cd, Pb, Hg and Ni) were above the EQS set by Directive 2013/39/EC. Overall, the status of the lower Drin River is assessed as poor.

The chemical – physicochemical quality of the Lake Skadar/Shkoder is high. This is not the case for its outflow where nitrate and ammonium concentrations are elevated (pH, DO, BOD and COD mean concentrations are at satisfactory good levels), thus classifying the Lake's outflow as of moderate physicochemical quality. Besides Cu, the levels of specific pollutants are below the EQS. The ecological status is poor, as a result of the poor biological status. As far as the chemical status is concerned, the mean concentrations of cadmium, lead, mercury and nickel (Cd, Pb, Hg and Ni) are above the EQS set by Directive 2013/39/EC. Overall, the status of the Lake Skadar/Shkoder outflow is classified as poor.

As regards Buna/Bojana River's chemical – physicochemical quality, this deteriorates from its sources to its mouth, ranging from good to moderate, due to elevated ammonium, nitrite and BOD concentrations. On the contrary, with regard to the specific pollutants it is the mean concentrations of Cu and Sn that are elevated and are above the EQS limits in the upstream stations Dajc and Fraskanjel respectively. The biological status in all four stations along the Buna/Bojana River is poor and this results in their ecological status to be also poor. Cadmium (mean concentration) is above the EQS only in Fraskanjel and it is almost not detectable in the rest of the stations; lead is above EQS in Dajc and Fraskanjel, mercury in all stations and nickel in Dajc and Bojana Left Branch. The Buna/Bojana river chemical status is assessed as moderate, and the overall status as poor.

It should be noted that the data available for the stations along the Buna/Bojana River, at least regarding the abiotic parameters, are considered limited. Only two seasonal measurements exist for a number of parameters. In addition, there is no information for a number of specific pollutants and priority substances. The poor data basis in terms quality and quantity, result in a high level of uncertainty regarding the assessed chemical-physicochemical and chemical status for these stations; results may be considered preliminary. It is safer to rely on the biological assessment since it mirrors the impact of long-term pressures on macro-invertebrate assemblages which are good indicators for organic pollution.

[87] IUCN Red List of Threatened Species - http://www.iucnredlist.org/details/164824/0

Mercury is present also in Viluni Lagoon (it is the only heavy metal whose concentration is above EQS). According to the physico-chemical data available there are high nutrient concentrations. Using only Chlorophyll-α as a surrogate of the biological elements required by the WFD, the resulting theoretical ecological status is moderate, and so is the overall status of the lagoon.

In the case of Lake Shasko, the overall status is assessed as “equal to or below moderate” due to the “equal to or below moderate” theoretical ecological status (since biological data are missing). The latter results exclusively from the moderate chemical-physicochemical status (due to the elevated total N concentration in the lake); other nutrient species and specific pollutants are of satisfactory quality. The chemical status of the lake is moderate as a result of elevated mercury (Hg) concentration.

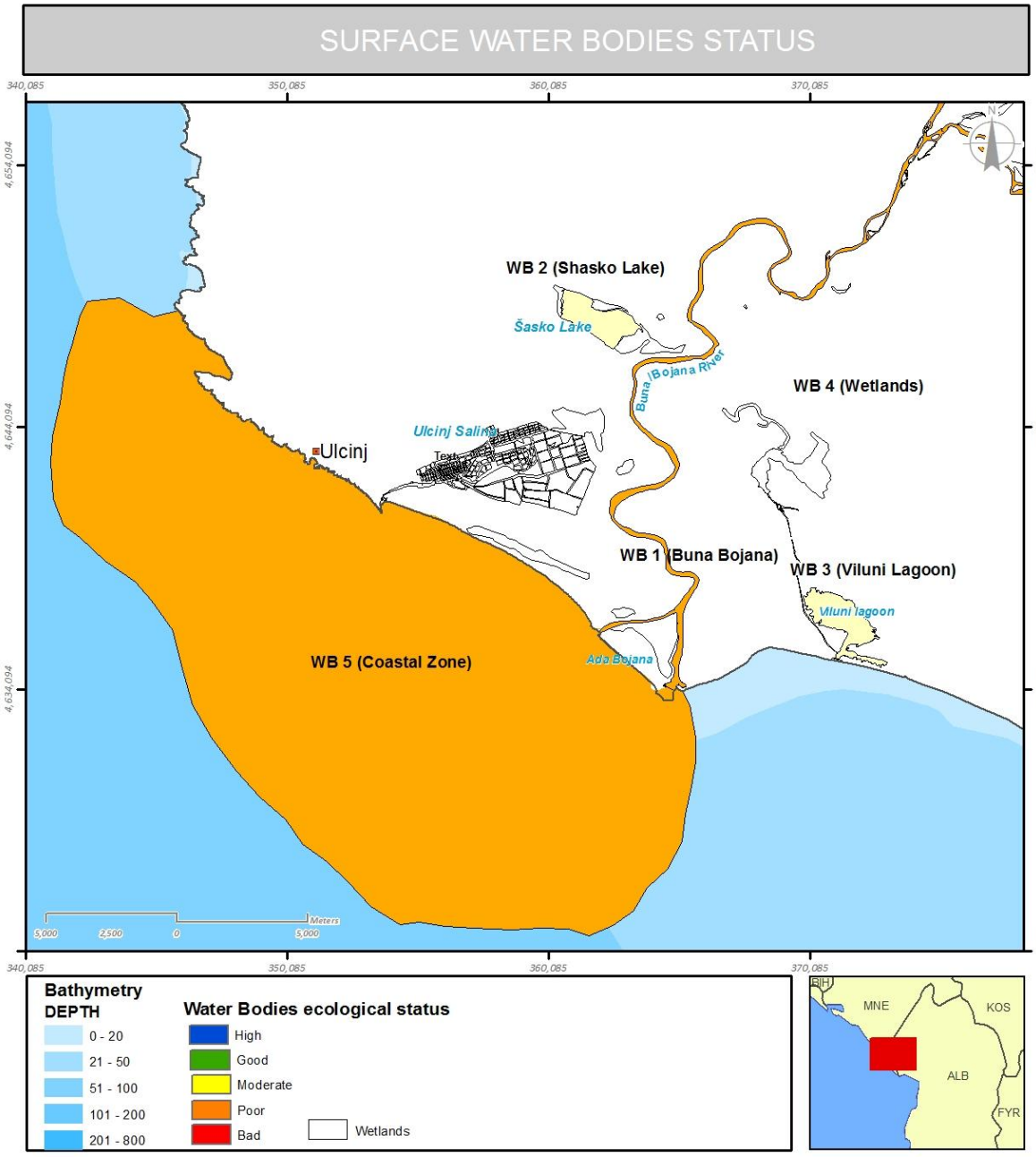
It should be noted that for Lake Shasko and Viluni Lagoon, only two seasonal measurements are available, thus introducing high uncertainty in the assessment of the status. In addition, a number of specific pollutants and priority substances were not determined. Moreover, the concentration of dissolved substances may vary considerably with time, depending on pollution sources, sedimentation, eutrophication, and water level fluctuations. Thus, the assessment of the chemical-physicochemical status and the chemical status of these lentic systems may be considered as very preliminary. The same is true for the biological status assessment (since only one biological element is available, i.e. Chlorophyll-α only for the Viluni Lagoon).

Finally, the coastal zone has been classified as of poor status as a result of its poor biological status (the chemical-physicochemical status is considered moderate). Again here, the assessment includes a high degree of uncertainty since the classification of its status is influenced by its poor biological status, which is based exclusively on Chlorophyll-α.

Table 20: Overall assessment of the status of surface water bodies in the Plan area in accordance to the WFD

WBs		Stations	Physicochemical Quality	Potential Specific Pollutants	Chemical – Physicochemical status	Biological Status[1]	Ecological status	Chemical status	Overall status	Water Body status
	Lower Drin	Bachalleck	Moderate	Moderate	Moderate	Poor	Poor	Moderate	Poor	Poor
	Skadar/Shkoder outflow	Buna Bridge	Moderate	Moderate	Moderate	Poor	Poor	Moderate	Poor	Poor
1	**Buna/Bojana**	Dajc	Good	Moderate	Moderate	Poor	Poor	Moderate	Poor	Poor
		Fraskanjel	Moderate	Moderate	Moderate	Poor	Poor	Moderate	Poor	
		Bojana Bridge	Moderate	Good	Moderate	Poor	Poor	Moderate	Poor	
		Bojana Left Branch	Moderate	Good	Moderate	Poor	Poor	Moderate	Poor	
2	**Shasko Lake**	Shasko Lake	Moderate	Good	Moderate	[2]	≤ Moderate [3]	Moderate	≤ Moderate	≤ Moderate
3	**Viluni lagoon**	Viluni lagoon	Moderate	Good	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
4	**Wetlands**		[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
5	**Costal marine zone**	Ada Bojana	Moderate[4]	[2]	Moderate	Poor	Poor	[2]	Poor	Poor
		Bojana	Moderate[4]	[2]	Moderate	Poor	Poor	[2]	Poor	
		Port Milena	Moderate[4]	[2]	Moderate	Poor	Poor	[2]	Poor	

[1] By using exclusively macro-invertebrates, [2] Data are absent or there are not enough data available to the authors to assess the respective status, [3] Theoretical ecological status resulting exclusively from the chemical – physicochemical status (in absence of any biological data), [4] By using nitrate, ammonium and phosphate.



***Error! Reference source not found.**: Surface water bodies ecological status.*

9.6.4.4 Groundwater bodies

The overall assessment of the groundwater bodies according to the requirements of the WFD was not possible because of the almost complete absence of necessary data. In order to have an indication, the respective risk map was used to offer a probabilistic sense of the potential status of the groundwater bodies in the Plan area (taking into account the pollution pressures/hazards). Thorough monitoring is necessary to assess the actual groundwater status in the Plan area; the present preliminary conclusions need to be accredited by chemical measurements prior using them for decision making.

The potential groundwater quality status is illustrated in *Table* 21. The karstic formations with intensive anthropogenic land uses are expected to have poor status. Limestones with moderate hazards, due to their land cover, are expected to have moderate status, and low permeability formations good to high status depending on the pollution hazard due their land covers.

Table 21: Groundwater potential Status in the Plan area

GW Status	Area (km^2)	Area (%)
High	97030000	19.76
Good	143680000	29.26
Moderate	228580000	46.54
Poor	21830000	4.44

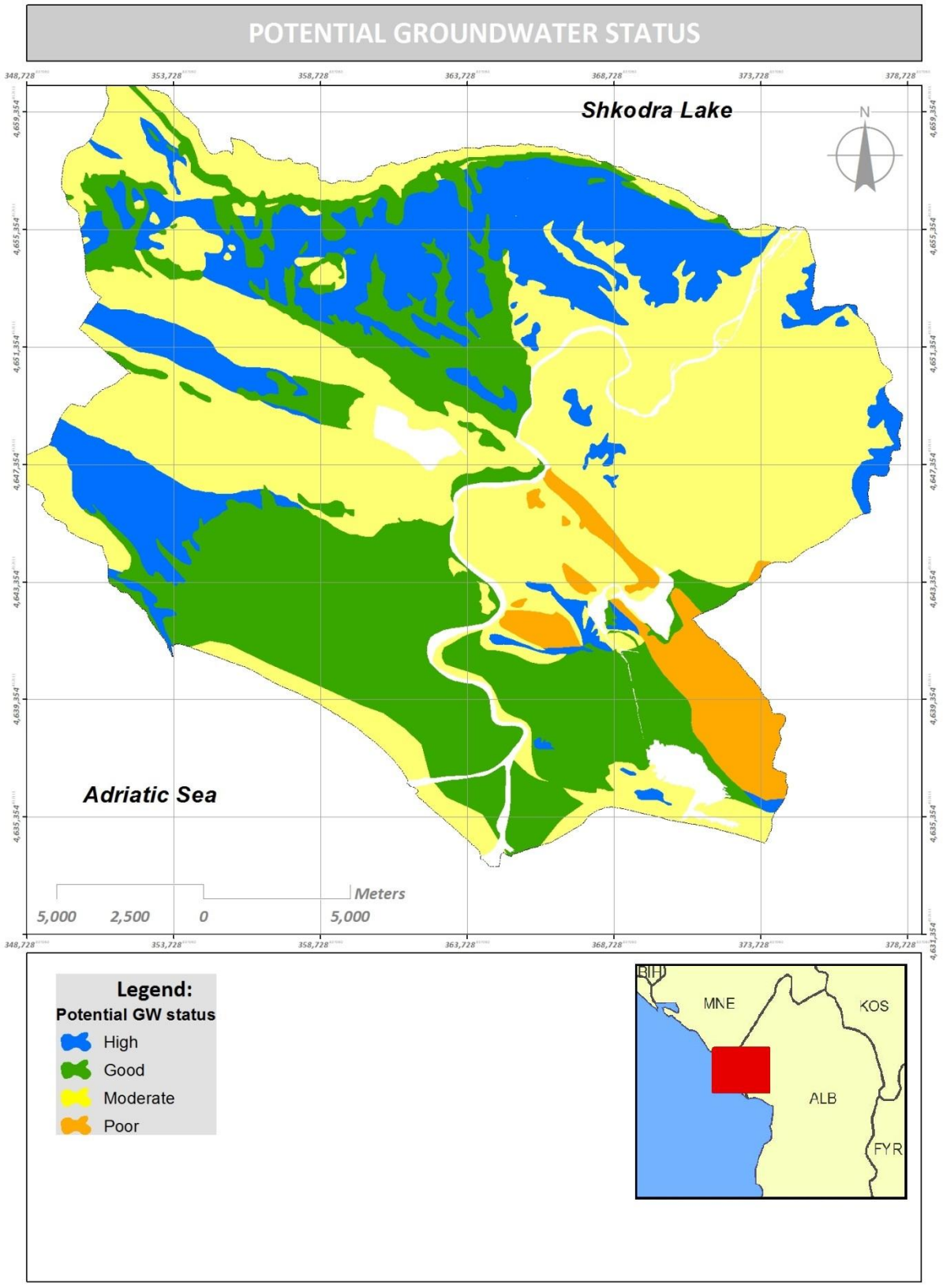


Figure 59: Indicative groundwater potential quality status based on groundwater vulnerability and hazard (risk map)

11 Socio-economic and development challenges

KEY HIGHLIGHTS

- **The pattern of urbanisation in the plan area is characterised by the recent rapid development of a narrow strip within 1 kilometre of the coast, and is generally linear in nature along the coast and highways.**
- **In Montenegro there is a considerable "over supply" of land designated for building, resulting in heavily dispersed construction, and landscape degradation.**
- **Albanian development has been characterised by the lack of formal plans and informal development, particularly in the coastal areas and urban centres.**
- **In the absence of an effective planning system, the rate of urbanisation can be expected to fluctuate widely according to tourism and speculative market factors rather than demographic pressures.**
- **The already inadequate infrastructure throughout the plan area has not fully matched the rapid spatial transformation. Waste water management is not sustainable leading to possible contamination of both the land and marine environments, with the consequent risk to human health. Potable systems are of particular concern as, due to lack of (or inadequate) infrastructural systems water shortages and even contamination risks might occur. Solid waste collection and disposal systems are of major concern throughout the plan area as, with inconsistent local collection services, illegal dumping frequently occurs. Roads are in poor condition, suffering from inadequate maintenance. Severe congestions are frequent during the summer months, notably in Montenegro.**
- **Agriculture of the Albanian Plan area is characterized by under-development (remaining on a self-production scale), with underlying structural issues from field fragmentation to ownership problems and the transition to a market economy. The irrigation system is in a state of disrepair and lack of investment.**
- **In Montenegro, the sector is characterized by field abandonment and aspirations for the conversion of land to development.**
- **The overall economic effects of tourism in the destination's economy, although showing growth, still could be considered inadequate, primarily due to underutilisation of available accommodation capacities, dominance of the residential type of tourism and absolute concentration of tourism activities in the three summer months.**
- **Climate change impacts are likely to be reflected in agriculture and tourism. These are generally in the mid to long term. While this is true, certain aspects of coastal development have long life – e.g. transport networks, coastal defences, areas for residential construction. If these are constructed without taking account of climate scenarios then we may be making commitments which will entail high future adaptation costs.**

Period after the 90s changed industrial facilities' operations leading to general decrease of anthropogenic impacts on the environment. However, in the last decade, political and economic stability led towards the re-opening of many potentially polluting industries including mining, fertilizer production and tanning, and the increase of population in urban centres. Whilst some of these facilities

are equipped with wastewater treatment plants, many of these have fallen into disrepair. As the Albanian and Montenegrin economy continue to grow, there is also an increase in the usage of artificial fertilizers and pesticides by inadequately trained agricultural workers. In addition, modifications have been made in the watersheds of Drin River as well as in Buna/Bojana River.

These activities exert pressures to the natural environment mainly through pollution, unsustainable use of natural resources, disturbance of the natural regimes in terms of water flows and sediment distribution etc. This has also an effect to the anthropogenic environment both economic activities and human wellbeing.

11.1 Urbanisation

Albania

The urbanisation process in Albania intensified after 1990's when the share of urban population increased from 35% (in 1989) to 42% (in 2001) (World Bank, 2007). The 2011 Albanian census (INSTAT, 2012) showed the dominance of the urban population - according to its preliminary results, 54% of the population lives in urban areas compared to 46% living in rural areas.

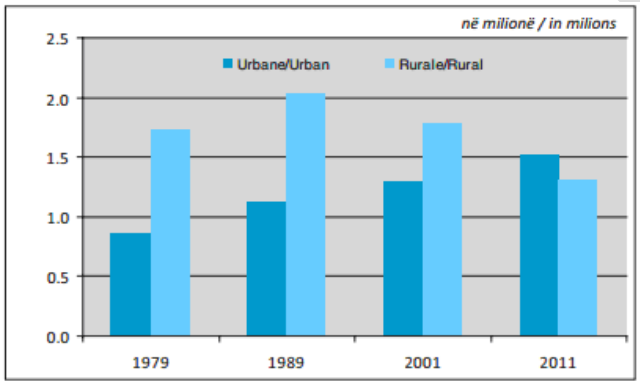


Figure 60: Urban and rural population in 1979, 1989, 2001 and 2011 censuses (source: INSTAT 2012)

The main characteristic of urbanisation in the Buna area is the lack of important urban centres and the predominance of rural areas. Namely, the entire area could be considered as rural. However, as indicated in the chapter 8, the share of urban population is probably higher than the official data due to voting purposes. Even though in the Buna area there are no urban centres, the main villages of Velipojë, Dajç, Ana e Malit and Bërdicë could be considered as the main local centres (see Figures 9, 11, 12).

Neither Shkodra county nor any of the local municipalities in the Buna area have comprehensive territorial plans regulating development. There are some strategic documents and urban/development studies such as the:

- Strategic Concept for the Regional Development of Shkodra region;
- Strategic Development Plan of Dajçi commune;
- Local Development Plan of Velipoja commune;
- REMAKE - Urban study for tourism development and protection of the coastline of Velipoja for the Velipoja beach.

Distribution of area covered with territorial plans is shown in map 28. However, these do not reflect the overall land use of the area as mainly Dajçi commune and part of Velipoja have some land use planning distribution. According to the Plan of Dajçi commune, the greatest share of the territory is an area of

urban consolidation, i.e. future residential area with related services. The proposed density of such area is from 100 to 140 inhabitants/ha. It is interesting to point out that the plan also proposed so called freezing urban areas, as areas where development should be reduced or totally banned. In the coming period, all the communes in Buna area are due to prepare their territorial plans.

The lack of effective plans has resulted in a chaotic situation of construction leading to increased costs of basic infrastructure (roads, sewage, water, etc.). The spread of settlements increases the fragmentation and reduction of agricultural land and contributes to the degradation of the natural environment (due to unregulated solid waste dumping, collection of sewage in septic tanks etc.) (REC, 2006).

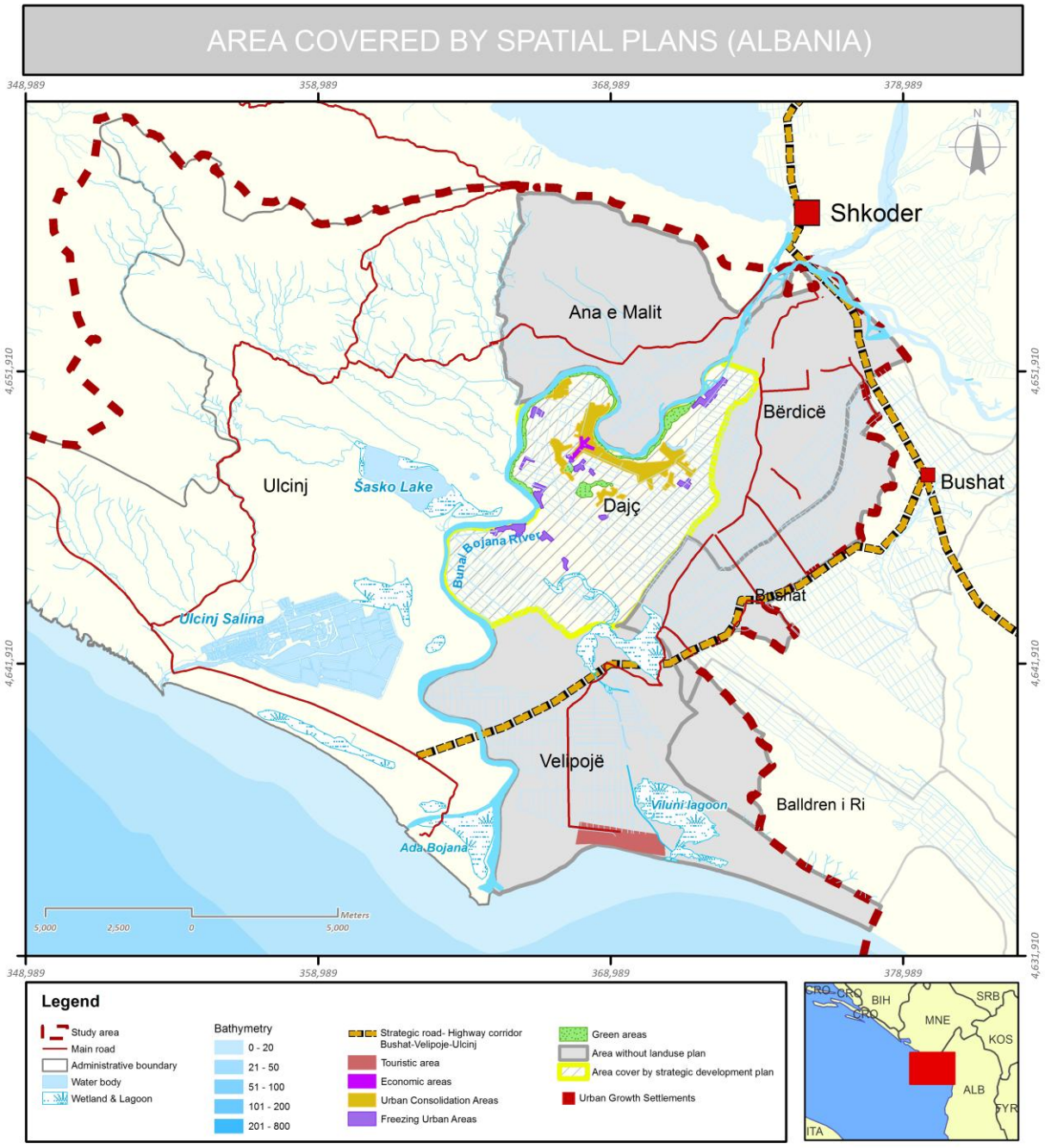


Figure 61: Distribution of area covered with spatial plans in Albania

Information from the Shkodra region (SRC, 2011) shows the overall predominance of agriculture in the current land-cover, except in commune of Velipoje where forest and other green areas are the dominant land cover. In all communes (except Dajci) non-productive surfaces extend to 10-20% of total commune area (Figure 63). In addition to built-up areas, these include farm roads, drains, irrigation structures, as well as abandoned agricultural land.

