Funded by the European Union

MNE-ALB
IPA CROSS-BORDER COOPERATION PROGRAMME
MONTENEGRO-ALBANIA 2014-2020

SKADAR/SHKODER LAKE WATERSHED
A Transboundary Biosphere Reserve

Report on the gap analysis in the context of available data and information for the nomination of the Skadar/Shkoder lake basin for a biosphere reserve

ENVPRO

AGENCIJA ZA ZAŠTITU ŽIVOTNE SREDINE CRNE GORE
ENVIRONMENTAL PROTECTION AGENCY OF MONTENEGRO

EDEN Qendra Mjedisore

ENVPRO

AGJENCIA KOMBËTARE E ZONAVE TË MBROJTURA

NATIONAL PARKS OF MONTENEGRO

Ministarstvo javne uprave

Funded by the European Union

MNE-ALB
IPA CROSS-BORDER COOPERATION PROGRAMME
MONTENEGRO-ALBANIA 2014-2020

SKADAR/SHKODER LAKE WATERSHED
A Transboundary Biosphere Reserve

Podgorica, July 2024

Project: Skadar/Shkoder Lake Basin - Transboundary Biosphere Reserve

Name of the document: Report on the gap analysis in the context of available data and information for the nomination of the Skadar/Shkoder lake basin for a biosphere reserve

Development period: January - July 2024

Client: Environment Programme – EnvPro

Author: Jelena Marojević Galić

Contributors: Milena Bataković, Environmental Protection Agency, Mne
Ana Katnić, Environment programme, EnvPro
Jana Baumgartner, E.C.O. Austria

EDEN Qendra Mjedisore

ENVPRO

AGJENCIA KOMBËTARE E ZONAVE TË MBROJTURA

NATIONAL PARKS OF MONTENEGRO

Ministarstvo javne uprave

Contents

Introduction

The gap analysis in the context of available data and information for the nomination of the Skadar/Shkoder lake basin for the transboundary biosphere reserve was initiated through the Skadar/Shkoder Lake Basin - Transboundary Biosphere Reserve project. The aim of the gap analysis is to identify the existing and missing information at the national and cross-border level necessary for filling out the nomination form for the nomination of biosphere reserve. In this regard, the analysis itself should include several steps, specifically:

Collection of existing policies, laws, strategies, plans and the like relevant to the TBR nomination file, in particular but not limited to:

- conservation networks/protected area networks,
- forestry, agriculture and fishing, rural development, energy development,
- water management,
- infrastructure development,
- national development programs, economic sector programs,
- tourism,
- education and communication (horizontal, vertical, institutional and non-institutional),
- natural disaster management,
- waste management,
- border protection and security,
- spatial planning,
- climate change,
- bilateral cooperation programs (ME-AL),
- national ratification and implementation of international agreements and conventions (UN Agenda 2030, Paris Agreement, Biological Diversity (CBD), Ramsar Convention, etc.)
- Creation of a comprehensive database and references in coordination with relevant stakeholders and project partners.
- Development of a methodology for the analysis of textual data in consultation with experts for the TBR nomination file.
- Research and review of existing regional, national and local documents, projects, programs and past initiatives relevant to the UNESCO TBR criteria and process.

Identification of the presence and absence of three Biosphere Reserve (BR) functions:

- the contribution of the future BR to the preservation of landscape, ecosystem, species and genetic diversity,
- the contribution of the future BR to economic and human development that is socioculturally and ecologically sustainable,
- logistical support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development.

Identification of the presence and absence of seven criteria for naming a biosphere reserve in local political documents:

- representation of the ecological systems of the main biographical regions,
- biological diversity in the future BR,
- the potential of the future BR for promoting sustainable development,
- zoning and its characteristics,
- organizational arrangements (inclusion of interested parties) of the future BR,
- implementation mechanisms (governance structures, relevant policies and legislation).

Conducting interviews with relevant stakeholders to fill data gaps.

Identification and assessment of gaps in existing documents for the development of the TBR nomination file.

Preparation of gap analysis for the TBR nomination file.

Therefore, this analysis will identify and assess existing gaps and opportunities in the country and the cross-border area and will provide useful technical information and support for effective management of project time and resources.

The gap analysis report aims to identify potential synergies and conflicts between the development of the Skadar Lake Basin Biosphere Reserve and existing legislation, national strategies, plans and programs. The results should help to avoid mistakes in the later planning phase or during implementation, which could lead to rejection of the nomination file.

The gap analysis report should be helpful to intervene at the national level in the early stages of the preparation of the nomination file and to amend the relevant policies and regulations. It should also identify synergies between national and international policies and BR development, and provide an overview of construction of institution for conservation and regional development to support construction of institution and future funding for BR.

The results of the analysis are presented in this report following the very structure of the questions and topics from the nomination form.