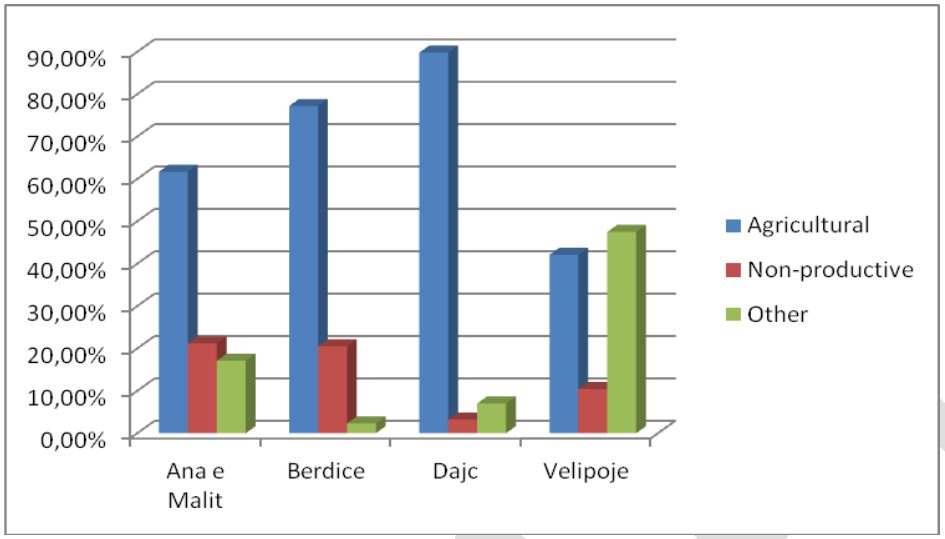


Figure 62: Share of agricultural land

In the absence of comprehensive territorial planning documents of the area, integrative land cover map has been produced, based on CLC 2006, ortophoto and expert opinion (Figure 64). It can be observed that the area in mainly agricultural, with patches of urban development near the main communal centres.

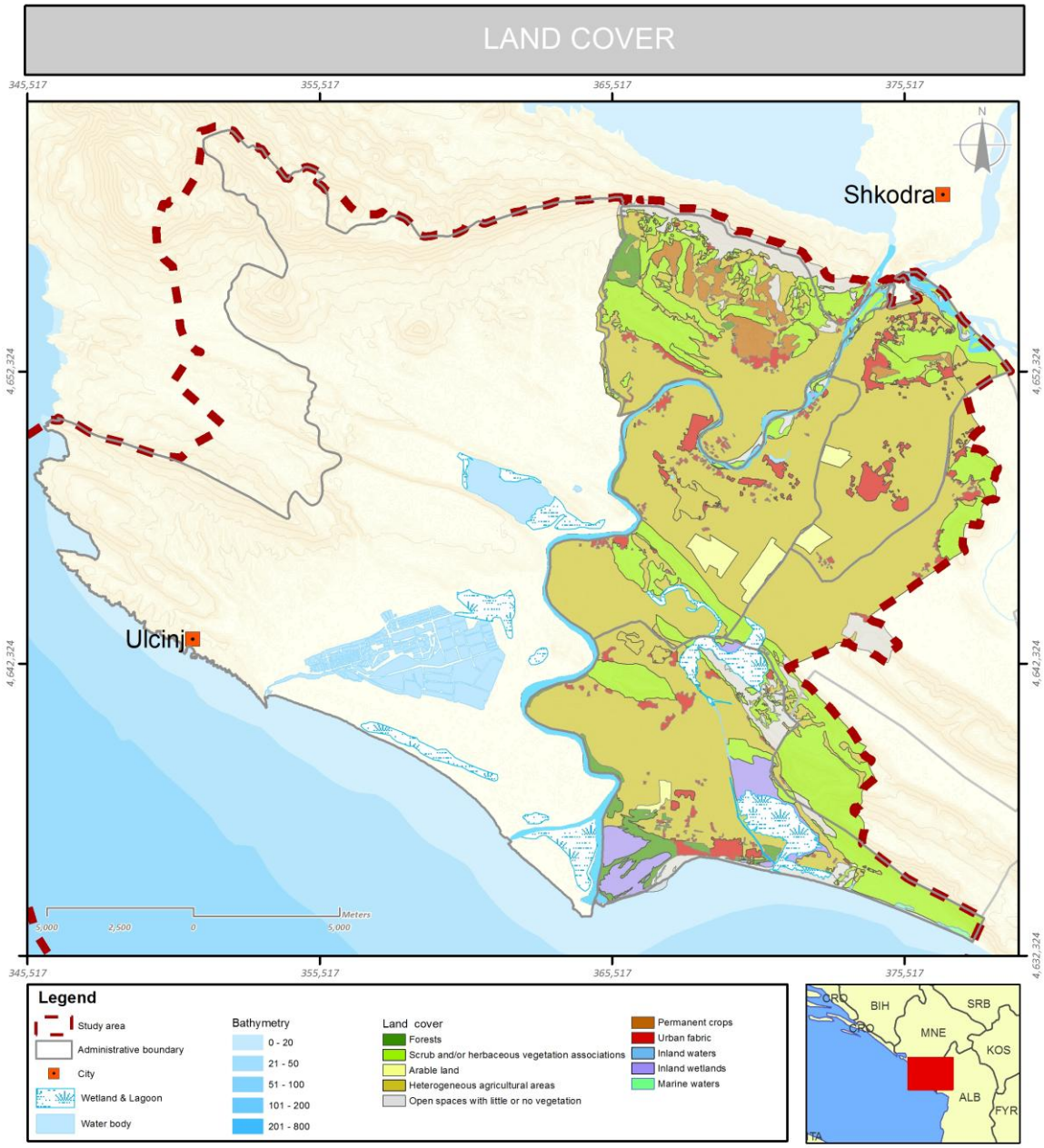


Figure 63: Land cover map, based on expert opinion, ortofoto and CLC

European Environment Agency's (EEA) updated land cover data-base according to CORINE Land Cover nomenclature (CLC 2000 – 2006), show that the overall land cover change from agriculture to artificial surfaces between 2000 and 2006 in Albania is 3% - the highest level of change occurring in Europe in this period. Urbanisation trend could also be observed in Buna area, where the greatest changes occurred after 2006. According to the expert evaluation of the available ortophoto, in the period from 2006-2012 urbanisation occurred on approximately 30 ha or 0.2% of the entire territory, with totally urbanised 896 ha (Figure 65).

In addition, the phenomena of urbanisation in the narrow coastal area could be observed as well (500 and 1000 meters from the coastline). According to the available information, it can be estimated that nearly 55ha (12%) of the 500 meter zone and 93ha (10%) of the 1000 meters zone were urbanised by 2012. According to expert preliminary analysis using available ortophoto and Google Earth images, it seams that coastal urbanisation is predominantly located more than 50 meters from the shoreline.

Unlike in Montenegro, the comparison between land actually urbanised and land designated to be urbanised in plans could not be undertaken, due to lack of spatial planning documents.

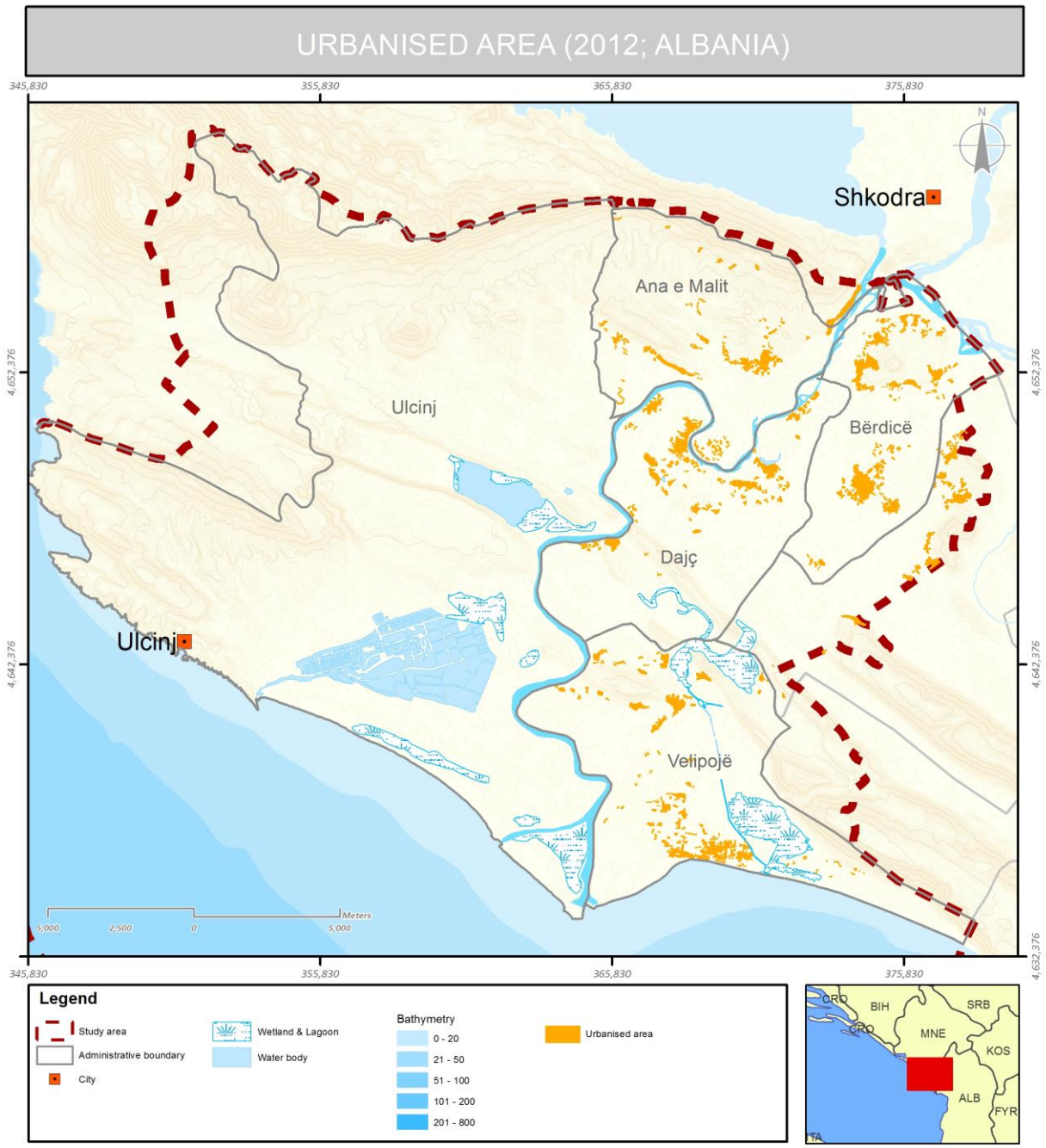


Figure 64: Urbanised areas in 2012

Montenegro

The urbanisation process in the coastal areas of Montenegro has been intensified from the 1960's onwards, in particular after the 1990's. Results of the 2011 census show that 63% of the total population live in urban settlements (MONSTAT, 2011). Between 2003 and 2011, the share of the urban population

in the municipality of Ulcinj increased from 49 to 54%. However, this proportionate increase has taken place against the background of a decline in the overall population.

With the exception of Vladimir, most of the settlements are within 5 kilometres of the coastline. Even though initial settlements were located away from the coast on higher ground, the spread of settlements migrated downhill towards the coast. This has resulted in a significant share of population living in the narrow coastal zone: 62% of all population in Ulcinj municipality are living in settlements that have direct access to the sea (within 1 km from the coastline); 73% living within 5 kms of the coast.

The importance and attractiveness of the narrow coastal zone can generally be assessed using the percentage of the area urbanised. Although it can be generally concluded that the pressures of population and the economic activities in the narrow coastal zone of Montenegro are mainly the result of the specific coastal topography (in particular in the northern coastal zone, in Boka kotorska bay) this is not so much the case on the southern municipalities (in particular Ulcinj).

Using the CORINE Land Cover (CLC) information on land-cover changes in the period of 2000-2006 only few minor changes could be observed. The reason is twofold: the greatest land-use changes did not occur in that period, but also, due to low resolution of the mapping (in order to be able to show the entire European surface) changes less then 5ha could not be identified. However using the latest orto-foto images (2011) the current percentage of artificialized area could easily be extracted.

Looking at the entire municipal surface, it can be observed that 3% of Ulcinj municipality is urbanised. However, within the narrow 1km up to 7.5% of coastal area is urbanised (Figure 66); the urbanisation trend intensifies towards north (e.g. 45% of the coastal area in Bar is urbanised).

Also, an interesting indicator is the percentage of the urbanisation of the coastline[88]. Coastal urbanisation in Montenegro had a linear character as it developed along the coastal road, the "Adriatic coastal road" (*Jadranska magistrala*). This resulted in urban sprawl all along the Montenegrin coastline with 32% of the entire coastline already being built. This is not entirely the case with municipality of Ulcinj where 12% of the coastline is urbanised (Figure 66), mainly due to the fact that on the significant part of the coastline are wide sandy beaches, under specific management regime by Morsko Dobro, public enterprise for management of maritime domain. .

[88] A geographical line where land meets the sea

Figure 65: Urbanised areas in Ulcinj

Even though all demographic trend show decline in number of people, analysis of the urban plans[89] show that urbanisation is planned for over 400% increase of number of people and double the tourist number (as compared to 2011 figures). In addition, the most intense development pressure is concentrated in the narrow coastal area, where almost 40% of total area within 1.000 meters from the coastline is designated for building (Figure 67).

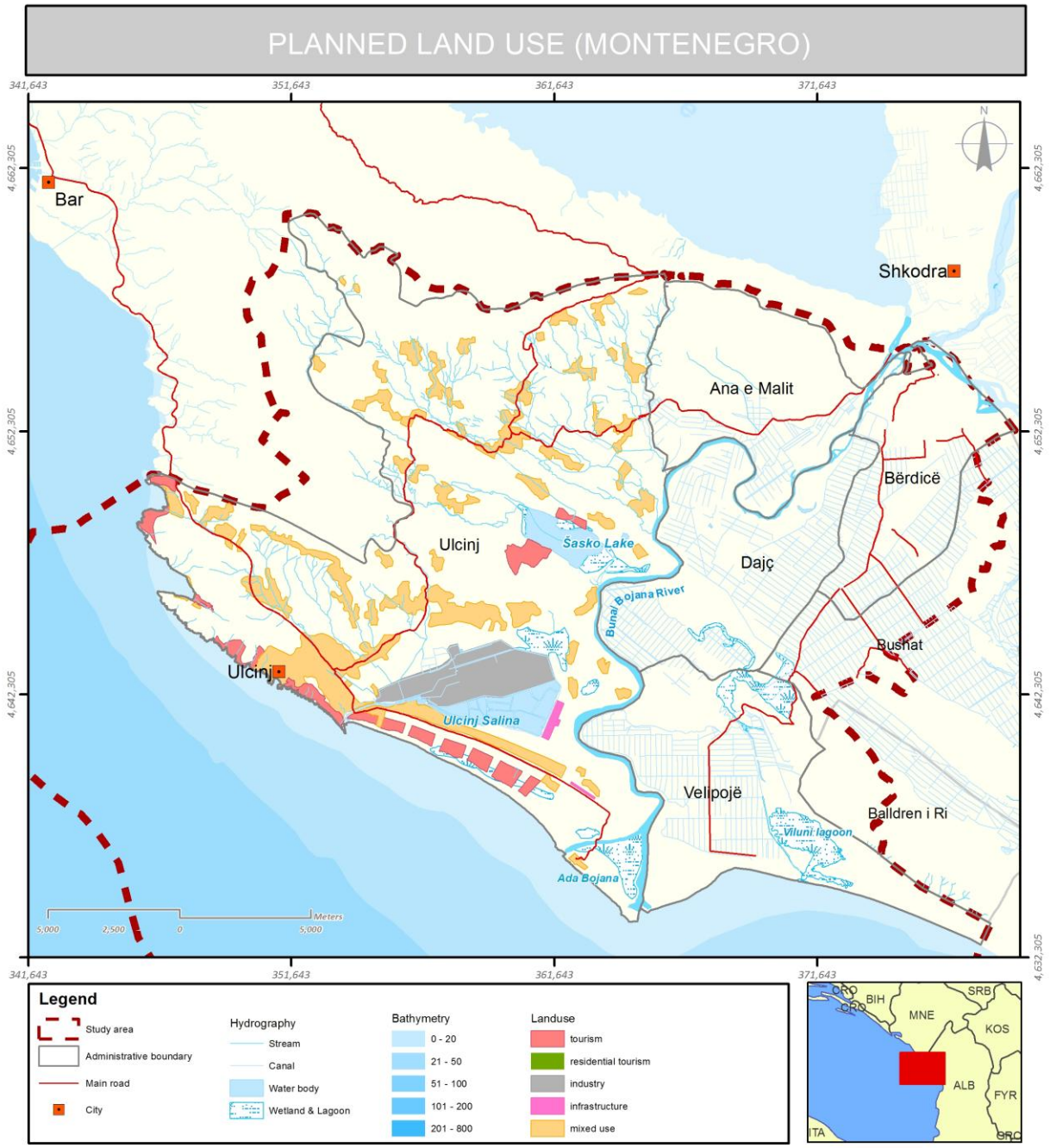


Figure 66: Land use area in Ulcinj

[89] State planning documents: (1) Spatial plan of Montenegro ; (2) Spatial plan of special purpose; (3) Detailed Spatial Plan; (4) State Location Study. Local planning documents: (1) Spatial Master Plan of Local Government; (2)Detailed Urban Plan; (3) Urban projects ; (4) Local Studies of sites.

Such intense planning is therefore not based on realistic projections and needs but rather opportunistic real-estate business pressure. Combined with lack of strict development rules that can ensure building concentration, such planning practice results in scattered, non-concentrated buildings all over the territory. In addition to deteriorated landscape quality, such build-up pattern leads to increased cost of infrastructure development, which as a consequence mainly has inadequate or even lack of infrastructure.

11.2 Infrastructure and technical systems

11.2.1 Water supply

Albania

Water supply system is inadequate; however, the villages supplement the potable water needs with individual drilled wells, without licences. Usually, this affects the water quality.

Out of 11 villages in the commune of **Dajç**, only 4 of them have access to, or are supplied with drinking water by the water supply network. In addition, only 15% of total population of the commune are supplied with drinking water from the water supply network. About 85% of the population is supplied with drinking water from individual drillings, which do not ensure adequate quality for water consumption.

The water supply network provides drinking water for 5 villages of the commune of **Bërdicë** (excluding the village of *Trush).*

The commune of **Ana e Malit** has a shortage of drinking water for the villages of *Shtuf*, *Goricë*, *Fshat i Ri*, *Alimetaj*, *Dodaj* and *Muriqan*. In general, the drinking water supply system is facing an abnormal functioning condition. Local stakeholders suggest that this is a major issue of concern, which could be solved by building four new water supply networks.

Water supply for the commune of **Velipojë** is provided by the village of *Trush*. The water supply network is composed of a system of mechanical pumps, a storage system and a free flow system. The commune has two water supply networks, where one provides water for the village of *Mali Kolaj*, while the other provides for the rest of the commune. The water supply network situation has improved, due to finalization of the second phase of constructing the water supply network. However, water quality is still a major issue of concern, as generally the network is quite outdated.

Montenegro

Since July 2011, regional water supply system operates in the Montenegrin coastal area, which significantly improved water supply in all coastal urban areas. In Ulcinj municipality, 85% of municipality's territory is covered with water supply system to the regional system since July 2012 (54% of total municipal population). In addition, five local water supply systems operate, mainly in rural areas, using 8 local wells (Gač*, Mide, Salč, Kaliman, Klezna, Lisna Bori, Brajša* and *Vladimir*). Out of these 5 local systems, two are maintained by the public enterprise "Vodacom"; three are maintained by local population.

Even though water supply system has generally being improved since development of regional water supply system, there are still some major issues. Namely, reported losses in the system in Ulcinj for the

year 2013 were almost 74%[90]. Also, increased concentration of ammonia and iron was found in samples from water supply system in Ulcinj (MORT, 2015).

In addition, water shortages in Ulcinj were recorded in the summer months (2013) with total duration of 50 hours.