Methodology

When it comes to the applied methodology for the gap analysis in the context of available data and information for the nomination of the Skadar Lake basin for the biosphere reserve, the first step was to collect relevant documents at the national, cross-border and local levels. Then the analysis of those documents started and the relevant questions from the nomination form for the nomination of the National Biosphere Reserve were used as a starting point for the analysis, as well as the key words within them (biogeographical regions, land use, population, settlements, cultural significance, biophysical characteristics, climate, ecosystem services, species, endemic species, key species, pressures, measures, research, monitoring, projects, spiritual and cultural values and customs). The keyword analysis methodology was implemented by quickly reading and searching the documents from the Excel table of the database (Reference documents) which were discussed in this way in connection with the question and thematic area from the TBR nomination file that are the subject of the analysis. For all documents in which it is logical to find such information, a keyword search was performed, but an analysis of the information in the document was also undertaken in order to assess the relevance of the information for giving an appropriate answer to the relevant thematic area and questions from the file for the nomination of BR. Therefore, only relevant sources are included in the report as a reference and in the Excel table based on an expert assessment of the usability and relevance of the information in the documents in relation to the questions from the nomination form for the biosphere reserve.

The basic structure and relevant chapters (at this stage) from the nomination form were used to create this document.

For each chapter and most of the questions contained in it, answers are provided aiming to contribute to the creation of the basis for the further process of preparing the nomination form for the declaration of the Skadar Lake basin as a biosphere reserve at the national level. They can in no way be considered as final and complete answers. The answers were prepared on the basis of various sources, and given in the form of examples, while wherever possible the text was quoted and a reference (link) was placed to the document from which the text was transferred and the page number. Where this was not possible, the answers were prepared as a synthesis of entire chapters from the relevant documents with the name of the document on the basis of which those answers were prepared. For a smaller number of questions due to the scope of the topic, an indication is given in which document additional or complete information can be found.

Additionally, based on the consideration of the text, an expert comment and conclusion was given on the existence of gaps, completeness of information and recommendations for further stages of the BR nomination process. For this, the traffic light principle was used, whereby the main gaps in information were identified in sections and/or chapters marked in red. Parts and/or chapters marked in yellow indicate the partial existence of information, while the green colour of the text indicates the completeness and availability of information relevant to the preparation of the nomination form.

Analysis of available information and data in relation to the national nomination form and the transboundary aspect of the biosphere reserve

The content of the nomination form as the basis of the Analysis

At the very beginning of the Analysis of the available information and data in relation to the Nomination form for the transboundary biosphere reserve, taking into account that it should focus on the description of the existing situation in relation to the content and questions of the Nomination form, an analysis of the relevance of the thematic parts and questions in terms of the subject that this analysis deals with, was carried out. Specifically, part of the questions from the nomination form refer to the final information that resulted from the consultation process and final decisions regarding the nomination of the area in terms of its scope and factual information in relation to it, while part of the questions refers to the description of the existing situation, which is of importance for filling out the nomination form, which is the focus of this Analysis. Therefore, in Table 1, an overview of the content of the thematic units of the Nomination form is given with a comment on the relevance in the context of the subject of this analysis, in order to make it clearer which parts of the form the Analysis itself refers to.