11.2.2 Wastewater

Albania

All the communes have no sewage network systems. The population use the septic holes, which are in number quite equal to the number of households. In many cases, the sewage flow comes out the septic holes, on the surface, causing pollution and health risk to residents. This problem become more dangerous, during the flooding periods. The large number of septic holes, which in the beach area increases as the density, constitutes a risk for contamination of groundwater.

Montenegro

Development of sewerage system in Ulcinj municipality, as in most parts of Montenegro is significantly delayed and it has negative impacts and increasing environmental pressures on the environment. Even though 80% of urban area (30% of total area) in Municipality of Ulcinj is connected to the sewage system, waste water is drained directly into the sea, without any pre-treatment, which leads to increased pollution.

One branch of the main collector transports waste water to Port Milena, with direct effusion into the sea.

Beach tourist facilities in Ulcinj (including Velika plaža), Valdanos and Ada Bojana and villages in the hinterland of Ulcinj municipality are not connected to the system. However, tourist complex Valdanos collects and disposes waste water into the sea, 1850m distant from the coastline. There is a drain on Velika plaža, 1200m long, ending at a sea depth of about 25m. In addition, number of hotels near Velika plaža collect their wastewater into septic tanks and disposes them into the sea. Still, marine water quality assessments frequently report water quality meeting the highest standards (JPMD, 2015).

11.2.3 Waste management

Albania

The assessment on municipal waste composition (EU INPAEL[91] project, 2010) indicated that the waste production in Shkodra County is around 0.9 kg/person/day. Out of the all accumulated municipal waste over 50% is bio-degradable. In addition, there are significant quantities of other materials for recycling in the form of glass, textiles and plastics.

The results showed low quantities of ferrous and non-ferrous metals in the municipal waste stream since much of this material is scavenged from the waste bins at their point of collection. In addition the quantity of healthcare waste within the municipal waste stream is also low on account of the fact that

[90] 5,717,383 m^3 of water suppressed; 1,505,344 m^3 of water delivered (and charged)
[91] Implementation of the National Plan for the Approximation of Environmental Legislation in Albania

healthcare waste is normally collected at the point of generation and sampling was not conducted at healthcare facilities.

According to the waste law, solid waste collection is the responsibility of the local authorities. Having in mind the significant waste problems in the area, local communities agreed to use a joint landfill in Bushat area. However, since the Bushati landfill (image 8) was built in 2011, major problems have occurred. Namely the site proved to be particularly problematic as it spreads across and is sitting directly on the banks of the river and its flood plain. In addition, the site is seasonally affected by rainfall and melt-water from the mountains.

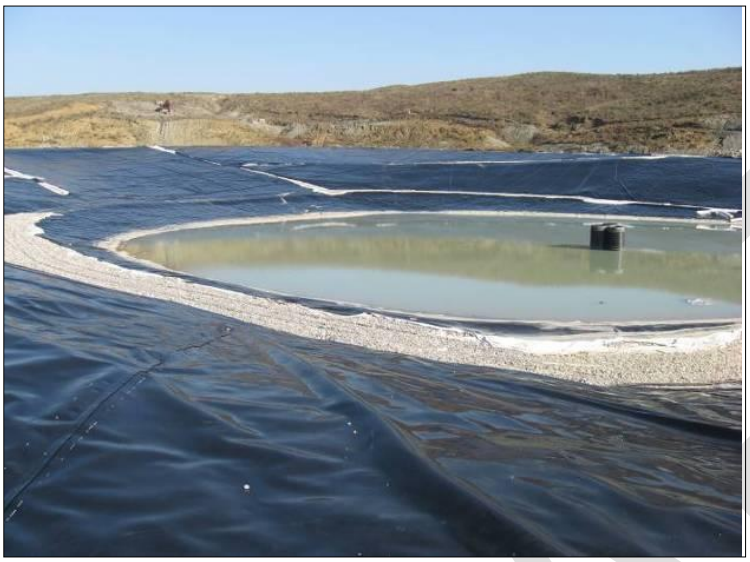


Image 8: Bushati landfill

The base of the site is the historical gravel riverbed which allows any contaminants to percolate straight into the water table or the surface waters. The depth of waste deposition does not appear to be particularly deep and is spread and compacted over a site which seems to have no limits or boundaries other than the main roads around it and the river itself. The river itself is also eroding part of the site and waste is being transported downstream as a consequence of this process. In addition, transport costs have proved to be a major obstacle to its utilization, given that the location is far from the communes particularly Velipoje. At the moment only the commune of Dajç performs collection and discharge of solid wastes in the landfill of Bushat.

A serious issue in the area is the absence of general plans for the distribution of collection points for waste, the absence of waste bins and collection vehicles.

The solid waste collection service in *Ana e Malit Commune* is carried out by two employees with very simple collection equipment. The waste is gathered near institutions, business activities, housing etc., but without any specific collection site. Also, there is no specific place for waste disposal they use. In addition, the area of Ana e Malit is exposed to flooding from the Buna river as well as water coming down from mountain streams bringing garbage and plastics in the water bodies. According to different sources the commune is collecting from 1 to 6 tonnes per day.
Since 2011, there is solid waste collection service in the territory of the *Dajç municipality* and the waste is sent to the Bushat landfill. Previously, the authority has been using “Mali i Gjymit”, a natural cavity, as the place to deposit the waste, located 2-3 km from the main road, connecting the village Pentar with centre of Dajç. Currently, an awareness raising campaign has been developed by the commune in cooperation with local and national NGOs (Miqte e Bunes, Eden centre). However, there are still few cases that waste is dumped in open irrigation and drainage canals."

Image 9: Waste in Dajç municipality

Based on the commune data, the average quantity of the waste produced in the area of *Velipoja commune* is 30-40 tonnes per day, with organic waste being the dominant type. The main problem for the waste in the area of Velipoja is the beach, where number of people significantly increases during the summer season.

Villages of the commune are cleaned daily along the main road; the collection of waste from the beach is carried out twice a day during the summer season. More remote villages are only provided with the service between once and three times per week. Businesses are provided with regular solid waste collection. Through different projects and private donation, the commune is furnished with garbage containers.

For the moment, the Velipoja Commune is using the old damp for the deposit of their waste. The damp is about 4.4 km from the beach area and about 800 m from the river Buna, in the Pulaj village. The damp has a surface of around 0.9 ha, without any EU standard. It is used mostly during the summer season (June-September).

Montenegro

Based on the Management Plan on Solid Waste for the Period of 2008-2012 (Official Gazette 16/2008) the approximate quantity of waste for the municipalities of Ulcinj was 8,311[92] tonnes for the year 2006. These calculations were made assuming that permanent population produces 0.90 kg of waste/per day, tourists 1.50 kg/per day and refugees 0.25 kg/per day. Also, it is estimated that in coastal area approximately 15% of waste is paper, 7% glass, 4% metal, 12% plastics, 5% textile, organic waste 35% and 22% the rest.

The collection of waste is the responsibility of the local municipalities. Waste in Ulcinj municipality is collected by Public Enterprise Ulcinj on a daily basis, and because of the narrow streets in the old part of the town, a special plan has been designed in which waste is collected three times daily. Since 2012, municipal waste collected from the Municipality of Ulcinj is disposed of at regional sanitary landfill Možura. The site is located at the territory of the Municipality of Bar, 17 km from the town of Bar and 11 km from Ulcinj. The area of the space intended for the sanitary landfill and recycling centre is 24.4 ha.

[92] Only 54% has been managed (deposited and/or recycled)

The distance of the location “Možura“ from the sea is about 1,500m. Within a radius of 850m there are no residential or corporate facilities.

According to the Management plan, previously used landfill Kruče was on the priority list of landfills that need to be remediated by 2012. Remediation still did not take place.

11.2.4 Transport system

Albania

The **transport** network in Buna area is poorly organised. The existing network of roads does not provide a scheme for the effective circulation of vehicles, bicycles and pedestrians. There are no pavements, parking areas or bike ways which makes the movement of the pedestrians unsafe, and there is the need for better connection between villages and with the main road from Shkoder to Velipoja. The closest maritime port in is Shenjin, south from Velipoja and outside the Plan area.

Montenegro

The existing road infrastructure in the territory includes national, regional and local roads. Even though these are of relatively good quality and connectivity, there is a lack of regular maintenance and intensive traffic jams especially during the summer season (June-September), the frequency of traffic being up to 20 times greater than during the rest of the year. In addition, the main and regional roads largely run through towns (mainly due to unplanned expansion of cities) with the consequent impact on the urban quality of life and congestion.

The port of Bar is the most important in Montenegro for international maritime traffic, and is the only port in Montenegro, with a developed infrastructure, modern equipment, storage facilities, and personnel to compete in the international market. Therefore, all the international maritime traffic for Ulcinj needs to pass through Port of Bar.

Given that the quality of rail infrastructure is out-dated. Taking into account the relationship with the Port of Bar, which is of key importance, the railway is one of the important factors in this region development.

There are no **airports** in Plan area. However, the proximity of the airports in Tivat and Podgorica makes this region is relatively well connected by air.

11.3 Challenges in agriculture

Albania

Agriculture, characterised by the small farm size, remains still oriented to auto consumption. Namely, most of the farm sizes in the area are significantly below 1ha[93] and fragmented in numerous plots (3-4 plots per farm on average) that could be considered as one of the important obstacles to the increased and efficient agricultural productivity securing high return from investments. In addition, problems with

[93] Based on Agriculture and Food Sector Strategy (MAFCP, 2007), Shkodra county is among the counties with the smallest farm sizes (on average, from 0,5 to 1 ha)

land ownership (uncertainty and ownership overlapping), that are frequent in the area, additionally contribute to inefficient development of the agricultural sector.

As a result, total production from the area is sufficient to cover the needs of the local consumption for only six months of the year while the remaining comes from the import. Also, the products are usually traded in very poor sanitary conditions, such as on the pavements along the streets. There is no technology for packaging or standardization of the products for local/national or export (including tourist) purposes (REC, 2006).Before the 90's, the agricultural land was drained by a well-managed system, composed of underground canals, drainage canals, pumping stations, and rivers. This system is now highly damaged and the situation is very critical; so critical that the area cannot produce crops without improving this system (REC, 2006).

Montenegro

Regardless of the favourable climate conditions and the availability of highest quality land, agricultural development in the coastal region is limited due to lack of interest of the local population, availability of alternative and lucrative sources of income, as well as limited support for agricultural development. Agriculture is characterised by small scale production, with only 277 (out of 1731; i.e. 16%) family agricultural holdings that could be considered as serious producers, with agricultural field larger then 2ha (MONSTAT, 2011a). In addition, substantial areas of agricultural land are not used for production. Arable land area has further reduced through conversion into meadows and pastures outside urban areas. The investment and construction boom has also affected the conversion of agricultural land, for example for housing, especially after the refund of land owners (Figure 68).

Analysis of the local spatial plans, show the negative trend of allocating the most valuable agricultural land into building areas[94]. This shows the future development orientation of the Municipality that favors tourism and real-estate business over intensive agricultural development.

[94] Blue areas are showing only land larger than 5000 ha converted into buildable areas; in addition there are more smaller areas as well

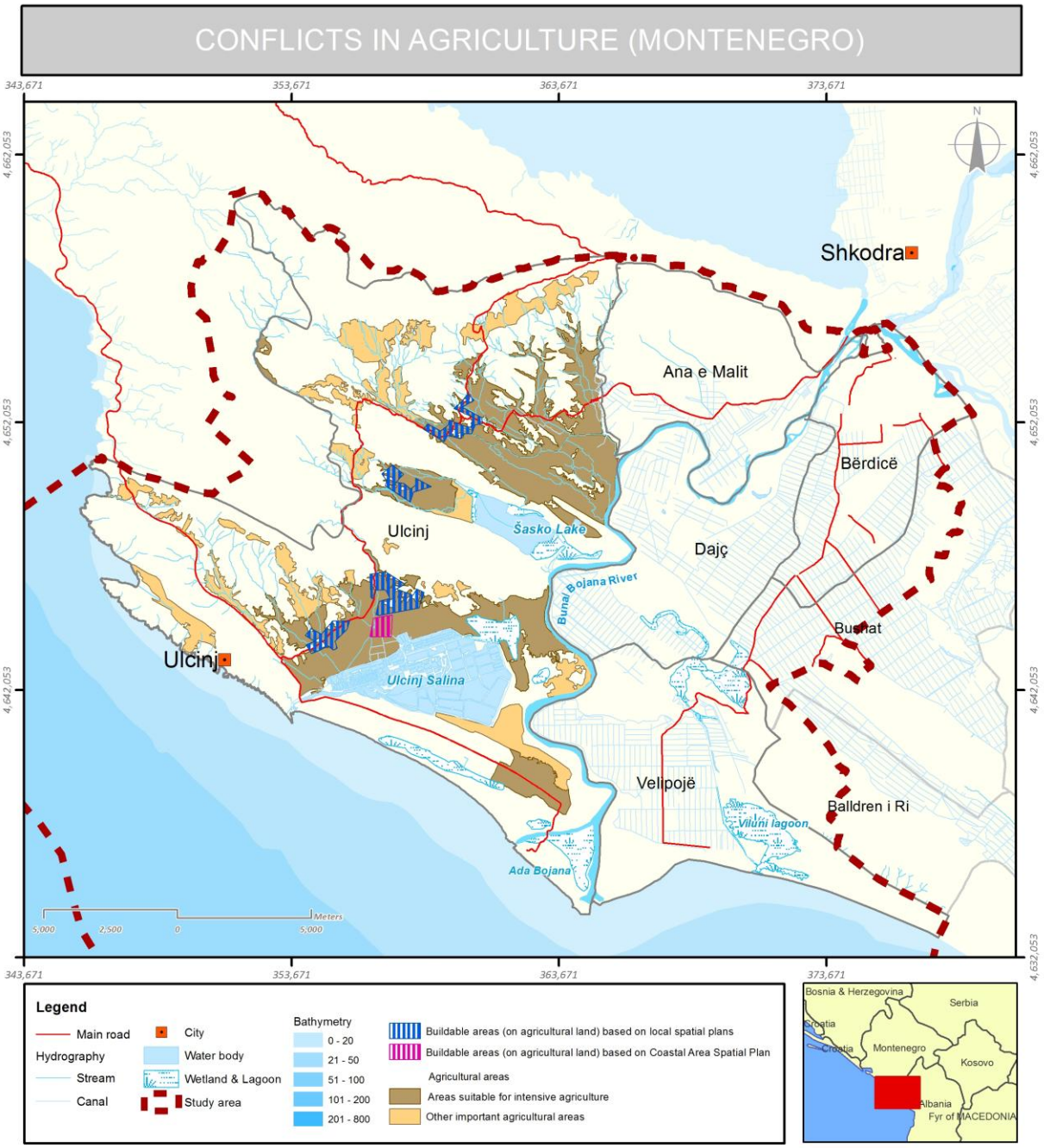


Figure 67: Conflicts with urbanization and agriculture in Ulcinj, Montenegro

11.3.1 Impacts of climate change for the agricultural sector

The National Communications by Montenegro and Albania to the UNFCC highlight the potential impacts of climate change on the agricultural sector. For Albania, as stated in the First National communication, these include the increase in irrigation requirements as a result of changes in rainfall, evaporation and soil moisture changes. However, these changes are not expected to impact on crop yields in the shorter time horizon of 2025 owing to sufficient available water resources for irrigation by 2025. For the longer time horizons of 2050 and 2100 the expected impacts on agriculture are: "the reduction of the extent of arable land, due to soil erosion and alteration; the changes in the growth cycles, harvest time and the quality of the agricultural production, especially along the coastal area, owing to an increase in salinity because of the sea level rise and intrusion of salt water into the soil; the cultivation of early agricultural products in the open air or in greenhouses, owing to an increase in winter temperatures" (Ministry of Environment, Albania, 2002, pp. 100). However, UNDP report prepared for the Third National Communication, highlight that increased spring temperatures will increase soil temperatures that might extend suitable zones for summer crops and length of growth season (for over 30 days). The impacts of climate change on the agricultural sector discussed in the National Communication of Montenegro include the effects on soil structure and moisture content, and agricultural productivity on the basis of evapotranspiration and water demand by plants in two future scenarios namely, 2001-2030 and 2071-2100 (Ministry for Spatial Planning and Environment, Montenegro, 2010).

In order to try to provide **initial quantification** of the changes in agricultural output for the Buna/Bojana area as a result of climate change, two sets of percentage change in agricultural productivity estimates are used, one from the PESETA study (Iglesias et al., 2009) for the 2011-2040 scenario and the other from the Cline (2007) study for the 2080s with and without carbon fertilization. **It should be noted that these quantifications are presented, not as an absolute figures, but as a demonstration of impact changes in climate could have on the agriculture.** . The baseline agricultural data for the year 2003 for the Ulcinj municipality that falls in the Buna/Bojanaarea in Montenegro, come from the Statistical Yearbook of Montenegro (MONSTAT, 2006). It should be noted that calculations were only based on some cereals and vegetables[95], crops for which comparison based on these two studies could be done.

The assessment shows that a 2 % decline in agricultural yield translates into a loss in agricultural output for selected crops to the tune of 0.12 million Euros for Ulcinj, 75% of all coastal municipalities and 16% of the total agricultural loss for Montenegro as a whole during 2011-2040.

Similarly, an 8.6 % decline in agricultural yield (excluding the effects of carbon fertilization) translates into a loss in agricultural output of selected crops to the tune of 0.52 million Euros for Ulcinj, 75% of all coastal municipalities and 14% of all Montenegro during the 2080s. On the other hand, assessment shows that with carbon fertilizers increase in agricultural yield of 5.1 % is possible, that translates into a gain in agricultural output of selected crops to the tune of 0.36 million Euros during the 2080s.

Regarding wine production, the IPCC Fifth Assessment Report (AR5, Kovats et al, 2014) indicates that the "climate change will alter the geographic distribution of wine grape varieties (high confidence) and this will reduce the value of wine products and the livelihoods of local wine communities in southern and continental Europe (medium confidence) and increase production in northern Europe (low confidence)." In addition to impacts on grape yields, it can be expected that wine quality as well as grape varieties could also be affected by the higher temperatures. For this area, the impact could even be the positive one; however, any assessment will require further research.

A study by Ponti et al (2014) assessed the ecological and economic impact of a projected 1.8 °C climate warming (A1B scenario) on the olive and its pest, the olive fly, across the Mediterranean Basin and found varying impact on olive yields and fly infestation levels with some areas benefiting economically and others losing. Comparing the periods 1961 to 1970 and 2041 to 2050, the study predicted a minimal

[95] Maize, wheat, potatoes, beans

impact of climate warming on aggregate olive oil production with some decrease in risk across the region. The study gives results for Croatia, Albania, Greece, Turkey, and Cyprus as a whole. They indicate slight increases in average olive yield, from 2.2 to 2.38 tones per ha, and decreases in olive fly infestation from 57 to 45 percent, which translate into an increase in profit from about 2,234 €/ha to 2,491 €/ha.

In the above presented assessment regional estimates were mainly used. For more precise information detailed studies for each individual crop needs to be done. Therefore a word of caution is in order while interpreting the above values. Nevertheless the above analysis highlights the approach that can be followed in estimating the impacts of climate change on the agricultural sector.

11.3.2 Impacts of climate change on the fisheries

There is increasing evidence that the distribution of fish species is changing, as waters begin to warm. It is likely that there will be impacts of this on the fisheries and tourism sectors (Callaway et al, 2010). Threats also come from invasive species, overfishing and destruction of habitat. The distribution of the *Sardinella aurita* has been shown to be changing in the Western Mediterranean (Sabates et al, 2006). There have been a number of studies on the North Sea and the change in centre of gravity of certain fish species, but little in the Mediterranean (Cheung et al, 2009). More work is needed in this area to enable estimation of the impact of climate change on fisheries.

Salinity is also likely to have an impact, as sea level rise extends the reach of brackish water.

It is not possible at this stage to give an indication of the scale of the impact.

11.4 Tourism

Albania

Buna area has tourism potential, however all the facilities are developed with an extremely poor standards, near the beach, attracting low quality mass tourism. Tourism activities are exclusively present in the three summer months (June-August). In addition, most of the facilities are developed in an illegal way. Still, after 2007, informal construction trend decreased as demolition of the informal constructions in the beach area hold back the new initiatives.

Montenegro

Tourism is one of the activities with highest economic potential of the area. Nevertheless, its overall performance is far from sustainable. Looking at the ratio of number of overnights and number of accommodation capacities in Ulcinj (2011) it shows that the overall utilisation of available (official) capacities is only 44%. Furthermore the majority of available capacities (2.4 times more) are concentrated in the *complementary* tourism resources, i.e. apartments, private rooms, secondary homes and alike, indicating the lack of key factors for strengthening tourism economy development. Finally, even though the general figures indicate that the number of tourists and overnights is in constant rise, including the average length of stay, around 83% of all tourist visits are in three summer months (June-August).

The share of number of (official) accommodation capacities with the number of local population is showing a good correlation (0.3-0.4). However, if we take into consideration estimated number of residential tourist as well (24,604) the ratio becomes much more unfavourable, indicating significant pressure to the local community. Still, it can be concluded that there is not yet significant disruption of the social and cultural integrity of area.

Nevertheless, the issue of secondary homes in the area indicates unsustainable path of tourism development. According to the European Environment Agency (EEA, 2002) secondary homes take (per person basis) up to 40 times land area required for a flat and up to 160 times of an 80-beds hotel. Figures (Monstat, 2011) show significantly greater number of dwellings compared to number of people/households. At the same time, it is evident that majority of dwellings in Ulcinj are for seasonal use. It should be highlighted that almost all of these (95%) residential tourism dwellings are within 5km coastal zone. This confirms that tourism in Ulcinj is predominantly based on residential tourism which is not only irretrievably consuming valuable coastal resource with minimum economic benefit but is posing additional pressure to the local community and government requiring necessary infrastructure, usually beyond economic sustainability.

11.4.1 Impacts of climate change on tourism

Just as for the agriculture, quantifications were used just as demonstartion of level of impact climate change has on the sector, rather than the actual figure. Having in mind the current relevance for national economy, the impact of climate change on tourism was undertaken only for Montenegro. However, overal conclusions of the impacts on Montenegro are also applicable for Albanian part. It was examined in a recent study by Callaway et al (2010). Two approaches were used to assess the likely consequences – one using the Hamburg Tourism Model (HTM) and using an approach developed in the PESETA project that used monthly rather than annual data. The results show the range of potential outcomes for the region in terms of both tourism numbers and expenditures – and the sensitivity to the scenario applied and the modelling technique.

In terms of the modelling of tourism demand, three scenarios are presented – the historic average for the period 2001-2008, the period 2007-2008 and a “high” scenario. The high scenario represents a doubling of 2007-2008 tourism levels. It is difficult to project what demand will be in the future – hence these scenarios give some idea of the sensitivity of the climate impact to assumptions on levels of tourism.

Key findings include that the tourism impact is likely to be negative under all scenarios with the HTM model but could be slightly positive under lower temperature increases under the Peseta model: In any event under both models increases in temperature above 3^{o}C result in visitors numbers becoming negative. This shows a potential threshold effect for temperature change and tourism demand. However, other variables should also be taken into account – e.g. growth in overall demand which may be more significant than the climate signal.

There may also be a change in the seasonality of tourism. Under conditions of 2.5^{o}C increase, this shows a move away from tourism demand in July and August towards other months.

12.INSTITUTIONAL AND LEGISLATIVE FRAMEWORK

- **Albanian and Montenegrin policies, laws and institutional set up relating to the environment are changing rapidly in order to comply with the requirements of the EU accession process.**
- **Inadequate law enforcement and slow implementation of adopted plans is an issue**
- **High-level management mechanisms have been established for the joint decision-making processes related to management of the Drin basin, including Buna/Bojanaarea.**
- **Coastal management, although required by the ICZM Protocol, still does not have such integrated structures as the water sector.**
- **There is a need for upgrading capacities at both national and local levels as well as awareness raising to increase law enforcement and implementation of the integrated approaches in managing coastal and marine ecosystems.**
- **Local governments stand out as a part of the institutional framework where strengthening is particularly needed.**

12.1 Current Situation

There is a history strategic planning (strategies, action plans etc.) and legislation that has created a basic integration across sectors are present. Policies and legal framework are under a revision process. The EU Accession Process[96] has been the main driving force.

Albania and Montenegro have both ratified the Barcelona Convention and the ICZM Protocol. Albania was among the first countries to ratify the latter in 2010; the ratification of the Protocol by Montenegro at the end of 2012 resulted in the ICZM concept to be incorporated in a number of national policies and strategic documents.

Overall, progress in law making is considerable introducing, among others, command and control as well as economic instruments. Nevertheless, there are deficiencies in the area of implementation and enforcement. The reasons are manifold:

- Sectoral policies, plans and programmes, are sometimes conflicting as they are adopted in a hasty manner or without incorporating sufficient integration related and environmental considerations.
- Many laws are framework laws and require the adoption of secondary legislation and a set of regulations; steps have been made but there is still a long way to go.

Apart from gaps in the existing legislation, a major issue is the weak administrative capacity of institutions involved in environmental policy making and implementation. According to the EC progress reports, the existing institutions are not fully operational and there are gaps and fragmentation of responsibilities, particularly in the water and waste sectors. Furthermore, commitment to and

[96] Albania is candidate country for membership to the EU since 27 June 2014. A SAA with the country was signed on 12 June 2006 and entered into force on 01 April 2009. Montenegro is candidate country for membership to the EU since 17 December 2010. The accession negotiations with Montenegro started on 29 June 2012. A SAA was signed on 15 October 2007 and entered into force on 1 May 2010.

understanding of sustainability requirements vary among different institutions. Consolidation of effective cooperation and coordination mechanisms are yet to be established.

The efforts to strengthen administrative capacities are continuous, but still inadequate.

An additional issue is the availability and access to existing data that needs to be improved to ensure a sound basis for policy making and implementation. Furthermore, the unstable economic situation has had an effect on law enforcement as well as the success of economic instruments; willingness to pay for the use of natural resources, especially water, has been low.

Public participation is legally defined in both countries; however, it is still lacking timely and efficient public influence in the decision-making process. While there is progress in this respect, additional effort is necessary for NGOs to become a key source for capacity building, raising awareness and increasing accessibility of information.

There is a need for transboundary cooperation for the management of water resources within Buna/Bojanaarea. Already established mechanisms should be used. The Shkoder/Skadar Lake Commission that has been established through an agreement between the two countries could be used in this regard; the mandate of the joint body would have to extend to cover also the management of Bojana/Buna. Furthermore, both countries are participating in the effort for the coordinated management of the Drin Basin –the Buna/Bojanais part of the basin - along with FYR Macedonia, Kosovo and Greece. An institutional structure has been established for the implementation of the Drin MoU.

Table 22: Ministries in charge of legal drafting on different sectors of environmental / natural resources management in the three countries of focus

Theme	Albania	Montenegro
Horizontal legislation*	ME	MSDT
Water Management and Protection	ME, MH, MARDWA, MTI, MEI, MUDT	MARD, MSDT
Nature Protection	ME, MARDWA	MSDT, MARD
Waste management	ME,MTI	MSDT
Industrial Activities and risks	ME, MI, MH	MSDT, MIAPA

**The body of law that is not focused on a single aspect of the environment but instead applies to all environmental fields e.g. Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Access to environmental information etc.*

Note: The allocation of legal competencies as they are illustrated in the table must be treated with caution. Taking into account the on-going restructuring of the institutional framework in the three countries, recent developments may not be reflected in the table above.

Albania: ME = Ministry of Environment, MH = Ministry of Health, MARDWA = Ministry of Agriculture, Rural Development and Water Administration, MUDT = Ministry of Urban Development and Tourism, MEI = Ministry of Energy and Industry, MI = Ministry of Interior, MTI = Ministry of Transportation and Infrastructure, MES = Ministry of Education and Sciences;

Montenegro: MSDT = Ministry of Sustainable Development and Tourism, MARD = Ministry of Agriculture and Rural Development, MIAPA = Ministry of Internal Affairs and Public Administration.

The framework for the governance of natural resources in the two countries is presented in the following pages.

12.2 Country Analysis: Albania

Legal frameworks

A sound legislative base has been elaborated during the past 20 years with the support and assistance of the EU. Legislation in the country covers horizontal and sectoral issues related to environment, natural resources management, basin management and coastal management. The key laws are given in the table below; more information regarding the main pieces of legislation are given in a separate study "Management Framework".

Albania is party to most of the Conventions and/or Regional Protocols related to environment. The Albanian Parliament passed the Law No. 10234 on Ratification of the ICZM Protocol on 18 February 2010. Implementation of this law is an issue.

Table 23: Selected laws for natural resources management in Albania and Montenegro

Albania	
• Law on Water Supply and Waste Water Management (1996) • Law on Management of Revenues Generated from the State Forest and Pastures (1998) • Law on Concerning the Right of Access to Official Documents (1999) • Law on Organization and Functioning of Local Government* (2000, amended in 2004) • Law on Protection of Arable Land* (2004) • Law on Usage and Exploitation of Arable Uncultivated Land* (2004) • Law on Regulatory Framework of the Sector of Water Supply and Collection and Treatment of Waste Waters* (1996, 2005) • Law on Efficiency of Energy* (2005) • Law on Allowed norms of liquid releases and the zoning criteria of receiving water environments (2005) • Law on Irrigation and Drainage (1999, 2008) • Law on Strategic Environmental Assessment (2005) • Law on Protected Areas* (2002, amended in 2007) • Law on Plant Protection Service (2005; amended in 2008) • Law on Service of Plant Protection* (2005, amended in 2008) • Law on Regulatory framework in water supply and waste water administration (2008) • Law on Territorial Planning (2009) • Law on Establishment and Operation of Soil Administration and Protection Structures (2010) • Law on Usage of Chemical Fertilizers (2011) • Law on Environmental Protection* (2011)	• Law on Environmental Impact Assessment* (2011) • Law on Integrated Management of Waste* (2011) • Law on Protection from non-ionizing radiation (2011) • Law on Integrated Management of Water Resources* (2012) • Law on Protection of Marine Environment from Pollution and Damage* (2002, amended in 2013) • Law Concerning the Environmental Treatment of Polluted Waters* (2003, amended in 2013) • Law on Chemical Substances and Preparations* (2003, amended in 2013) • Law on Protection of Transboundary Lakes* (2003, amended in 2013) • Law on Forest and Forest Service* (2005, amended in 2007, 2013) • Law on Protection of Biodiversity* (2006, amended in 2013) • Law on Pastures and Meadows (2007, amended in 2013) • Law on Protection of Wild Fauna (2008, amended in 2013)* • Law on Hunting (2010, amended in 2013) • Law on Environmental Permitting (2011, amended in 2013) • Law on Fishing* (2012, amended in 2012, 2013)

Institutional Framework

The **Council of Ministers** is the highest body in the administrative system of Albania responsible for the approval of national strategies and plans.

The institution responsible for **environmental** issues is the **Ministry of Environment** (ME). At regional level, the **Regional Environmental Directorates** (RED) under the ME are responsible for the implementation of environmental legislation. There are 12 REDs, one for each county with different municipal offices; the Shkodra County RED is responsible for the Buna area. Also the Agency of Environment and Forestry, as the technical body of the Ministry, is envisaged to act as the central focus for environmental monitoring.

The institutional setting of **territorial planning and water resources management** is given below. More information and details regarding the institutional structure on the areas of water management, waste management, land use, agriculture, fisheries, hunting, forestry, nature protection and management of protected areas and, environmental information are given in separate study "Institutional and legal framework"..

Although required by the ICZM Protocol there are still no integrated structures for **coastal management**. After September 2013, a new institution had been established, named the National Coastal Agency, but with no clear field working and scoping. In the coming period this institution is expecting to play an important role for the coastal management. Bearing in mind the interlinkages and interdependencies between the coastal and river basin areas, some form of integration of water (see below) and coastal management mechanisms should be considered e.g. having the basin authorities and the authorities responsible for spatial planning under the same same institutional structure.

One of the key sectors relevant for coastal management is **territorial planning**. There are three levels of territorial planning in Albania: national, integrated/interregional and local/cross-local (municipalities, communes).

- **The Ministry of** Urban Development and Tourism, is in charge of territorial planning issues. The National Council of Territory is the highest body for approval of national, integrated and interregonal territorial plans. The local territorial plans and cross-local territorial plans, are approved respectively by Council of Local Government and Councils of local governments, involved in the planning process
- The new **Law on Territorial Planning** (Nr. 10119, dt. 23.4.2009) signalled the initiation of the functioning of the **National Agency for Territory Planning** as the main technical body which supports horizontal and vertical coordination among the territorial planning authorities national and local, in order to harmonize issues on territory planning and development.
- During 2014, the MUDT, completed the drafting of amendments to the law on territorial planning, which relate to understanding and simplifying the terminology and planning processes, insertion of additional planning development control tools, as well as the definitions of duties and responsibilities of local planning authorities, depending on the territorial administrative reform.

Water management issues are dealt with by different institutions and ministries; in practice there are overlaps and lack of coordination:

- The **Council of Ministers** is among others responsible for the approval of national strategies and plans.
- The **National Water Council** (NWC) is an inter-ministerial body in charge of determining the water policy and for taking major decisions related to water resources.
- The **Ministry of Environment** is the line ministry.
- The **Directorate of Water Policies** has the function of water policies and database through the cadastre.

- The **Technical Secretariat** is the executing agency of the NWC[97] and from 2014 is under the direct responsibility of the Council of Ministers.
- The **Directorate of Environment** is another "water related" directorate which includes three Sectors: (i) Water, Air and Climate Change; (ii) Environmental Impact Assessment; (iii) Waste, Chemical and Industrial Accidents.

The **Ministry of Environment** shares responsibilities with:

- The Ministry of Agriculture, Rural Development and Water Administration (MARDWA) that is responsible for water utilization for irrigation purposes and drainage. At the regional level related responsibilities are dealt with by the regional directorates of agriculture.
- The Ministry of Transportation and Infrastructure (MTI) that is responsible for the elaboration of the policies related to water supply and sanitation. The General Directorate of Water Supply and Wastewater (GDWW) is a public institution under the MTI specialized in water infrastructure.
- The Ministry of Health (MH) that is responsible for setting drinking water quality standards and monitoring drinking and bathing water quality.
- The Ministry of Energy and Industry (MEI) that is responsible for hydropower production.

Six **River Basin Councils** (RBCs - having a multi-stakeholder synthesis) have been established for the implementation of the law and the duties charged by the NWC. Amongst others, these Councils are responsible for the issuance of water use permits and concessions for water use and gravel extraction. They are headed by Prefects.
The **River Basin Agencies** (RBA) are the executive units of the RBCs. They are part of the structure of the ME and are responsible for the implementation of the water relevant legislation and the respective regulations, the decisions of the NWC etc.[98] in the basin of their competence. The Buna basin is part of the Drini-Buna River Basin.

Monitoring of waters is carried out by scientific institutes contracted by the Ministry of Environment on annual basis: The Institute of Geoscience, Energy, Water and Environment[99]; The Albanian Geological Survey that is responsible for groundwater quality and quantity monitoring; The National Environmental Agency (former Institute of Environment) that monitors wastewater discharges; The State Sanitation Inspectorate that is authorized to monitor the quality of drinking water; The Institute of Public Health that performs biological monitoring.

[97] The TS is responsible for the:
- Development and implementation of the national policy for waters;
- Compilation of the central inventory (quantity - quality) of water reserves according to the rules decided by the NWC;
- Issuance of permits and authorizations regarding the use of water and discharges for activities that are performed in or affect more than one basins;
- Promotion of participation of water users in the management of water resources;
- Collection and assessment of water related information and preparation of reports;
- Supervision of the work of the six River Basin Agencies.

[98] They are also responsible for the preparation of the meetings of RBCs; preparation of the water inventories; preparation of water resources plans; collection of the water tariffs; reviewing of plans, programs and projects on irrigation and drainage protection of the rivers and submitting them to the RBC for approval; the proclamation of the sanitary areas around the water resources etc. In addition they: are involved in the process for the issuance of permissions, concessions and authorizations related to water use and to discharge of wastewaters to water bodies; undertake studies and surveys on water pollution in collaboration with research and scientific institutions.

[99] It is recognized by the World Meteorological Organization as the National Meteorological and Hydro-meteorological Service for Albania. It monitors surface water quality and quantity. It is a part of the Polytechnic University of Tirana and is therefore under the remit of the Ministry of Education and Sciences (MES), and does not report directly to the Council of Ministers. The IGEWE is responsible for the network of surface hydrological and meteorological monitoring stations as well as for issuing a daily meteorological bulletin.

The **Water Sector Regulatory Entity** is a state entity that is responsible for the issuance of licenses and for establishing tariffs in the water supply and sanitation sector.

Since 2002 local authorities (municipalities and communes) have been granted the responsibility for the management of water supply, wastewater collection, drainage and flood protection.

Water User Associations (WUAs) can be established at local levels as private and financially independent entities to manage water for irrigation and related infrastructure, at and below the secondary irrigation network level. Creation of water schedules and distribution plans, maintenance of water distribution infrastructure, setting and collection of fees are among their responsibilities.

Management setting

A brief overview of the management setting in horizontal and sectoral areas is given below:

Horizontal Issues
In principle, an environmental permit is required in order to conduct any kind of activity that is considered to have a potential impact on the environment. Transposition of the EU legislation on Environmental Impact Assessment (EIA) had been to be finalized also for the legislation on the Strategic Environmental Assessment (SEA).

A number of laws either advocate the use of economic instruments or specify precise details and charges. The low collection rates and levels of fines inflicted on transgressors of environmental legislation remain too limited to be a deterrent[100].

The National Monitoring Programme (NMP) the details of which is set by the Ministry of Environment and implemented in cooperation with other bodies is weak due to weak administrative and financial capacities. The water monitoring system established covers neither all river basins nor the total of the area of each river basin. The monitoring methodologies used as well as the data assessment, most of the times do not meet the appropriate standards.

The presence of environmental NGOs and civil society organizations (CSOs) is under development in Albania. Despite the difficulties, their capacities to contribute to the management of natural resources are growing. Unfortunately, the same cannot be said for NGOs and CSOs in the area of Buna River. The NGOs working in the area are based in the Shkodra city, and in Tirana. The most important group in the area is Transboundary Forum for Shkodra/Skadar Lake that is a coalition of several NGOs; this is active also in the area of Buna River.

Land Use and Territorial Planning
The administration and use of the public and private land are made through the regional plans, master plans, general regulatory plans and partial urban studies. However, the adoption and preparation of these plans is not mandatory. Only the partial urban studies are requested for the issuance of site and construction permits; the issuance of the site and construction permits must be based on the approved urban studies. Shkodra County and in particular Buna area is characterised by the general lack of urban studies, that, among other, lead to mushrooming of unplanned illegal settlements.

[100] The Law on Environmental Protection (2011) summarizes the general status of economic instruments and sets out a series of potential environmental violations, together with fines and administrative arrangements. Permits including lease rates are required for the exploitation of natural resources e.g. excavation of stone, humus, sand, gravel, etc., in forests and riverbeds; wood coal, tinder and lime production; beehive cultivation; and quarrying. A total of 12 types of violation and related fines are defined. Fines are set by the Environmental Inspectorate (under the ME) and enforced in cooperation with the state police; the respective amounts are "channeled" to the state budget. Delays in payment of the fines incur an additional daily penalty.

The protected areas in Shkodra and Buna areas have been designated as special planning areas for which detailed spatial plans are to be developed and approved by the Government; these can supersede local/municipal level plans. The Regulation and Urbanization Plan of Shkodra (including the coast of the Shkoder Lake) was developed in 1998. A physical plan for Velipoja has been also prepared.

Water Management
A major part of the legislation for approximation with the EU Water Framework Directive and other Directives in this sector are yet to be adopted.

As regards water quality, alignment with EU standards is at an early stage. The new Law on Integrated Management of Water Resources (2012) does not address issues of coordination among the responsible institutions at the national and the local levels. It also fails to establish a clear framework related to water uses, and water quality monitoring.

Only one river basin management plan (RBMP) had been developed for the Mati River and there is starting two others for Drini and Semani basin.

Non-domestic water users and users of groundwater for domestic purposes must have a concession or obtain permission, authorization or license from the appropriate water authority. Obtaining water use permits is considered to be complicated.

Box 8: Types of administrative authorization for water use in Albania

1. Permission. Water authorities may grant administrative permission for: the use of underground water for any purpose; water supplied by permanent installations and; water used for irrigation, livestock, aquaculture, and industry. Permission is also required for the planting of trees and crops on river beds and the removal of solid material from river banks.
2. Authorization. Authorizations for water use are necessary for research, exploration, and study of surface and groundwater.
3. Concession. Water authorities may grant concessions for the use of surface and groundwater for public purposes, including hydropower production, supply of potable water, and irrigation by agricultural enterprises.
4. License. Commercial well drillers must obtain a license and separate permission for every well drilled.
Source: Law on Integrated Management of Waters, 2012

In general, the use of surface and ground water remains in most cases difficult to monitor and control. Water users are not registered, the extracted quantities are neither measured nor reported and the abstraction taxes/charges are not being paid; illegal abstraction is a common practice.

Law enforcement is an issue. The National Inspectorate including all the previous inspectorates (forest, environment and water)-which are understaffed and suffer from lack of offices and basic office equipment- can only evident illegal activities but have no power to stop these or to collect the fines or tariffs. This power lies with the National Inspectorate of Environment, Forest and Water and the related inspectorates of the 12 Regional Environmental Directorate and in the inspectorates of other line ministries. Law enforcement is an issue among others due to the lack of coordination among the inspectorates. Task-forces with the participation of inspectors of different inspectorates and the police are being formed for specific issues.

With regard to water supply most local authorities in Albania - ownership of the utilities has been transferred from the government to local authorities since 2008 - have been ill prepared to take on related responsibilities. There has been insufficient human and financial capacity to create and/or rehabilitate infrastructure or manage the utilities effectively. In many cases water supply in villages not

managed directly by the utilities; an individual has the responsibility of maintaining the network and collecting tariffs. As a metering system is not established, the level of consumption is not monitored.

Tariffs' levels are decided by the local authorities; these should be consistent with the general national policies. The notion of cost recovery is followed in principle. Water utilities tend to have high losses, low revenues and low collection rates. Illegal connections, especially by poor households, are common.

Water pollution standards have been defined by the law "Allowed norms of liquid releases and zoning of receiving water environments" (2005). According to this law no business which discharges wastewater effluents will be granted a permit to operate unless it installs a water purification facility. Enforcement of this legislation has been very poor.

Flood management in the country is based on the management of risk and the mitigation of impacts. Nevertheless, the management of risk is based mostly on technical works while flood forecasting is an issue due to mainly four reasons: (i) financial and technical capacity of responsible institutions; (ii) insufficient cooperation, in terms of planning, with the KESH that manages the cascade of dams; (iii) lack of cooperation with the flood competent institutions and organizations that manage the dams in neighbouring countries.

Waste Management

Implementation and enforcement are at a very early stage while investment needs to increase considerably. With regard to institutional capacities, the ME is seriously understaffed at least with what regards solid waste management. In addition, there is unclear allocation of roles among the different authorities involved.

Currently, solid waste collection systems exist only in the main cities and towns. The only landfill complying with EU standards close to the Buna/Bojanais the Bushat landfill in the Shkodra /Buna area, however, not actually operating (see section 11.2.3). Uncontrolled dumping and burning of waste still persists, particularly in rural areas. Substantial efforts are required to reduce waste generation and promote recycling.

Nature Protection

Enforcement and, in particular, management of the protected areas need considerable improvement. Inspections and sanctions have to be implemented; illegal logging and hunting and unauthorized construction in nature reserves remain significant concerns. In January 2009, the Government approved a decree on the criteria for the establishment of the biodiversity inventory and monitoring network; still, an effective monitoring and information system has not been developed.

Protection is regulated by the Law on Protected Areas in six (6) categories – according to the IUCN criteria. Zoning systems for protected areas and spatial planning (where these exist) do not always serve the objective of a balanced approach between the need for the conservation of the ecological system and the need for economic development. The insufficient design of the systems is one reason, e.g. unclear criteria for categorization and enforcement of rules for the management of protected areas; administrative capacity is another reason.

In Albania there are already prepared management plans for all protected areas; these include the Lake Shkoder protected area management plan (2012).

Forestry

There is a six-level grading system regarding levels of protection and restrictions imposed. Forest areas within protected zones are separately classified and protected; environmental permits are required for any activity not explicitly permitted or prohibited under the law. Private forests within designated protected areas can only be used in accordance with an approved management plan.

According to the law, logging, collection of secondary forest products, access to forests for recreation, health, and general occupation require permission by the authorities. Nevertheless, enforcement is limited due to lack of institutional and administrative capacity. This is attributed to a number of factors: the unclear status of forest personnel; communication shortcomings and low salaries of forest service field staff. Insufficient inspection system is also an issue: the same person is responsible for controlling harvesting, measuring timber volume harvested and transported, thus, there is no independent checking that the documented and actual harvested volume and quality match.

Fisheries
Fisheries Management Organizations (FMOs) manage fishing activities and stocks, and issue fishing licenses. FMOs have been established in Shkoder Lake.

Law enforcement is minimal due to insufficient human resources -fishing inspectors- and the lack of financial resources and equipment. In addition cooperation among the competent authorities -the local authorities, FMOs, the fishing inspectorates and the rangers[101]- is an issue.

In Buna/Bojanabasin, in the part that reaches up to the Velipoja Lagoon, fishing is under the jurisdiction of the FMO of Shkoder. From this lagoon to the sea there is a large number of illegal fishermen. Fisheries management is really poor, resulting to employment of illegal fishing practices and disregard of fishing bans. The licensed fishermen regularly appeal to the authorities for support against illegal fishing. In Viluni Lagoon, which is declared as a core area within the category "Protected Water and Ground Landscape", fishing is also poorly administered.

12.3 Country Analysis: Montenegro

Legal framework

The Montenegrin legal system is in the process of harmonization with EU acquis. Part of relevant legislation is in the process of changes, while others have been recently enacted in the process of harmonization of national legislation with the EU acquis. Although it can be concluded that Montenegrin legislation is significantly improved, further harmonization is imminent, but what is even more important - significant efforts are necessary to enable efficient implementation; a sound information system, including data management and observatory and reporting mechanisms are among the necessary instruments.

The key laws are given in the table below.

Table 24: Selected laws for natural resources management in Albania and Montenegro

Montenegro	
– Law on Communal Affairs ("Official Gazette of Rep. of Montenegro", no. 12/95), Proposal of new Law on Communal Affairs, 2012 – Law on state administration (Official Gazette of MNE" No. 22/08 i 42/11)	– Decree on the projects for which EIA is obligatory instrument ("Off. Gazette of Montenegro". No 47/13) – Regulation on the content of the elaborate for environmental impact assessment ("Off. Gazette of Montenegro", no. 80/05)

[101] Protected areas administration

– Low on public maritime domain (Official Gazette of Rep. of Montenegro" No. 14/92, 59/92, 27/94; Official Gazette of Montenegro, No. 51/08, 21/09, 73/10, 40/11) – Low on physical planning and constructions (Official Gazette of Montenegro" 51/08, 40/10, 34/11, 47/11, 35/13, 39/13); New Proposal of the amendments to the this Low is in the process of development – Regulation on the detailed content and form of the planning document, the criteria of land use, urban regulation elements and unique graphic symbols – Regulation on conditions that must be met at artificial (decorated) and built beaches ("Off. Gazette of Montenegro", no. 20/08, 20/09, 25/09, 04/10, 61/10, 26/11) – Law on Waters ("Off. Gazette of Republic of Montenegro" , no. 27/07) – Draft law on legalization of informal buildings located is in the parliamentary procedure of adoption – Law on environment ("Off. Gazette of Montenegro", no. 48/08, 40/10, 40/11); – Law on Nature Protection ("Off. Gazette of Montenegro", no. 51/08, 21/09, 40/11, 62/13) – Law on Protection of Cultural Heritage („Off. Gazette of Montenegro", no. 49/10) – Law on environmental impact assessment ("Off. Gazette of Rep. of Montenegro, no. 80/05, "Off. Gazette of Montenegro", no. 40/10, 73/10, 40/11, 27/13) – Law on state property ("Off. Gazette", no. 21/09, 40/11) – Law on Concessions ("Off. Gazette", no. 08/09); – Law on Ports ("Off. Gazette" no. 51/08, 40/11, 27/13) – Law on Freshwater Fishery ("Off. Gazette of Montenegro", no. 11/2007) – Law on Seawater Fishery and Aquaculture ("Off. Gazette of Montenegro", no. 56/09, 40/11) – Law on Sea ("Off. Gazette of Montenegro", no. 17/07, 06/08, 40/11) – Law on agriculture and rural development ("Off. Gazette of Montenegro", no. 56/09)	– Decree on the national list of environmental indicators ("Off. Gazette of Montenegro", no. 19/13) – Law on strategic environmental assessment ("Off. Gazette of Republic of Montenegro", no. 80/05 and "Off. Gazette of Montenegro", no. 73/10, 40/11, 59/11) – Law on Forestry ("Off. Gazette of Montenegro", no.74/10) – Law on tourism ("Off. Gazette of Montenegro", no.61/10); Proposal of the new Law on Tourism is in the procedure, that is approved by the Government in 2014 – Proposal of the Law on regional water supplying of the Montenegrin coastal area, in the Parliamentary procedure – Law on Geological Survey ("Off. Gazette of Republic of Montenegro", no. 28/93, 27/94, 42/94, 26/07, „Off. Gazette of Montenegro", no. 28/11) – Law on Non-Governmental Organizations ("Off. Gazette of Montenegro", no. 39/11) – Law on Inspection Control ("Off. Gazette of Republic of Montenegro", no.39/03, "Off. Gazette of Montenegro", no. 76/09) – Law on financing of the Water Management ("Off. Gazette of Montenegro", no. 65/2008) – Low on Local Self Government ("Off. Gazette of Republic of Montenegro", no. 42/03, 28/04, 75/05, 13/06, "Off. Gazette of Montenegro", no. 88/09, 03/10, 38/12) – Law on Access to information ("Off. Gazette of Montenegro", no. 44/12) – Law on Waste Management ("Off. Gazette of Montenegro", no. 64/11) – Law on National Parks ("Off. Gazette", no. 56/09, 40/11) – Law on Hunting and Wildlife ("Off. Gazette of Montenegro" no. 51/08, 40/11) – Law on ratification of the Aarhus Convention ("Off. Gazette of Montenegro",no.03/09)

Institutional Framework

The **Ministry of Sustainable Development and Tourism** (MSDT) is the backbone of the institutional structure in Montenegro. It is responsible for the issues that have key importance for management of the transboundary area of Bojana/Buna: for environmental protection, sustainable development policy

and natural resources management, coastal zone management, spatial planning and constructions, tourism, communal infrastructure and water supplying. The above mentioned competencies include the execution of a series of tasks relevant for the management of transboundary area of Bojana/Buna, among which: integrated planning, space management and valorization; implementation of sustainable development programs and projects within the competence of the Ministry; provision of professional, organizational and administrative support to the work of the National Council for Sustainable Development; strategic spatial and environmental planning; drafting of state planning documents; provision of opinions and approvals for local planning documents; coastal zone management; drafting and adoption of plans for temporary facilities in the coastal zone and national parks; keeping of documentation database for spatial plans for the purpose of monitoring the spatial status and drafting planning documents; drafting of reports on spatial planning status; drafting of spatial planning program; system of integrated environmental protection and sustainable exploitation of natural resources; impact assessment and strategic environmental impact assessment, integrated pollution prevention and control; protection of nature; air quality; climate change, ozone layer protection, chemicals management, integrated coastal zone management; integrated protection of sea against pollution; industrial pollution control and risk management; implementation of new technologies and cleaner production technologies; waste and wastewater management; system of public utility services; coordination of regional water supply systems; cooperation with international financial institutions and funds of the European Union in the part related to the implementation of projects in the area of environmental protection and public utility services; development of tourism, hospitality, touristic offer, correlation of coastal and continental tourism; development of private tourism sector; establishment of tourism locations and areas; sustainable valorization of potentials and ecological advantages of national parks and protected areas from the aspect of tourism development; implementation of investment programs of interest for the sustainable tourism development; monitoring of infrastructure projects in function of tourism development; monitoring and promotion of investments in the tourism sector.

The Ministry supervises the activities of the following administration bodies relevant for the management of resources of the transboundary area of Bojana/Buna: The Institute of Hydrometeorology and Seismology, Environmental Protection Agency, National Tourism Organization. Regional Water Supply and Vodacom are important for water supply, as well as the local level service providers (utilities) in these areas.

The **Institute of Hydrometeorology and Seismology** carries out the tasks related to meteorology, climate, hydrology, monitoring of water, air and soil status, seismic, hydrography and other related individual tasks.

The **Environmental Protection Agency of Montenegro** carries out professional tasks and related administrative tasks in the area of environmental protection: issues permits, carries out the monitoring of all environmental segments, establishes and operates the environmental information system, carries out analyses and drafts reports, and other related individual tasks.

The **Public Enterprise for Coastal Zone Management** has been established with the purpose of the coastal zone management. It carries out tasks of coastal zone protection, planning and improved use of marine resources, concludes agreements on marine resources exploitation and carries out construction and maintenance of infrastructure facilities for the purpose of coastal zone management.

Management of beaches and beach infrastructure is a particularly important responsibility of Public Enterprise Morsko Dobro. It earns income by leasing parts of public maritime domain to different clients/ users and income is partially reinvested into activities to monitor, protect and improve the state of e.g. coastal infrastructure and beaches, bathing water etc., within the limits of its competences.

The Law on Ports stipulates the obligation of the Public Enterprise for Coastal Zone Management to administer ports of local importance, which are seven in number, according to the Regulation on classification of ports according to their importance. This role implies the competence of the Public

Enterprise in the management of other maritime infrastructure facilities such as moorings, docks, anchorages and berths.

According to the new draft of Coastal Zone Law which is in the procedure of adoption, it is stipulated that the Government, for coastal zone management purposes, shall establish the Coastal Zone Management Agency (Article 12), in such a way to transform the Public Enterprise into an Agency, which will also imply a wider range of tasks from the aspect of coastal zone protection, improvement and utilization.

Center for Ecotoxicological Researches "CETI" Ltd - Podgorica is a single-member society founded by the Government of Montenegro, whose main tasks are technical researches and analyses. Its scope of activities includes a large number of tasks, such as: ecotoxicological and quality tests (physical and chemical tests and tests of radionuclide contents) for all environmental segments (water, air, soil, sediments, sea...); control of health safety of food and consumer goods (physical and chemical tests and tests of radionuclide contents); dosimetry measurements, quality assurance and quality control (QA/QC); testing of waste gases - emission; occupational environment testing; preparation and drafting of acts related to occupational risks; artificial fertilizer testing; pesticide testing; toxicology analyses of biological materials; waste categorization; noise and vibration testing in work and living environments; drafting of toxicological studies, analyses and programs for purposes of state bodies, scientific research institutes, business companies and other entities.

The **Ministry of Agriculture and Rural Development** has a special importance for the management of the area of Bojana/Buna. It carries out tasks that, among other things, are related to: agricultural policy and rural development, including systemic approaches in agriculture, protection, exploitation and improvement of agricultural land; crop production; stock farming; organic production; phyto-sanitary area; veterinary issues; food safety; apiculture; freshwater and marine fishing and mariculture; forestry, water supply industry (supply and exploitation of water, river basin land and springs for water supply purposes, water and watercourse planning and protection against adverse water effects), etc.

Under the umbrella of the Ministry of Agriculture and Rural Development in continuation are the bodies which carry out tasks relevant for the management of the transboundary area of Bojana/Buna: **Forest Administration, Water Administration, as well as the Phyto-sanitary Administration, Veterinary Directorate and Tobacco Agency**.

The **Water Administration** is the administrative body within the Ministry of Agriculture and Rural Development which, among other things, carries out tasks related to: establishment and implementation of measures and activities related to water and watercourse planning, protection against adverse water effects and protection of waters against pollution; exploitation of water, materials from watercourses, river basin land and water facilities owned by the state, by means of concessions, leases etc; establishment and management of water information system, water cadastre, register of waters of importance for Montenegro and monitoring of natural and other events for the purpose of data acquisition for protection against adverse water effects, etc.

The **Ministry of Transport and Maritime Affairs** is competent, among other things, for maritime policy, development of ports of state importance and safety and security of maritime transport, including the navigation in the Bojana river, establishment of indicators, prevention and emergency measures in case of sea pollution from ships and crafts. These are the relevant organizational units within the Ministry: Directorate of Transport, Directorate for Maritime Transport with Branch Units – Port Authority of Bar and Port Authority of Kotor; Administration bodies operating within this Ministry are: **Directorate for Transport, Port Authority and Maritime Safety Department**.

The **Ministry of Finance** has significant competence in the management of transboundary area of Buna/Bojanataking in consideration it administers and controls state properties on behalf of the Government and is in charge of tax policy. Relevant administration bodies of the Ministry are: **Real Estate Administration, Property Administration, Tax Administration.**

The competences of the **Ministry of Interior** are also relevant from the aspect of: maritime security control, which also includes waters of the Bojana river, carried out by ships and crafts; risk management, environmental management, rescue in emergency situations and remediation management in emergency situations (earthquakes, fires and other natural and technical and technological disasters); civil protection duties as a part of integrated system of emergency situation management;

The **Ministry of Science** carries out tasks which are, among other things, related to: implementation of programs of common interest involving scientific research institutions in the European research area and international science programs; professional advancement and mobility of Montenegrin researchers; regional cooperation and infrastructural interconnection in the area of research; implementation of national and international scientific and research projects;

The **Ministry of Culture** carries out the tasks which are, among other things, related to: development of cultural and artistic creation; protection, preservation, valorization and presentation of cultural heritage; advancement of public interest in the area of culture; drafting and implementation of strategies and programs for the development of culture; research in culture, etc. The **Directorate for Protection of Cultural Heritage and Properties** is the administration body within the Ministry of Culture.

The **Ministry of Economy** carries out the administrative tasks among which the following are relevant for the transboundary area of Bojana/Buna: preparation and assessment of development investment projects, implementation of regional development policy of Montenegro, creation of conditions for sustainable and balanced growth and development and development of economy and its competitiveness; electric energy and gas production, exploitation of minerals and rocks (exploitation of energy and other raw materials); implementation of policy and coordination of energy efficiency projects implementation; system of concessions and award of concessions within the competences of the Ministry; exploitation of mineral and other raw materials; geological research; hydrocarbon research and production, etc. An important administrative body within the Ministry of Economy is the **Directorate for Development of Small and Medium-sized Enterprises**.

The **Geological Survey of Montenegro** is the public institution in charge of geological scientific and technical activities in Montenegro. The Institute implements geological research programs and projects of interest for Montenegro, issued by the Ministry of Economy and financed from the Budget of Montenegro. It also acquires a part of its revenues on the market through the development and implementation of projects in various fields of applied geology.

Pursuant to the Law on State Administration, a new solution has been introduced with respect to the work of inspection services, by their merging into the **Directorate for Inspection Affairs**. Supervision and inspection affairs are divided between national and local levels. The Directorate includes, among other, the following inspection services of relevance for the management of the transboundary area: urban planning and building inspection (controls the implementation of spatial plans adopted at the national level and respective building activities), environmental inspection (responsible for control of emissions, waste and protected areas), water inspection (responsible for works on water infrastructures and watercourses and protection of waters against pollution from land-based sources), tourist inspection, sanitary inspection, fisheries inspection, inspection for protection of cultural properties and cultural heritage and others. Port authority and the navigation safety inspection are not integrated in the competences of the Directorate for Inspection Affairs.

Supervision of legality and functionality of operations and of legality of administrative acts in particular administrative areas within the competence of the **Directorate for Inspection Affairs** are carried out by respective ministries. Supervision of coordinated work of inspections within the Directorate for Inspection Affairs is carried out by the Government, through the Ministry of Economy. At the level of local self-governments operate building and communal inspections.

Ministry of Health among many responsibilities is also responsible for health protection, including control of drinking water quality. Related monitoring is done by the Public Health Institute.

Local competences pertinent to coastal and water management (e.g. for the locally important water bodies) are performed through several secretariats (local administration bodies). Competences of **local self-administration bodies** relevant for the management of the transboundary area of Buna/Bojanaare implemented through the work of different bodies including secretariats for development (and in some municipalities development agencies), secretariats for planning, urban planning and construction, secretariats for communal issues and public utility services (water supply, waste, sewerage, etc), and other numerous organs and bodies. Almost all municipalities in the coastal area have environmental protection departments or personnel (one person or more) in charge of environmental issues. Public communal enterprises[102] (utilities) are owned by municipalities and are responsible for provision of water and waste services. Local level inspectorates perform urbanistic, construction and communal inspections. In accordance with the Law on Local Self-Government, municipalities are also responsible for the preparation of development plans and programmes, plans for capital interventions and investment policies, and similar strategic documents. The principal sources for financing activities of local administrations are own revenues (municipalities are authorized to collect revenues from a set of local taxes and charges) and national budget transfers.

Management Setting

There is an apparent need for upgrading the capacities at both national and local levels in order to increase law enforcement and implementation of integrated approaches. When it comes to insufficient administrative capacities, local governments stand out as a part of the institutional framework where strengthening is particularly needed.

To operate effectively in the area of the Plan the functional coordination structure is required. It is customary that at the level of implementation of certain projects individual administrative - co-ordinating body are often established with the ambition to provide a coordinated cross-sectoral monitoring for project activities (as was the case with the Commission for the Skadar Lake). Thus the need for the implementation of the Program of integrated coastal zone management of Montenegro (CAMP Montenegro) and the preparation of the National Strategy for Integrated Coastal Zone Management of Montenegro the Steering Committee was established and functioned during the period of 2011-2014.g. The Steering Committee was attended by representatives of relevant ministries, PE for coastal zone management and coastal municipalities, while the the Advisory Committee was composed of representatives of professional institutions at the national level and the professional services of local governments in coastal areas.

Based on the results of the Steering Committee Board as one of the outcomes of the process of development of the National strategy on integrated coastal zone management the Council for integrated coastal zone management is established as a part of the National Council for Sustainable Development, Climate Change and Integrated Coastal Zone Management and is chaired by the President of State. To monitor the implementation of the policy of integrated coastal zone management of Montenegro the Co-ordinating body for integrated coastal zone management is established and is chaired by the Minister of Sustainable Development and Tourism, and co-chaired by PE Marine dorbo.

[102] The Enterprises are responsible for the preparation of the following plans: (i) General and operating plan of protection from the adverse effect of water, for waters of local importance (in agreement with the MARD); (ii) Operating plan for water protection against pollution from breakdown for waters of local importance (in agreement with the MARD); (iii) Plan of prevention measures and works to be taken by the owners and users of the land in erosion areas, with a view to the protection from erosion and torrent; (iv) Long-term, medium-term and short-term plan for activities in the area of water supply and drainage.

The above structure is also important for the improvement of vertical horizobtalne and coordination of the plan.

This structure is also important for the improvement of vertical and horizobtalne coordination in the ares of Plan.

A brief overview of the policy issues that are important for management setting on horizontal and sectoral areas is given below:

Horizontal issues

The **EIA and SEA Directives** have been transposed; latest amendments in both were made in 2013.

Efficiency of coordination on all data on environment and related systems on **monitoring and reporting** should be improved. In some cases data is not available/missing or erroneous. Availability of and access to existing data needs to be improved.

Information system weaknesses, in particular lack of and/ or unavailability of functional data and lack of their use for the assessment of state, monitoring of changes, setting of goals and evaluation of results of implementing policy measures are among the most significant deficiencies of the coastal zone management system.

Scientific research is rare since it requires considerable technical and financial resources, and its results are even more rarely used in decision-making. Moreover, the scope of research in the context of **monitoring the state of environment** is insufficient. This weakness results in a **lack of systematically gathered and comparable time series of data** on important parameters of the state of environment, space, natural and anthropogenic hazards, coastal processes, thus complicating management and increasing risks of making wrong decisions. Besides, data are often not prepared and adjusted to be used in other sectors as well (e.g. in spatial planning). This reduces considerably their practical value.

Main shortcomings of this area also include **mutual incompatibility** between the existing databases and unsatisfactory communication and data exchange between numerous entities competent for natural resources management. This refers primarly to the data at the disposal of public administration and scientific and professional institutions. There are still cases of data witholding and insufficient cooperation.

Causes that have led to such a situation include insufficent capacities (technical, human, financial) of institutions responsible for data collection and keeping.

Existing **financial instruments** and fees are insufficient to implement the 'Polluter/user Pays' Principle and function as incentives or disincentives. Environmental Fund is still not functional. Depleted economic power of the citizenry, current low levels of revenue and possible regressive effects of already introduced financial instruments are the main obstacles to the introduction of new ones.

Environmental NGOs have developed significantly over the course of the last decade, both in terms of the number of active organisations and the scope of their activities. Some of important national **NGO**s such as Green home and the Centre for the Protection and Research of Birds, have been active in the Plan area and had several successes[103].

Land Use and Territorial Planning

[103] Policy changes, raising of awareness regarding environment and sustainable development, promotion of protected areas, cross-border cooperation, implementation of projects to address pollution and waste management problems, significant contributions to research regarding biodiversity, improvements in spatial planning and cultural heritage protection, etc.

The most important practical regulators of the use of resources are **spatial plans**. Spatial planning is highly important in Montenegro as one of the key tools (besides sectoral and local development plans and strategies) to steer development. In terms of integration of other ministries and sectors into the spatial planning process and facilitation of their coordination, the spatial planning system has primary responsibility.

Land uses, guidelines for sectoral development and specific urban development requirements are set through a hierarchy of spatial plans at the national and local levels. Lower level plans have to be harmonised with higher level ones (Spatial Plan of Montenegro being the highest one). Local self-governments are responsible for municipal spatial urban, detailed urban plans, and local studies of locations.

Further effort is needed for the integration of environmental and sustainability requirements in spatial planning documents.

Box 9: Spatial plans at national and local levels in Montenegro

A. State planning documents; the MSDT is responsible for their development
- Spatial Plan of Montenegro;
- Special purpose spatial plan (for national parks and public maritime domain/coastal zone);
- Detailed spatial plan (for areas where objects of national interest will be located or for projects that have regional character);
- State location study (detailed plans for sites within the areas covered by special purpose spatial plans).

B. Municipal spatial-urban development plans (related responsibilities lie with the municipal authorities)
- Detailed urban development plan;
- Urban development project;
- Local location study.

Spatial plans have the power of law, but their implementation has been traditionally faced with difficulties. Capacities need to be upgraded at both national and local levels in this regard. Enforcement of construction provisions is necessary to prevent further unregulated development and inspection control need to be strengthened.

The spatial planning system, exposed to continuous pressures for **land use conversions,** failed to produce adequate responses to the existing unsustainable development patterns. Among key problems and weaknesses of the spatial planning system the following ones can be singled out:

- Under conditions of insufficiently successful economic policy, **criteria for preservation** of natural, cultural, landscape and environmental values that should be met for all investments **are invalidated**. Spatial planning system, which regulates spatial development and sets out requirements from the preservation perspective, is increasingly perceived as an **administrative barrier to development**. At the same time, it is less and less seen as an important regulation mechanism which should ensure long-term sustainable development and create conditions for shifting towards development that will give opportunity to future generations to enjoy and use values of natural, cultural and landscape heritage similar to those the current generation inherited from the previous ones.

- In the absence of other economic opportunities at the local level individuals tried to seize the ones offered by **land trading**. Big earnings were possible due to increased value of areas converted into construction land, oftentimes ten times higher than the actual land value. Therefore, purchase of

cheap agricultural and other types of land at attractive locations and their conversion into construction land emerged as a significant form of generating profit.

- Unfortunately, both of these lead to **uncontrolled and dispersed expansion of construction areas** where financing of **the costs of communal infrastructure** becomes impossible. The process of "atomised" consumption of space is characterised by interventions and investments in hundreds of sites and zones.
- There is limited cooperation and coordination between sectors in the planning process.
- It is evident there is insufficient compliance with and **inadequate implementation of regulations and planning documents**. Illegal construction contributed considerably to spatial degradation in the coastal zone. This has still not been stopped entirely, nor were measures for mitigation of negative impacts of illegally built structures implemented.
- There is an evident **declarative nature of planning** where planning directions and goals are not elaborated into graphically and normatively clear, specific, measurable and, where possible, quantified provisions for implementation of planning solutions.
- There is insufficiently objective analysis of the state and processes in space and lack of use of measurable indicators.
- Lack of quality sectoral baselines is evident.
- Application of technical criteria and methods when making decisions on the use of space (primarily environmental ones) is insufficient.
- There is inadequate understanding of the participatory process.

Ultimately, the state described above has considerable impact on the quality of planning documents.

The two framework national level spatial plans relevant for the Buna/Bojanabasin are the:

- **Spatial Plan of Montenegro** (SPM, 2008) that sets goals of spatial development and determines principal land uses and development directions for the entire country and;
- **Spatial Plan of the Special Purpose Area Public Maritime Domain** (SP *Morsko dobro,* 2007).

Other relevant spatial plans developed on the national level, with MSDT as the plan proponent, are state studies of locations[104]. In 2011, MSDT initiated the preparation of a new spatial plan that will cover the entire area of six coastal municipalities (coastal zone), including the area currently designated as public maritime domain (the new plan will supersede SP *Morsko dobro*). New Coastal Area Spatial Plan, supported by Coastal Area Management Programme, is in the process of finalization.

Water Management

One of the main issues is the coordination between the MARD that is the line ministry for water management and the MSDT that is line ministry for protection of all segments of environment and sustainable development.

Alignment with the **EU Water Framework Directive** is in a relatively advanced stage (according to some official report about 65% of all provisions are transposed - the expected date of complete transposition is end of 2016). Transposition of other relevant Directives, especially Marine Framework Strategy Directive, Bathing Water Directive, Urban Water Directive, Flood Risks Directive are equally important.

No significant measures have been taken since 2007 regarding the **implementation of the EU WFD**. Two River Basin Districts (RBDs) have been established as the basic spatial units for water management: the Black Sea RBD and the Adriatic Sea RBD (includes the Shkoder/Skadar and Buna/Bojanawatersheds

[104] These are detailed plans that regulate development in specific locations judged to be of national interest.

along with their tributaries). RBMPs[105] for each one of the RBDs should be prepared, for a period of six years, within nine years from the date that the Law on Water entered into force (i.e. until 2016). The RBD authorities were established in 2011 but they are not operational.

Waste Management

Waste management regulates set of policy issues that have strategic importance for spatial development, social and economic development of the Area. The process of providing the functionality of an **operational integrated waste management system** has not been completed in Montenegro yet. Alignment with the European standards is low. Financial and administrative limitations have delayed the initiation of the implementation of the Waste Management Law.

Two sanitary landfills (build according to the EU standards) have been constructed in Bar and Podgorica, and are currently operational. There is ongoing process of development new **State Waste Management Plan** that will encompass strategic and operational plan for waste management until 2020, with directions until 2030.

Cost recovery is an issue due to low waste collection coverage rate (from 50-95%), and low fee collection rate.

Lack of financial resources and capacities of local authorities are major issues.

Nature protection

There are six categories set to characterize the protected natural resources[106]. Some preparatory activities for establishment of the **National NATURA 2000 network** have been done, while beginning of the complex process with the aim to identify areas of importance for NATURA 2000 network is expected. Improved databases for designation and management of protected areas (including Natura 2000 sites) are needed.

The management settings for protected areas (including management tools, categories of protection of natural areas, prohibited activities and licensing etc.) are prescribed by law. Under the 2008 **Nature Protection Law**, competences for proclamation and management of certain categories of protected areas (namely for regional/ nature parks, natural monuments, and landscapes with outstanding characteristics) were delegated to local authorities. The proclamation of new protected areas with the support from international organizations (UNDP Montenegro and GEF) is on the way. The establishment of a sustainable management framework at local level is expected to be a challenge. So far, the only protected areas with operational management structure are the National Parks.

The most relevant problems and weaknesses that characterize nature protection and management with protected areas of nature are the following:

- Although biodiversity databases is a priority action defines in the National Strategy for Biodiversity (2010-2015), it is not operational.
- Due to the lack of data on certain natural assets and areas, implementation of the **regulation on conditions for nature protection** has not begun yet.
- One of the reasons significantly contributing such a situation is the **lack of systematic mapping and expert baselines** on the distribution and state of habitats and species. Combined with insufficient capacity, these deficiencies lead to public administration not responding properly to the pressures

[105] According to the law, the plans of water management in the water basin shall set out the elements of water management and shall contain the identification of the water bodies intended for water supply, review significant effects of human activities on the status of surface and underground waters, describe the list of priority objectives of environmental protection in respect of surface and ground waters, describe the programs of measures, etc.

[106] Strict and special nature reserves; National parks; Regional parks and the parks of nature; Natural monuments; Protected habitats and; Areas of exceptional characteristics.

from high real estate demand (particularly in the most attractive locations), i.e. to pressures from intensive urbanisation and construction not adapted to the natural surroundings.

- **Lack of Assessment of acceptability** of actions and economic activities in the context of preserving ecological network's integrity and ecologically significant sites in accordance with the provisions of the *Law on nature protection*.
- Particularly important group of deficiencies is related to the **protected natural areas.** Practical application of the legal provisions is made difficult by a number of problems including incomplete information about boundaries and status of protected natural areas, incompatibility of earlier procedures for designation of protected natural areas with the newly prescribed protection categories, etc. Protection measures for valuable ecosystems outside of protected areas are hardly ever implemented.
- The model of protected areas management in public maritime domain is questionable from the perspective of preservation of integrity of protected areas that expand or will expand beyond boundaries of the public maritime domain, since Public Enterprise Morsko Dobro is determined as the manager of protected areas only in the coverage of public maritime domain. Particular concern is raised due to the fact that the existing protected areas system **is not representative**, i.e. it was not established in a way to include all the valuable ecosystems (for example, marine protected areas are not designated) and that goals concerning designation of new protected areas are not achieved within the set time-limit.

  Illegal logging as well as widely spread unauthorised construction, particularly in the coastal area, remain significant concerns.
- Knowledge and information about **values of ecosystem services** are not sufficiently developed.
- **Incentives for development of green economy activities** which contribute to the preservation of ecosystem stability are not developed either, which is why resource intensive activities continue to prevail (be that through pollution or consumption/ take up of resources).
- Implementation of the ***European Landscape Convention*** is not satisfactory, while related harmonisation of legislation in the areas of spatial planning, nature protection and cultural heritage has not been finalised. Moreover, **landscape policy** has not been adopted.
- **Enforcement of legislation** needs to be strengthened. Although there are related provisions with regard to inspection, inspection measures and sanctions have not yet been implemented to the necessary extent.
- Further **awareness-raising** efforts are necessary, especially with regard to the benefits as well as the ecosystem services provided by those areas.

Forestry

Addressing the issue of **illegal logging** is of crucial importance and so is the development of a system of concessions enabling a controlled use of forest resources by the local population.

According to the provisions of the Law on Nature protection if the coverage of the area of importance for NATURA will overlap with forestry management unit than common management structure will be established.

Enterprises which resulted from the merging of forest enterprises and former state-owned wood industries, have undertaken certain forest management functions through long-term contracts. Almost all of these enterprises (85%) have been privatized. In some cases local authorities and NGOs indicate unsustainable logging as a major issue.

Fisheries

According to the **Law on Freshwater Fishery**, commercial fishing may be practiced in designated fishing areas while the activities of commercial and sport fishing are permitted by owning the appropriate permissions.

The capacity of the fisheries' administration is very limited. Inspection and control measures are weak. There is a need to improve the collection of data with regard to the fishing fleet, catches, landings and biological state of fish stocks.

Hunting
Hunting areas extend to almost 90% of the territory of the country. These areas are poorly managed by local hunting associations. Hunting is not allowed in areas of special importance for the State (5 National Parks and coastal zone) and urban settlements. **Illegal hunting** is an issue of concern. Hunting control and enforcement of related legislation need to be strengthened.

12.4Transboundary cooperation

A number of legal documents regarding cooperation on natural resources management have been signed between Albania and Montenegro. Most of them are regarding Lake Shkoder/Skadar.

There are two documents of importance for the Buna/Bojanaarea. These can either be used as inspiration or as basis for management arrangements that will extend in both countries:

- **Agreement between the Government of the Republic of Montenegro and the Council of Ministers of the Republic of Albania for the Protection and Sustainable Development of the Shkodra/Skadar Lake and its Watershed**, signed in 2008. It serves as the legal instrument for the implementation of a joint Strategic Action Plan. The Shkodra/Skadar Lake Commission has been established under this Agreement and commenced work in 2009. The Commission has six permanent members, three from each country. It comprises of representatives of the Government, local authorities/protected areas authorities and the civil society. The Commission's functions are supported by four working groups (Planning and Legal, Monitoring and Research, Communication/Outreach and Sustainable Tourism, and Water Management). A Joint Secretariat, consisting of two individuals (secretary and assistant) based in Shkodra, Albania, provides technical assistance to the Commission and the working groups. There were no meetings in 2013 due to financial constraints.
- **Memorandum of understanding on cooperation in the field of environmental protection and sustainable management of natural resources between the Ministry of spatial planning and environment of Montenegro and the Ministry of environment, forestry and water management of Albania was signed in June 2010, replacing the previous one from 2003.** It defines that Parties shall further strengthen the cooperation in specific areas, as follows:
    - Integrated protection and promotion of the preservation of all segments of the environment;
    - Harmonizing national legislation with *Acquis Communautaire* of the European Union in the framework of the Stabilization and Association to the EU;
    - Sustainable management and protection of shared natural resources: Skadar Lake, the Bojana River, the Adriatic Sea and the massif of Prokletije;
    - Implementation of relevant sectoral both international and regional agreements related to environmental protection, particularly in cases of possible cross-border impacts on the state and quality of the environment;
    - coordination of government departments of both countries to protect and permanently preserve environmentally sensitive ecosystems and natural resources;

- Strengthening of institutional and human capacity in the sector of environmental protection and management of natural resources;
- Functioning of cross-border activity structures, such as the Committee for the Skadar Lake and the Working Groups of the Committee, and enhancement of the institutional framework for the strengthening of cross-border and inter-state cooperation in the field of environmental protection;
- Support to research institutions and centers, in order to develop high-quality policies for the management of natural resources;
- Cooperation of local governments in both countries;
- Educational activities and the strengthening of public awareness regarding the importance of the preservation and rational use of common natural resources;
- Any other specific area of environmental protection, jointly accepted as adequate.

The cooperation between the Parties under this Memorandum shall be implemented through the following:

- Develop a system for effective coordination and cooperation in specific areas, as defined in Article 2 of this Memorandum, on the level of relevant government departments of both countries, government institutions, research centers, local governments and national experts;
- further strengthening of the work of established inter-governmental structures, such as the Committee for Skadar Lake and the Working Groups of the Committee;
- Expansion and strengthening of the framework for cross-border and intergovernmental cooperation in the area of environment;
- Preparation and implementation of international and regional projects aimed at applying the principles of integrated environmental protection and sustainable use of natural resources;
- Development of mechanisms for timely exchange of information and relevant documents in the case of assessment of any likely transboundary environmental impacts;
- Coordinated participation and appearance in regional and global initiatives of common interest;
- Establishment of "ad hock" working bodies in the cases of development of environmentally sensitive programs and projects;
- Establishing a system for early warning for the purpose of coordinated and effective response in case of natural hazards, such as for e.g. floods;
- Organization of bilateral meetings, conventions, seminars, conferences, which will be attended by the representatives of government departments and state institutions, experts and the civil sector;
- Other forms of cooperation that are mutually agreed.

This MoU establishes the basis for strengthening of bilateral cooperation among countries emphasizing importance of transboundary cooperation and related institutional mechanisms.

• **Memorandum of Understanding for the Management of the Extended Transboundary Drin Basin**. The MoU was signed by the Ministry of Environment, Forestry and Water Administration of Albania, Ministry of Environment and Physical Planning, FYR Macedonia, Ministry of Environment and Climate Change, Greece, Ministry of Environment and Spatial Planning, Kosovo, Ministry of Agriculture and Rural Development, Montenegro. The Parties committed to promote joint action for the coordinated integrated management of the shared water resources in the Drin Basin, as a means to safeguard and restore to the extent possible the ecosystems and the services they provide, and to promote sustainable development across the Drin Basin. An institutional structure has been established including the Meeting of the Ministers, the Drin Core Group mandated to coordinate the implementation of the MoU and 3 expert working groups. A GEF project of 4.5

million USD has been approved to support the implementation of the MoU and the related Action Plan approved by the Ministers in May 2013.

For cooperation in the field of water management between the two countries **Commission for water management** was established, but it is not functional for some time.

Further to the legal instruments additional efforts at transboundary level have promoted the cooperation
for the management of the Buna/Bojana basin:

- The establishment of "**Joint Forum of Shkodra/Skadar Lake**" in 2008 as one of the main civil society platform for transboundary dialogue between Montenegro and Albania on Shkodra/Skadar Lake on different levels, particularly for the civil society organizations, research and scientific bodies, regional offices, etc.

- A Declaration on the Occasion of Designation of the "**Lake Day**" was signed by the Minister of the Environmental Protection and Physical Planning of the Republic of Montenegro and the Minister of Environment, Forests and Water Administration of the Republic of Albania in 2006. Celebrated on third week of June "Lake Day" has become a special event related to environmental protection involving all stakeholders.

Despite to the existence of the above agreements on cooperation and intermittent functioning body for cooperation in cross-border context, usually for a specific project, for now t**here is no permanent body to enable functional transboundary cooperation in all areas of importance for the two countries or areas that have been identified in this Plan**. It is necessary to define institutional model of transboundary cooperation, so as to ensure continuity in the functioning and representation of all relevant departments at the state level, and local governments in both countries.

In accordance with the results so far achieved in cooperation between Albania and Montenegro and the needs identified in the preparation of this Plan for the cross-border area of Buna/Bojanaand in order to establish a comprehensive and functional structure for cooperation between the two countries it is necessary to agree on and sign the agreement on comprehensive cooperation in cross-border area which, among others:

- Establishes a Joint Committee for the management of cross-border area between Albania and Montenegro encompassing coverage of the areas of river Bojana, Skadar Lake and the border part of the coastal areas. The Commission should be composed of the representatives of relevant ministries of the two countries, relevant professional institutions and local governments.
- Determines the thematic areas which are the subject of cooperation, such as: sustainable development, environmental protection, tourism, spatial planning, integrated coastal zone management, energy, agriculture, water management, forestry, fisheries, transport, emergency, scientific collaboration.
- Determines the body of a Joint Commission (one of the professional bodies can be, for example, previously established by the Commission for water management).

BIBLIOGRAPHY

Ahaneku, I. E. (2011). Comparisons of Measured and Empirical Potential Evapotranspiration in Ilorin, Nigeria. International Journal of Science and Technology. Vol. 1 (3): 115-120

Alba-Tercedor, J. & A. Sánchez-Ortega, 1988. Un metodo rapido y simple para evoluar le calidad biologica de las aguas corrientes basado en el de Hellawell (1978). Limnetica 4: 51-56.

Alba-Tercedor, J., 2000. BMWP', un adattamento spagnolo del British Biological Monitoring Working Party (BMWP) Score System. Biol. Amb. , 14(2): 65-67

Alba-Tercedor, J. & A. M. Pujante, 2000. Running water biomonitoring in Spain: opportunities for a predictive approach. In Assessing the biological quality of fresh waters: RIVPACS and other techniques. Wright, J. F., D. W. Sutcliffe, & M. T. Furse (eds): p. 207-216. Freshwat. Biol. Ass., Ambleside.

Andreo, B., Goldscheider, N., Vadillo, I., Vias, J.M., Neukum, C., Sinreich, M., Jimenez, P., Brechenmacher, J., Carrasco, F. , Hotzl, H., Perles, M.J., Zwahlen, F. (2006). Karst groundwater protection: first application of a Pan-European approach to vulnerability, hazard and risk mapping in the Sierra de Lýbar (Southern Spain). Science of the Total Environment 357, 54-73.

AQEM Consortium, 2002. Manual for the application of the AQEM method. A comprehensive method to assess European streams using macro-invertebrates, developed for the purpose of Water Framework Directive. Version 1.0, February 2002.

ARCOTRASS – Consortium (2006). Montenegro Country Report, Study on the State of Agriculture in Five Applicant Countries. Available at http://ec.europa.eu/agriculture/analysis/external/applicant/montenegro_en.pdf

Armitage, P. D., D. Moss, J. F. Wright, M. T. Furse, 1983. The performance of a new biological water quality score system based on macro-invertebrates over a wide range of unpolluted running-water sites. Water Res. 17: 333-347.

Armitage, P. D., Cranston, P. S., Pinder, L. C. V., 1995. The Chironomidae: biology and ecology of non-biting midges. London: Chapman & Hall. ISBN 0-412-45260-X.

APAWA & CETI (2007). THE STRATEGIC ACTION PLAN FOR SHKODRA / SKADAR LAKE ALBANIA & MONTENEGRO, Association for Protection of Aquatic Wildlife of Albania (APAWA) & Center for Ecotoxicological Research of Montenegro (CETI), SNV Montenegro, Global Environment Facility (GEF) World Bank (WB), March 2007, 75 p.

Bego, F. (2003). Gjitaret. In: Monitorimi i faunes ne zonat Velipoje, Kune, Vain, Patok, Divjake e Sarande. MSHN, MM. Tirane: p 61-67, 38, 54.

Beqiraj, S., Dhora, Dh. (2007). Regional importance of the fauna of the cross-border river Buna. In: Rivers and citizens. Cross-border experiences in environmental protection and sustainable development. Lecce: p 36 – 49.

Bonada, N., P. Narcís, A. Munné, M. Rieradevall, J. Alba-Tercedor, M. Álvarez, J. Avilés, J. Casas, P. Jáimez-Cuéllar, A. Mellado, G. Moyá, I. Pardo, S. Robles, G. Ramón, L. Suárez, M. Toro, R. Vidal-Abarca, S. Vivas & C. Zamora-Muñoz, 2002. Criterios para la selección de condiciones de referencia en los ríos mediterráneos. Resultados del proyecto GUADALMED. Limnetica 21(3-4): 99-114.

Borkent, A. and W.W. Wirth. 1997. World species of biting midges (Diptera: Ceratopogonidae). Bulletin of the American Museum of Natural History 233: 1–257.

Bogdani, M. (1996). Risk assessment from floodings in the rivers of Albania. Int. Conf. on Destructive Water, Anaheim, 24-28 June 1996 , pp. 83-85.

Borja, A., Franco, Valencia, V., Bald, J., Muxika, I.,Belzunce, M. J., Solaun, O. (2004). Implementation of the European water framework directive from the Basque Country (northern Spain): a methodological approach. Marine Pollution Bulletin (48), 209-218.

Borja, A., Bald, J., Franco, J., Larreta, J., Muxika, I., Revilla, M., Rodriguez, J. G. (2009). Using multiple ecosystem components, in assessing ecological status in Spanish (Basque Country) Atlantic marine waters. Marine Pollution Bulletin (59), 54-64.

Borgvang, S., Mukaetov, D., Selvik, J.R., Shumka, S., Skarbvik, E., Stalnacke, P., and Vagstad, N. 2006. Bridging the gap between water managers and research communities in a transboundary river: Nutrient transport and monitoring regimes in the Drim/Drini Catchment. Proc. of the Balwois International Conference on Water Observation and Information System for Decision Support. Ohrid, FYR Macedonia, 23–26, May 2006.

Beshku, H. (2014). Additional contribution to UNESCO-IHP component of the MedPartnership.

Bratli L.J. (2000). Classification of the environmental quality of freshwater in Norway. Hydrological and Limnological aspects of lake monitoring. John Willey & Sons Ltd., 331-343.

Bushati N., A. Neziri , M. Hysko (2010). Investigation on physico-chemical and microbiological of the parameters of Lake Shkodra. BALWOIS 2010 Ohrid, Republic of Macedonia, 25 – 29.

CEED Consulting (2012). Socio-economic inputs for preparation of Buna/Bojana/Bojana Transboundary Integrated Management Plan. Podgorica, Montenegro.

CeSPI (2010). Local democratic governance in Shkodra region. See Net Programme - A trans-local network for the cooperation between Italy and South East Europe. Centro Studi di Politica Internazionale. 28 pp.

Chinery, Michael Collins Guide to the Insects of Britain and Western Europe 1986 (Reprinted 1991).

Ciscar, J.-C. (ed.) (2009). Climate Change Impacts in Europe: Final Report of the PESETA Research Project. JRC Scientific and Technical Reports EUR 24093. Available at http://ftp.jrc.es/EURdoc/JRC55391.pdf.

Cline, W. R. (2007). *Global Warming and Agriculture: Impact Estimates by Country*. Center for Global Development and Peterson Institute for International Economics, Washington. Available at http://www.cgdev.org/content/publications/detail/14090

Coffman, W. P. & L. C. Ferrington, Jr., 1996. Chironomidae. pp. 635-754. In: R.W. Merritt and K.W. Cummins, eds. An Introduction to the Aquatic Insects of North America. Kendall/Hunt Publishing Company.

Cullaj A, Hasko A., Miho A., Schanz F., Brandl H., Bachofen R. (2005). The quality of Albanian natural waters and the human impact. Environment International 31 (2005) 133– 146.

COMMON IMPLEMENTATION STRATEGY FOR THE WATER FRAMEWORK DIRECTIVE (2000/60/EC), 2003. Carrying forward the Common Implementation Strategy for the Water Framework Directive-Progress and Work Programme for 2003 and 2004 - AS AGREED BY THE WATER DIRECTORS 17 June 2003.

Daly, D., Dassargues, A., Drew, D., Dunne, S., Goldscheider, N., Neale, S., Popescu Ch. & Zwhalen, F. (2002). Main concepts of the “European Approach” for (karst) groundwater vulnerability assessment and mapping. Hydrogeology Journal, 10 (2), 340-345.

De Pauw N. & G. Vanhooren, 1983. Method for biological quality assessment of watercourses in Belgium. Hydrobiologia 100: 153-168.

De Vries, E. J. & R. Sluys, 1991. "Phylogenetic relationships of the genus Dugesia (Platyhelminthes, Tricladida, Paludicola)". Journal of Zoology 223 (1): 103–116.

Dedej Zamir, 2012. Waste Management in the area of Buna/Bojana River. Prerаration of the Buna/Bojana Transboundary Integrated Management Plan. PAP/RAV-UNEP/MAP GEF.

Dhora, Dh., Beqiraj, S., Dhora, D. (2001). Report on Biodiversity of River Buna. APAWA, Kalimera, REC. Tirane: p 3-21

Dömpke, S. (2008). Nacrt temeljne studije za uspostavljanjem zaštićenog područja Delte Bojane. Unpublished Document. Berlin. 104 pp.

Dubljević, R. (2009). Country Pasture/Forage Resource Profiles - Montenegro. Food and Agriculture Organization of the United Nations - FAO, Italy

Djuraskovic, P.N. and Kojovic, A. 2006. Statistical characteristics of the data series of the nutrient content into the waters of Skadar Lake and its main tributaries. Balwois Conference, Ohrid, 2006.

Đukić, G. (2010). Diverzitet vodozemaca (Amphibia) i gmizavaca (Reptilia) Jugoslavije sa pregledom vrsta od medjunarodnog znacaja. In: Stevanovic, V., Vasic, V. (eds) (1995): Biodiverzitet Jugoslavije sa pregledom vrsta od medjunarodnog znacaja. Bioloski fakultet Univerziteta u Beogradu i Ekolibri.

Economou N. Alcibiades, 2002. National Centre for Marine Research, EL. With Contributions of: S. Schmutz, A. Melcher and G. Haidvogl (Austria), J. Breine and I. Simoens (Belgium/Flanders), P. Kestemont and D. Goffaux (Belgium/Wallonia), D. Pont (France), J. Böhmer (Germany), V. Kesminas and T. Virbickas (Lithuania), M. Zalewski and M. Lapinska (Poland), J. Backx & J.J. de Leeuw (Netherlands), T. Ferreira (Portugal), U. Beier, and E. Degerman, (Sweden), I.G. Cowx, R.A.A Noble, and A. Starkie (UK). May, 2002. Defining Reference Conditions (D3). Development, Evaluation & Implementation of a Standardised Fish-based Assessment Method for the Ecological Status of European Rivers - A Contribution to the Water Framework Directive (FAME), Contract n°: EVK1 -CT-2001-00094.

Ehlert, T., D. Hering, U. Koenzen, T. Pottgiesser, H. Schuhmacher, & G. Friedrich, 2002. Typology and type specific reference conditions for medium-sized and large rivers in North Rhine-Westphalia: Methodical and biological aspects. Int. Rev. Hydrobiol. 87 (2-3): 151-163.

EC - European Commission (2003). Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance Document No 3, Analysis of Pressures and Impacts, Luxembourg.

EEA - European Environmental Agancy (2001). Household water consumption. (Indicator fact sheet signals 2001. Chapter households ; YIR01HH07).

Elliot, J. M. & P. A. Tullet, 1978. A Bibliography of Samplers for Benthic Invertebrates. Freshwat. Biol. Ass., Occas. Publ. 4: 1-61.

E.U., 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Communities L 327, 22.12.2000: 1-72.

Falkner, G., R.A. Bank & T. von Proschwitz. 2001. CLECOM-PROJECT: Check-list of the non-marine Molluscan species-group taxa of the states of northern, Atlantic and central Europe (CLECOM I). Heldia 4(1/2): 1-76.

Falkner G., Obrdlík P., Castella E. & Speight M. C. D. (2001). Shelled Gastropoda of Western Europe. München: Friedrich-Held-Gesellschaft, 267 pp.

Faloutsos, D., Constantianos, V., and Scoullos, M. 2006. Assessment of the Management of Shared Lake Basins in Southeastern Europe. Global Water Partnership-Mediterranean Secretariat,Athens, Greece.

Filipovic. P. S (1981). Efects of pollution on lake Skadar and its most important tributaries. The biota and limnology of Lake Skadar. p. 97 –108.

Filipovic. P. S, Topaloviç A. (2002). Water quality assessment, physical- chemical investigations of Skadar Lake. The Shkodra/Skadar Lake Project, Heidelberg, Conference report.

Furse, M. T., 2000. The application of RIVPACS procedures in headwater streams - an extensive and important national resource. In Assessing the biological quality of fresh waters: RIVPACS and other techniques. Wright, J. F., D. W. Sutcliffe, & M. T. Furse (eds): p. 79-91. Freshwat. Biol. Ass., Ambleside.

Ghetti, P. F., 1997. Manuale di applicazione Indice Biotico Esteso (I.B.E.). I macroinvertebrati nel controllo della qualità degli ambienti di acque correnti. Provincia Autonoma di Trento, Agencia provinciale per la protezione dell' ambiente, 222 p.

Gibson, G. R., M. T. Barbour, et al., 1996. Biological criteria: technical guidance for streams and small rivers (revised edition). EPA 822-B-96-001. USEPA Office of Water, Washington DC.

Golder Associates (2010). Lake Shkodra/Skadar Integrated Ecosystem Management Project: Social and Economic Assessment. Prepared under The Global Environment Facility (GEF) the Lake Shkodra/Skadar Integrated Ecosystem Management Project (LSIEMP). Implemented by Golder Associates (UK) Ltd., for the Albanian Centre for Economic Research (ACER) and the Centre for Economic and Entrepreneurial Development (CEED). Report No. 09514930065.501/A.0.

Gritzalis, K. C. 2006. Biological Monitoring of Mediterranean Rivers with Special Reference to Greece. pp. 295-325. In: Water Quality Measurement Series. Biological Monitoring of Rivers. Applications and Perspectives. Ziglio, G., M. Siligardi & G. Flaim (eds). John Wiley & Sons Ltd, Chichester, West Sussex, England.

Gritzalis K. C., 2013 (Ed.): RESEARCH PROJECT 847: "Three year Monitoring of the Quality and Assessment of the Ecological Status of the Messinian Rivers (SW Peloponnese, Greece), Pamisos, Aris, Ligdou, Epis, Karias, Tzanes-Polylimnio, Maurozoumena, Despotis, Mourtia, Arkadikos, Neda & Velika" Technical Report, Publ.: HCMR, Anavyssos, Greece.

Gritzalis, K. C. 2014. Unpublished data.

Guarnieri, A., Oddo, P., Bortoluzzi, G., Pastore, M., Pinardi, N., Ravaioli, M., (2010). The Adriatic Basin Forecasting System: New Model and System development. Coastal to Global Operational Oceanography: Achievements and Challenges. Proceedings of the 5th International Conference on EuroGOOS, 20-22 may 2008, Exeter, UK, pp. 184-190.

Guarnieri A., Pinardi, N., Oddo, P., Bortoluzzi, G., Ravaioli, M. (2012). Modelling baroclinic circulation with tidal Components in the Adriatic Sea. Journal of Geophysical Research – Oceans, submitted.

Guerold, F., 2000. Influence of taxonomic determination level on several community indices. Water Res. 34 (2): 487-492.

GWP-Med (2013). Stakeholder Analysis Report and Public Participation Plan for the Buna/Bojana. Global Water Partnership-Mediterranean. Athens, Greece. 36 pp.

GWP-Med; PAP/RAC and UNESCO-IHP (2015). *An Integrative Methodological Framework for coastal, river basin and aquifer management: Towards Converging Management Approaches or Mediterranean Coastal Zones.* Global Water Partnership Mediterranean, Priority Actions Programme Regional Activity Centre, UESCO – International Hydrological Programme. Split, Croatia.

Hawkes HA (1998) Origin and development of the Biological Monitoring Working Party score system. Water Research 32: 964-968

Hering, D., M. Gerhard, E. Kiel, Th. Ehlert & T. Pottgiesser, 2001. Review study on near-natural conditions of central European mountain streams, with particular reference to debris and beaver dams: results of the "REG Meeting" 2000. Limnologica. 31 (2): 81-92.

Hering, D., A. Buffagni, O. Moog, L. Sandin, M. Sommerhäuser, I. Stubauer, C. Feld, R. K. Johnson, P. Pinto, N. Skoulikidis, P. F. M. Verdonschot & S. Zahrádková, 2003. The development of a system to assess the ecological quality of streams based on macro-invertebrates – design of the sampling programme within the AQEM project. Int. Rev. Hydrobiol. 88: 345-361.

Hughes, R. M., 1995. Defining acceptable biological status by comparing with reference conditions. In Davis W. S. & T. P. Simon (eds), Biological assessment and criteria. Tools for water resource planning and decision making Lewis Publishers, Boca Raton, Florida p. 31-47.

Iglesias, A., Garrote, L., Quiroga, S. and Moneo, M. (2009). Impacts of climate change in agriculture in Europe. PESETA-Agriculture study. JRC Scientific and Technical Reports, EUR 24107. Available at http://ftp.jrc.es/EURdoc/JRC55386.pdf.

INSTAT (2012). *Censusi i Popullsisë dhe Banesave 2011 / Population and Housing Census 2011*. Albanian Institute of Statistics. Tirana, Albania. 176 pp.

IPCC (2007). Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Edited by M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Cambridge University Press, Cambridge, UK.

Jáimez-Cuéllar, P., S. Vivas, N. Bonada, S. Robles, A. Mellado, M. Álvarez, J. Avilés, J. Casas, M. Ortega, I. Pardo, N. Prat, M. Rieradevall, C. E. Sáinz-Cantero, A. Sánchez-Ortega, L. Suárez, M. Toro, R. Vidal-Abarca, C. Zamora-Muñoz & J. Alba-Tercedor, 2002. Protocolo GUADALMED (PRECE). Limnetica 21(3-4): 187-204.

Jewell, M. E., 1935. An ecological study of the fresh-water sponges of northeastern Wisconsin. Ecol . Monogr . 5: 461-504.

Jewell, M . E., 1939. An ecological study of the fresh-water sponges of Wisconsin. 2. The influence of calcium . Ecology 20 : 11-28.

Joksimović A., Dragicević B. and Dulčić J., (2008). Additional record of *Fistularia commersonii* from the Adriatic Sea (Montenegrin coast). Journal of the Marine Biological Association 2 - Biodiversity records, 6232: 1-2. http://www.mba.ac.uk/jmba/pdf/6232.pdf

JPMD (2015). Rezultati mjerenja sanitarnog kvaliteta za predhodne godine. Available at http://www.morskodobro.com/index.php?option=com_content&view=category&layout=blog&id=46&Itemid=112&lang=sr Javno preduzeće Morsko dobro

Kaimaki S., I. Karavokyris, A. Katsiri, N. Skoulikidis, E. Gouvatsou, S. Zogaris, Y. Karaouzas, N. Christopoulou (2009). Consultancy for the evaluation of monitoring program results for surface waters in the framework of article 5 of the Directive 2000/60/EC, Contract TAY 54/2009, Democracy of Cyprus, Ministry of Agriculture, Natural Resources & Environment, Water Development Department (TAY).

Karajovic S., 2012, Solid Waste inputs for the prerаration of the Buna/Bojana Transboundary Integrated Management Plan. PAP/RAV-UNEP/MAP GEF.

Karaouzas, Ioannis, 2002. Master Thesis: "The freshwater quality assessment of the Pamisos River South West Greece using different European sampling methods". M.Sc. Environmental Pollution Science Thesis, Brunel University, United Kingdom, 2002, 116 pp. & Appendices I, II, II, IV, V, VI, VII & VIII.

Karaouzas, I. D. & K. C. Gritzalis, 2002. The effects of a modified river on the biodiversity and ecological characteristics on the benthic macroinvertebrate fauna (Pamisos River, Peloponnese, Greece). Proceedings of the International Conference. Joint Research Center. Sustainability of Aquatic Ecosystems 'Science in support of European Water Policies'. Stresa, Lago Maggiore, Italy. p. 155.

Karayayev, A., Burlakova, L.E. & Padilla, D.K. 2002. Impacts of Zebra Mussels on Aquatic Communities and Their Role as Ecosystem Engineers. In: E. Leppakoski, S. Gollasch & S. Olenin (eds), Invasive Aquatic Species of Europe: Distribution, Impacts and Management.

Karr, J. R. & I. J. Dudley, 1981. Ecological perspective on water quality goals. Environ. Manage. 5: 55-68.

Kolkwitz, R. & M. Marsson, 1902. Grundsätze für die biologische Beurteilung des Wassers nach Flora und Fauna. Mitt. Kgl. Prüfanstalt Wasserversorgung Abwassrbeseitigung. Berlin-Dahlem. 1: 33-72.

Kolkwitz, R. & M. Marsson, 1908. Ökologie der planzlichen Saprobien. Ber. dtschen. bot. Ges. 26: 505-519

Kolkwitz, R. & M. Marsson, 1909. Ökologie der tierischen Saprobien. Int. Rev. Hydrobiol. 2: 126-519.

Koussouris, T., I. Bertahas, A. Diapoulis & K. Gritzalis, 1990. Evaluating water quality in the Louros River (Greece). Using biotic indices based on invertabrate communities. The International Journal of Environmental Education and Information, 9(4):163-174.

Koussouris, T., I. Bertachas, A. Diapoulis, V. Pakos, K. Gritzalis, N. Nkolaidis, V. Nikolaidis, Hdien-Lun, G. Fotis, A. koritsoglou-Moschovakou & A. Conides. Study of the problems relating to water abstraction from the artificial lake of Kastrakiou in the wider area of Agrinio city. Combating of freshwater mussels(Dreissena polymorpha, Pallas). Resolving the issues considering water

abstraction and water supply in the city of Agrinio and nearby communities. Athens, 1992. Edition: H.C.M.R., pp.48

Koussouris, T., A. Diapoulis, K. Gritzalis & I. Bertahas, 1994. The distribution of invertebrate fauna along Louros River (Greece). Bios, 2:109-114.

Kovats, S., Lachowyz, K., Armstrong, B., Hunt, A., Markandya, A. (2006). Chapter 2: Health. In: *Task 3 Report - Climate Change Impacts and Adaptation: Cross-Regional Research Programme: Project E – Quantify the Costs of Impacts and Adaptation*. Report for Defra by Metroeconomica Ltd. Available at http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=13231

Laschou S., Skoullos M., Dasenakis E., Chatzinikolaou Y., Skoulikidis N (2013). Establishment of Reference Conditions and Development of a Nutrient Classification System for Greek rivers and streams. J. Env. Manag. (in review)

Leckebusch, G. C. and Ulbrich, U. (2004). On the relationship between cyclones and extreme wind storms over Europe under climate change. Global Planet Change. 44**,** 181–193.

Lisický M. J., 1991. Mollusca Slovenska [The Slovak molluscs]. VEDA vydavateľstvo Slovenskej akademie vied, Bratislava, 344 pp.

MAFCP (2007). *Agriculture And Food Sector Strategy 2007-2013*. Government of Albania. Ministry of Agriculture, Food and Consumer Protection. 61 pp.

Mahazar Akmal, Mohammad Shuhaimi-Othman, Ahmad Abas Kutty and Mohamed Nor Mohamed Desa, 2013. Monitoring Urban River Water Quality Using Macroinvertebrate and Physico-Chemical Parameters: Case study of Penchala River, Malaysia. Journal of Biological Sciences, 13: 474-482.

Marini, M., M., Grilli, F., Guarnieri, A., Jones, B., Kljajić, Z., Pinardi, N., Sanxhaku, M. (2010). Is the Southern Adriatic coastal strip an eutrophic area? Estuarine, Coastal and Shelf Science 88 (3), 395–406.

Marku E., Nuro A. (2005) Chlorinated pesticides in the sediments and fish species of Shkodra Lake. Journal of Environmental Protection and Ecology; Vol.6, No.3:539-549.

Mason, C.F., 2002. Biology of freshwater pollution. Prentice Hall (4th ed.).

Meurisse-Génina, M., A. Reydams-Detollenaerea, O. Donattia and J. C. Michaa, 1985. Caractéristiques biologiques de la crevette d'eau douce Atyaephyra desmaresti Millet dans la Meuse. Annales de Limnologie. Volume 21 / Issue 02 / January 1985, pp 127-140.

Merritt, R W., K W. Cummins, and M B. Berg. An Introduction to the Aquatic Insects of North America. Dubuque, Iowa: Kendall/Hunt Company, 2008

Metcalfe, J., 1989. Biological water quality assessment of running waters based on macroinvertebrate communities: History and present status in Europe. Environ. Pollut. 60: 101-139.

Metcalf and Eddy (1991). Wastewater Engineering. Treatment, Disposal, Reuse, 3rd edition, McGraw-Hill Int. Ed., Singapore.

Miho A., Cullaj A., Hasko A., Lazo P., Kupe L., Bachofen R., Brandl H., Schanz F., Baraj B. (2005). Environmental state of some rivers of Albanian Adriatic lowland

Misourovic A (2002): Environmental monitoring in Montenegro. Report of the Shkodra/Skadar Lake Project. 2nd International Conference on Lake Shkodra/Skadar. Heidelberg, January 2002.

MoE (2002). *The First National Communication of Albania to the United Nations Framework Convention on Climate Change* (UNFCC). Ministry of Environment, Republic of Albania. Tirana, Albania. 138 pp.

Monstat (2004). Popis stanovništva, domaćinstava i stanova u 2003. / : Census of Population, Households and Dwellings in 2003. Zavod za statistiku Crne Gore – MONSTAT. Podgorica, Crna Gora.

MONSTAT (2006). *Statistički godišnjak Republike Crne Gore 2006. / Statistical Yearbook of the Republic of Montenegro 2006*. Zavod za statistiku Crne Gore – MONSTAT. Podgorica, Crna Gora. 346 pp.

MONSTAT (2011). Prvi rezultati. Popis stanovništva, domaćinstava i stanova u Crnoj Gori 2011. / First Results: Census of Population, Households and Dwellings in Montenegro 2011. Zavod za statistiku Crne Gore – MONSTAT. Podgorica, Crna Gora. 56 pp.

MONSTAT (2011a). Popis poljoprivrede 2010: Struktura poljoprivrednih gazdinstava – korišćeno zemljište / Agricultural Census 2010: Structure of Agricultural Holdings – Utilised Land. Zavod za statistiku Crne Gore – MONSTAT. Podgorica, Crna Gora. 495 pp.

Moog, O. (ed.), 1995. Fauna Aquatica Austriaca. A Comprehensive species inventory of Austrian aquatic organisms with ecological notes. Wasserwirtschaftskataster, Bundesministerium für Land- und Forstwirtschaft, Wien.

MORT (2015). Godišnji izvještaj o stanju u oblasti vodosnabdijevanja, upravljanju otpadom i otpadnim vodama, realizaciji prioritetnih aktivnosti u komunalnoj djelatnosti sa predlogom prioritetnih projekata za izgradnju komunalne infrastrukture i predlogom mjera. Ministartsvo održivog razvoja i turizma. Podgorica, Crna Gora. 151 pp.

Moss, B., Johnes, P. and Phillips, G., 1996. The monitoring of ecological quality and the classification of standing waters in temperate regions: A review and proposal based on a worked scheme for British waters.

MSPE (2010). *The Initial National Communication on Climate Change of Montenegro to the United Nations Framework Convention on Climate Change* (UNFCC). Ministry for Spatial Planning and Environment, Republic of Montenegro. Podgorica, Montenegro. 179 pp.

Mulder, C. P. H.; Bazeley-White, E.; Dimitrakopoulos, P. G.; Hector, A.; Scherer-Lorenzen, M.; Schmid, B. (2004). "Species evenness and productivity in experimental plant communities". Oikos 107: 50–63.

Naddeo N., Zarra T., Belgiorno V. (2007). Optimization of sampling frequency for river water quality assessment according to Italian implementation of the EU Water Framework Directive, Env. Sci. & Policy, 10:243-249.

NBN, 1984. Norme belge T 92-402. Qualité biologique des cour d' eau. Détermination de l' indice biotique se basant sur les macro-invertébrés aquatiques. Institut Belge de Normalisation. Brussels, 11 p.

Neidhoefer, J. R., The fresh-water sponges of Wisconsin. Wisconsin academy of Sciences, Arts and Letters, 177-197.

Neziri, A., Gossler, W. (2006). Determination of heavy metals in water and sediments of Drini river, Buna/Bojana River and Lake Shkodra, BALWOIS 2006 Ohrid, Republic of Macedonia, May 2006, 23 – 26.

Neziri A. & Shabani Z. (2013). Organochlorine Pesticide Residues in Surface Water of the Drini River (Albania). Journal of Environmental protection and ecology, 14 (2).

Nuro A., Marku E. (2011). Organochlorine Pesticides Residues for some Aquatic Systems in Albania, In: Margarita Stoytcheva (ed.) Pesticides - Formulations, Effects, Fate, ISBN: 978-953-307-532-7, InTech, Available from: http://www.intechopen.com/books/pesticides-formulations-effects-fate/organo-chlorinepesticides-residues-for-some-aquatic-systems-in-albania.

Nijboer, R. C., R. K. Johnson, P. F. M. Verdonschot, M. Sommerhäuser & A. Buffagni, 2004. Establishing reference conditions for European streams. In Hering, D., P. F. M. Verdonschot, O. Moog & L. Sandin (eds), Integrated Assessment of Running Waters in Europe. Kluwer Academic Publishers, The Netherlands. Hydrobiologia 516: 91-105.

OECD (2004). The Informal Economy in Albania. Analysis and policy recommendations. OECD Investment Compact. 143 pp.

Økland, K. A. & J. Økland, 1996. Freshwater sponges (Porifera: Spongillidae) of Norway: distribution and ecology. Hydrobiologia 330: 1-30.

Pasari, M., Orli, M. and Mohorovi, A. (2004). Meteorological Forcing of the Adriatic: Present vs. Projected Climate Conditions, Geofizika, 21: 69-87.

Pek I., Vašíček Z., Roček Z., Hajn. V. & Mikuláš R.: Základy zoopaleontologie. - Olomouc, 1996. 264 pp.

Penney, J. T. & A. A. Racek, 1968. Comprehensive revision of a worldwide collection of freshwater sponges (Porifera: Spongillidae). Bull. U.S. natn. Mus. 272: 1-184.

Pinardi N., Guarnieri A., (2011), Climate change and development scenarios impacts on the Buna/Bojana river catchment and coastal zone. CMCC. Bologna - Italy

Pollner, J., Kryspin-Watson, J. and Nieuwejaar, S. (2008). Disaster Risk Management and Climate Change Adaptation in Europe and Central Asia, The World Bank and GFDRR. Available at http://www.gfdrr.org/gfdrr/sites/gfdrr.org/files/publication/GFDRR_DRM_and_CCA_ECA.pdf.

Ponti, L., Gautierrez, A., P., and Dell'Aquila, A. (2014). *Fine-scale ecological and economic assessment of climaet change on olive in the Mediterranean Basin reveals winners and losers*. PNAS, vol.111 no 15.

Puri, S. (2010). AQMOD Development – Hydrogeological Study of Aquifers in the Bojana Delta, Montenegro – Final Report

Radojevic, D. (2012). Assessment of Risk and Uncertainty Related to Coastal Aquifers Management in the Mediterranean – National Report of Montenegro. Contribution to UNESCO-IHP component of the MedPartnership

Raven, P. J., N. T. Holmes, F. H. Dawson, P. J. A. Fox, M. Everard, I. R. Fozzard & K. J. Rouen, 1998. River Habitat Quality: the physical character of rivers and streams in the UK and isle of Man. River Habitat Survey Report No 2. Environment Agency.

Rakaj, Dhora and Bekteshi (2009) Evaluation of ecological status of the Lake Shkodra. International Conference: LAKES and NUTRIENT LOADS, 24-26 April 2009, Pogradec.

Rastall A.C., Neziri A., Vukovic Z., Jung C., Mijovic S., Hollert H., Nikcevic S., Erdinger L. (2004). The identification of readily bioavailable pollutants in Lake Shkodra/Skadar using semipermeable membrane devices (SPMDs), bioassays and chemical analysis. ESPR – Environ Sci & Pollut Res 11 (4): 240 – 253 (2004).

REAP. Regional Environmental Action Plan on the basin of the Drin River, the area of Shkodra depression and the area of Lezha; 2006. 57 pp. REAP. Regional Environmental Action Plan on the basin of the Drin River, the area of Shkodra depression and the area of Lezha; 2006. 57 pp.

Resh, V. H., M. J. Myers & M. Hannaford, 1996. Macro-invertebrates as Biotic Indicators of Environmental Quality. In Hauer, F. R. & G. A. Lamberti (eds). Methods in Stream Ecology, Academic Press, p. 647-667.

Reynoldson, T. B. & J. F. Wright, 2000. The reference condition: problems and solutions. In Assessing the biological quality of freshwaters: RIVPACS and other techniques. Wright, J. F., D. W. Sutcliffe, & M. T. Furse (eds): p. 293-303. Freshw. Biol. Ass., Ambleside.

Ruppert, E.E., Fox, R.S., and Barnes, R.D. (2004). "Nemertea". Invertebrate Zoology (7 ed.). Brooks / Cole. pp. 271–274.

Scott, Thomas, 1996. "Nemertini, Rhynchocoela, Nemertea, Nemertinea". Concise Encyclopedia of Biology. Walter de Gruyter. pp. 815–816.

Schneider-Jacoby, M., U. Schwarz, P. Sackl, D. Dhora, D. Saveljic, B.Stumberger (2006) Rapid assessment of the Ecological Value of the Bojana-Buna/Bojana Delta (Albania/Montenegro). B. Stumberger (ed.), Stiftung Europaisches Naturerbe (EURONATUR), Konstanzer Str. 22 D-78315 Radolfzell, Germany.

REC - Regional Environmental Center - Country Office Albania (2005). Regional development strategy, Millennium development goals: Lezha region. Regional Council of Lezha. Tirana, Albania.

REC (2006). (2006). Regional Environmental Action Plan. Drini River Delta Shkodra - Lezhe. Regional Environmental Center - Country Office Albania Tirana, Albania. 93 pp

Rustja, D. (2011). The Role of Geography in Managing Spatial Development Processes: the Case of the Peri-urban Area of Shkodër City, Albania. Hrvatski geografski glasnik 73(2), 81–92.

Savva, A.P. & Frenken, K. (2002). Crop water requirements and irrigation scheduling. Irrigation Manual Module 4. Water resources development and management office, FAO Sub- Regional office for East and Southern Africa. 42-48. ISBN 0-7974-2316-8.

Schneider-Jacoby, M., Schwarz, U., Sackl, P., Dhora, D., Saveljic, D. And B. Stumberger (2006). Rapid assessment of the ecological Value of the Bojana-Buna Delta (Albania/Montenegro). Euronatur, Radolfzell. 102 pp.

Schwarz, U. (2010). Habitat mapping of the Livanjsko Polje (BA), Neretva Delta (HR, BA) and Skadar Lake (ME, AL). In: Denac, D., Schneider-Jacoby, M. & Stumberger, B. (eds.) (2010): Adriatic flyway – closing the gap in bird conservation. Euronatur, Radolfzell. p 79-89.

Shipman, B. (2012). Buna/Bojana Bojana IMF. Sub-regional Workshop on the Interlinkages between IWRM and ICZ. Algeria.

Sekulic G. & Radojevic, (2007). Hydrology and Hydrogeology inputs for the preparation of the Buna/Bojana Transboundary Integrated Management Plan. UNEP, Mediterranean Action Plan, Regional Activity Centre for the Priority Actions Programme (PAP/RAC), UNEP/MAP GEF.

Skoulikidis N., Y. Amaxidis, I. Bertahas, S. Laschou and K. Gritzalis (2006). Analysis of factors driving stream water composition and synthesis of management tools – A case study on small/medium Greek catchments. The Science of the Total Environment 362: 205-241.

Skoulikidis N., Gritzalis K. (2006). Pilot implementation of the WFD in a temporary river basin – Assessment of the ecological status of the intermittent Anapodaris river with biological and hydrochemical criteria. Regional Development Fund of Crete, Final Technical Report, HCMR, 135 p.

Skoulikidis N. (2008). Defining chemical status of a temporal Mediterranean River. Journal of Environmental Monitoring 10(7): 842–852.

Skoulikidis N. (editor), A. Economou, I. Karaouzas, L. Vardakas, K. Gritzalis, S. Zogaris, E. Dimitriou and V. Tachos (2008). Hydrological and Biogeochemical Monitoring in Evrotas Basin. Final Technical Report 1, H.C.M.R. LIFE-ENVIRONMENT: LIFE05 ENV/GR/000245 «ENVIRON-MENTAL FRIENDLY TECHNOLOGIES FOR RURAL DEVELOPMENT".

Skoulikidis N. (2009). The environmental state of rivers in the Balkans - a review within the DPSIR framework. The Science of the Total Environment 407:2501-2516.

Skoulikidis N., A. Economou, K. Gritzalis and S. Zogaris (2009). Rivers of the Balkans. In K. Tockner, U. Uehlinger, Christopher C.T. Robinson (eds.) Rivers of Europe, Academic Press, Elsevier, 421-466.

SRC (2010). Strategical Concept of Regional Development 2010 – 2016. Shkodra Regional Council.

SRC (2011). Shkodra Regional District 2011 Council Data. Shkodra Regional Council.

Symboura N., P. Panagiotidis (2013). Monitoring Program for coastal and transitional waters according to Article 8 of the WFD. Ministry of Environment, Sustainable Development and Climate Change, Operational Program Environment & Sustainable Development (EPPERAA). Technical Report HCMR, 123 p.

Statistical Office of Montenegro. Online database available on: http://monstat.org/ (Accessed on 26/06/2013).

Thornthwaite, C. W. (1948). An approach toward a rational classification of climate. Geographical Review 38 (1): 55–94. doi:10.2307/210739

Verdonschot, P. F. M., 2000. Integral ecological assessment methods as a basis for sustainable catchment management. In Jungwirth, M., S. Muhar & S. Schmutz (eds), Assessing the Ecological Integrity of Running Waters. Kluwer Academic Publishers, The Netherlands. Hydrobiologia 422/423: 389-412.

Van den Berg, C. & Danilenko, A. (2011). The IBNET Water Supply and Sanitation Performance Blue Book: The International Benchmarking Network for Water and Sanitation Utilities Databook. The World Bank, Washington D.C.

Vourdoumpa, A. S. & K. C. Gritzalis, 2000. Influence of engineering works and controlled river discharge to the use of Biotic Indices. Proceedings of the 6th Hellenic Symposium on Oceanography & Fisheries, Chios, Greece. Vol. II, p. 258-260 (in Greek with English abstract).

UNDP Climate Change Programme (2014). Report on Climate Change Scenarios and likely changes in climate indicators. Draft report prepared in the frame of Third National Communication of Albania to UNFCCC.

UNECE. 2002. Environmental Performance Review of Albania, Serbia & Montenegro. Report for the 8th Session of the Committee on Environment Policy, UN – Economic and Social Council, EC – Committee on Environmental Policy.

Wallin, M., T. Wiederholm & R. K. Johnson, 2003. Guidance on establishing reference conditions and ecological status class boundaries for inland surface waters. CIS Working Group 2.3 – REFCOND 7th Version.

WB (2007). Albania Urban Sector Review. Report No. 37277-AL. Sustainable Development Department/ Europe and Central Asia Region/ World Bank. 123 pp.

Wiederholm T. and R.K. Johnson. 1997. Monitoring and assessment of lakes and watercourses in Sweden. pp 317–329 In: J.J. Ottens, F.A.M. Claessen, P.G. Stoks, J.G. Timmerman and R.C. Ward (eds.), Monitoring Tailor-made II, Information strategies in Water, Nunspeet, The Netherlands.

wiiw (2012). Albania: High heels sans Achilles. In: Fasting or Feasting? Europe - Old and New - at the Crossroads. wiiw Current Analyses and Forecasts No. 10, July 2012 , pp. 106-108.

WHO - World Health Organization (1982). Rapid Assessment of Sources of Air, Water, and Land Pollution. WHO offset publication, No 62, Geneva, Switzerland

WTTC (2012). WTTC Travel & Tourism Economic Impact: Albania 2012. World Travel&Tourism Council. 18 pp.

WTTC (2014). WTTC Travel & Tourism Economic Impact: Albania 2014. World Travel&Tourism Council. 18 pp.

WTTC (2014a). WTTC Travel & Tourism Economic Impact: Montenegro 2014. World Travel&Tourism Council. 18 pp.

Zwahlen, F. (2004). Vulnerability and risk mapping for the protection of carbonate (karst) aquifers. Final report of COST Action 620. European Commission, Directorate-General XII

WEB References

AQEM Project (www.aqem.at); http://www.aqem.de/mains/products.php

ASTERICS (version 4.0.3), in: http://www.fliessgewaesser-bewertung.de/en/download/berechnung/

Bouchet, P.; Rosenberg, G. (2013). Lymnaea Lamarck, 1799. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=160345 on 2013-06-06.

Bouchet P., Gofas S. & Rosenberg G. (2013). WoRMS Mollusca: World Marine Mollusca database (version Feb 2013). In: Species 2000 & ITIS Catalogue of Life, 11th March 2013 (Roskov Y., Kunze T.,

Paglinawan L., Orrell T., Nicolson D., Culham A., Bailly N., Kirk P., Bourgoin T., Baillargeon G., Hernandez F., De Wever A., eds). Digital resource at www.catalogueoflife.org/col/. Species 2000: Reading, UK.

Bunje, P. M. E., 2005. "Pan-European phylogeography of the aquatic snail Theodoxus fluviatilis (Gastropoda: Neritidae)". Molecular Ecology 14 (14): 4323–4340. doi:10.1111/j.1365-294X.2005.02703.x. PMID 16313596.

Daley, Beth, 2008. "Black flies surge in Maine's clean rivers". Boston Globe. Retrieved 2008-06-23.

FAME Project (https://fame.boku.ac.at/)

Holzenthal, R. W., Roger J. Blahnik, Aysha Prather & Karl Kjer, (January 12, 2010). “Trichoptera”. Tree of Life Web Project. Retrieved March 22, 2014

Moore, J. & O. Raith, 2006. "Chapter 7 – Nemertea". In Raith Overhill. An Introduction to the Invertebrates (2 ed.). Cambridge University Press. pp. 75–84. ISBN 978-0-521-85736-9. Retrieved 31 Jan 2011.

Nemertea. Integrated Taxonomic Information System. Retrieved February 18, 2011.

Pesic, V. 2010. Valvata montenegrina. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on 22 March 2014.

Species summary for Theodoxus fluviatilis, 2011. http://en.wikipedia.org/wiki/Theodoxus_fluviatilis

STAR Project (www.eu-star.at)

UCN 2013. IUCN Red List of Threatened Species. Version 2013.1. Downloaded on 25 July 2013.

http://animaldiversity.ummz.umich.edu/accounts/Beraeidae/classification/

http://bugguide.net/node/view/117

http://en.wikipedia.org/wiki/Nemertea#cite_note-ITIS-3 Retrieved March, 22, 2014.

http://en.wikipedia.org/wiki/Species_evenness Retrieved March, 22 2014.

http://en.wikipedia.org/wiki/Succinea_putris Retrived March 22 2014.

http://en.wikipedia.org/wiki/Valvata Retrived on March, 22nd 2014.

http://lakes.chebucto.org/ZOOBENTH/BENTHOS/xxvii.html.

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=4129 Retrived March 22, 2014.

http://www.catalogueoflife.org/annual checklist/2012/details/species/id/6897268

https://www.inbio.ac.cr/papers/Ceratopogonidae/howand.htm

http://www.waterbugkey.vcsu.edu/php/familydetail.php?idnum=8&f=Heptageniidae&ls=larvae

ANEX 1: Buna-Bojana DPSIR Analysis

DRIVER	PRESSURE	STATE	IMPACT
- Lack of transboundary coordination - Setting of developmental priorities - Structural issues in agricultural sector - Weak administrative and technical capacity / Insufficient law enforcement - Lack of awareness of environmental issues and values, and sustainable management practice - Climate change (due to narrow variation amplitude of the biological diversity particularly in temperature and water regime) - EU Accession	- Intensive urbanisation - Unsustainable agricultural practices - Unsustainable forest management - Unsustainable fishing / Illegal fishery - Illegal (bird) hunting	- Degradation (fragmentation) of coastal habitats, primarily the dunes at Velika Plaža and on the Rrjolli part; deterioration of the Skadar Oak forest in Štoj - Loss of rare species in the halophyte vegetation belt. - Decrease of birds' population is estimated in the range 10-20% (nevertheless there is no monitoring programme in place to verify estimation). - Fishery practices impede fish migrating route in Bojana / Buna river - Decrease of fish catch in the river in the past 25 years for 20-80% (percentage depending on species - according to Albanian fisheries association) - Local (agricultural) varieties and breeds are declining and disappearing - Degraded landscape value of the area	- Considerable number of the waterfowl species in Buna/Bojana Delta are threatened and included in the lists of endangered species at local, regional and international level - Significant biodiversity loss concentrated in the coastal zone - Significant decrease of fisheries economic potentials - Decreased potential for nature based tourism development

- Lack of transboundary coordination - Structural economic weaknesses and market transition; Low per capita GDP functions as disincentive for sustainable use of natural resources; - Setting of developmental priorities - The attractiveness of the coast - intense market pressure for development of apartments, houses, residential apartments and alike; Migrations - Policy framework not addressing properly unsustainable urbanisation - Weak administrative and technical capacity; lack of law enforcement - EU Accession	- Uncontrolled urban (including illegal) development - Planned (urban) development exceeding carrying capacity of the area (Montenegro) - Lack of formal plans (Albania)	- Insufficient communal infrastructure, in particularly related to transportation, water and wastewater systems - Significant areas degraded with unplanned (in particular in Albania), informal (illegal), low quality development. In Albania, at least 60 % of all buildings are illegal (80% in Velipoja). In Montenegro 12,7% of all illegal buildings in the country are in Ulcinj. - 7.5% of 1000meters coastal zone built in Ulcinj, with growing trend up north; 10% of 1000 meters zone built in Albanian part - 12% of the coastline urbanized in Ulcinj (35% Bar) - Dispersed urbanisation, often over arable and land with high nature values	- Landscape and nature degradation - High cost of infrastructure to serve dispersed settlements (including linear urbanisation)/ Increased infrastructure development costs - Loss of potential for high value or nature based tourismReduction of arable land - Potable sources are at risk of contamination

- Lack of transboundary coordination - Insufficient infrastructure – lack of communal infrastructure e.g. sewerage, sanitary landfills etc. - Weak administrative and technical capacity / Insufficient law enforcement - Lack of monitoring - EU Accession	- Intensive urbanisation - Unsustainable solid and liquid waste management - Unsustainable agricultural practices - Stockbreeding, predominantly in Albanian part	- Eutrophication is increasing in both, freshwater and marine waters - Nutrient and , probably, heavy metal pollution (according to analysis of samples from three sampling periods - data series are not enough to establish trends) - Poor chemical, ecological and biological status in accordance to Water Framework Directive - The chemical – physicochemical quality of Buna/Bojana River in accordance to the WFD, deteriorates from its sources to its mouth, ranging from “moderate” to “poor”, due to elevated ammonium and BOD5 concentrations - Limited data on groundwater pollution (field investigations indicates areas with high nitrate levels in groundwater; up to 13.9 mg/l); areas assessed as having high and very high groundwater pollution risk cover 4.6% of the Plan area - Extensive waste deposits on river banks, in drainage and irrigation ditches, and on beaches	- Degradation of chemical-physicochemical quality of water bodies - Biodiversity decline and threat to endangered species - Potential reduced sanitary drinking water quality, with the consequent risk to human health, livestock and wildlife mortality - Reduced sanitary bathing water quality, in Port Milena area - Severe visual and potential sanitary impacts on river banks, in drainage and irrigation ditches and on beaches and sea; in combination with rivers and coastal water pollution pose a risk to human health and wildlife mortality. - Tourism potential is deteriorated

- Economic development including urbanisation and tourism, causing growing demand for drinking water and water for other domestic uses - EU Accession	- Introduction of polluted groundwater from submarine coastal discharge	– High chloride concentrations in some springs during summer period in Montenegro – Possible groundwater level decline /Potential decreased quantities of submarine groundwater discharge	- Loss of groundwater yields - Impairment of drinking water quality - Loss of ecosystem services and native species; potential impact on coastal wetland functioning, brackish water habitats that support important biodiversity resources and fishery nursery areas

- Lack of transboundary coordination - Climate change and variability - Hydropower generation - Lack of financial resources for maintenance of flood protection infrastructure - Weak administrative and technical capacity / Insufficient law enforcement - Lack of awareness of environmental issues and values, and sustainable management practice - Lack of water consumption meters and respective charging by consumption, in all water uses (domestic, agricultural and industrial) - Lack of a common environmental monitoring and information exchange system between the 2 countries - EU Accession	- Alteration of the water flow regime in the Drin – Shkoder/Skadar – Buna/Bojana system - Hydroelectricity production in upstream Drin Basin - Gravel extraction along the river and removal of plant coverage - Blockage of the natural secondary channels in the delta area that existed in the past - Poor maintenance of the drainage channels and flood preventing constructions in the Albanian side and of the embankments in the Montenegrin side - Abstraction of surface water from some small lakes and wetlands for irrigation in Albania. - Water overconsumption in some uses (eg agricultural)	- Disturbance of the sediment distribution regime - Erosion of land adjacent to the river - Increased floods risks (two floods in 2010 being the most severe ones recorded in the last 80 years) - Degradation of small wetland zones - Regime of coastal dynamics has altered. There is erosion in some parts of the coast (progression of sea inland at some areas has been about 500 m since 1936 and about 50 m the past 20 years) and deposition of sand on others - Possible decrease in underground water storages - Early warning and mitigation flood risk system not in place	- Deterioration of ecosystems in the Buna/Bojana Delta as well as in the wetland zones - Significant change of the Buna/Bojana coastline in past 100 years - Reduction of availability of the water storages of good quality - Destruction of the aquatic ecosystems and of the associated services) - Floods hence, risk to life and infrastructure and economic damage / High vulnerability of citizens and resources - High uncertainty in development planning - Tourism potential is deteriorated