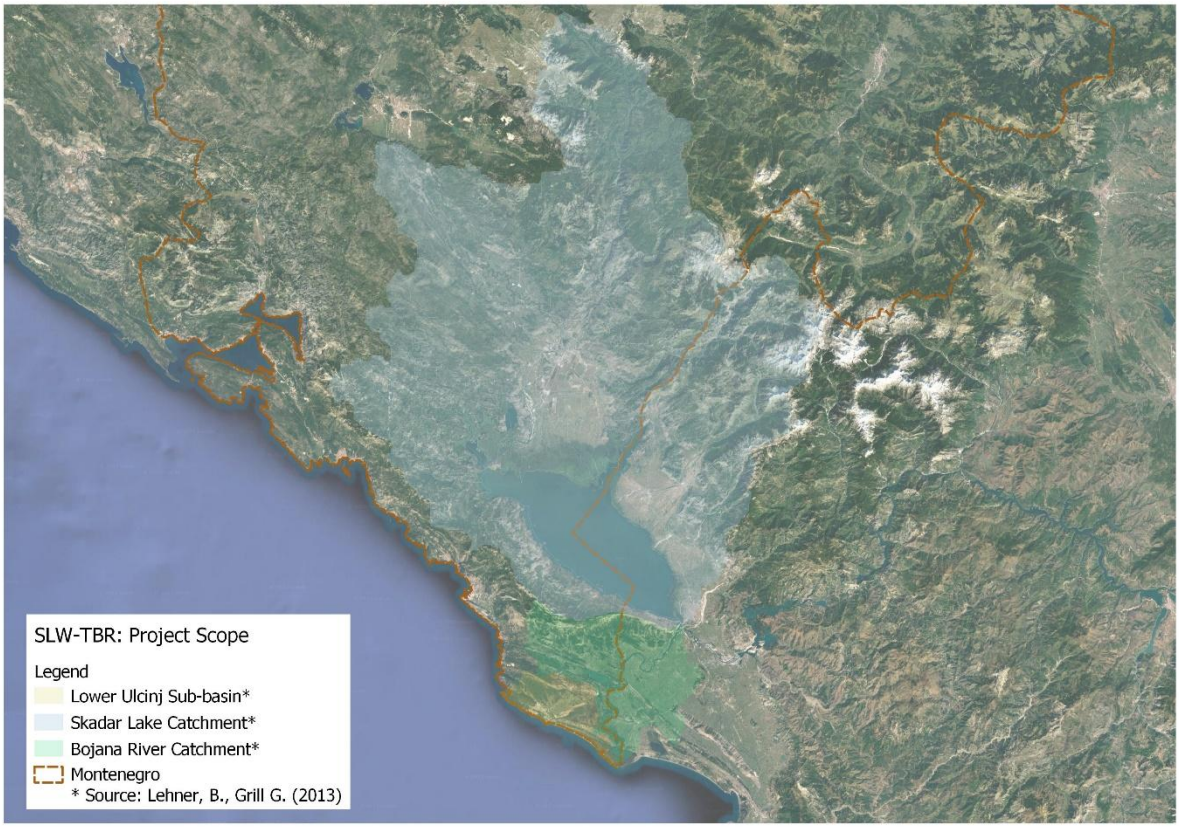
Table 1. The content of the nomination form and its relevance from the point of view of the subject of the gap analysis

Thematic unit of the nomination form	Relevance from the aspect of gap analysis subject
Part I – Summary Proposed name of Biosphere Reserve Country name Conclusions on the fulfilment of 3 functions of the biosphere reserve Conclusions on the criteria for candidacy for biosphere reserves Approvals	The above information is not the subject of the Gap Analysis because it is derived as a factual situation resulting from the final decisions regarding the area coverage of the candidate, the analysis of all information and the consultative process, and not as a product of the analysis of existing information in the documents.
Part II – Description Location Surface area	
Biogeographic regions	Thematic areas with accompanying questions are the subject of gap analysis because they relate to the description of the current state of the area.
Land use	
Population of the proposed biosphere reserve	
Biophysical characteristics	
Ecosystem services	
The main objectives of the proposed biosphere reserve	The above questions are not the subject of the Gap Analysis because they are derived as a result of the consultative process and not as a product of the analysis of the existing information in the documents.
Protective function	Thematic areas with accompanying questions are the subject of gap analysis because they relate to the description of the current state of the area.
Development function	
Logistics support function	
Management, Biosphere Reserve Management and Coordination	Thematic area with accompanying questions is not the subject of the gap analysis because it refers to the description of competences in the management and organization of the future management of the proposed reserve and require decision-making on the basis of a consultative process. Certainly, the existing institutional organization with competencies that are important for the future management of the biosphere reserve is given as an attachment to this report.
Special protection statuses	The document provides data and information on existing protected areas within the proposed scope.
Additional documents	Not relevant
Addresses	Not relevant

Analysis of relevant questions for Chapter II of the Nomination Form

LOCATION (coordinates and map)

The current proposed coverage of the biosphere reserve in the Skadar Lake basin is based on hydrological maps and the territories belonging to the lake basin. In addition to the Skadar lake basin, the scope also includes the river catchment of Bojana and lower Ulcinj sub-basin. Therefore, in Montenegro, the initial scope of the biosphere reserve covers the following municipalities: Podgorica, Danilovgrad, Cetinje, Nikšič, Zeta, Tuzi, Kolašin, Bar and Ulcinj. The analysis below was made on the basis of that coverage, and it will be the subject of further coordination with all interested and involved parties in the process of nomination of this area for the Biosphere Reserve. After agreeing on the borders of the coverage, precise coordinates and the surface of the proposed area will be entered in the nomination form.



SURFACE

After agreeing on the coverage and zoning borders for this area, the final surface of the proposed area as well as the surface of the proposed zones (core, buffer and transition zone) will be entered in the nomination form.

BIOGEOGRAPHIC REGIONS

The question in the Nomination Form to be answered within the topic of biogeographical regions is formulated as follows: State the generally accepted name of the biogeographical area in which the proposed biosphere reserve is located.

Based on the analysis of the available documents on the given question, the only division into biogeographical regions in Montenegro was done through the IPA Project for Establishment of Natura 2000 network in Montenegro and that is when the precise borders of two biogeographical regions were drawn: Mediterranean and Alpine.

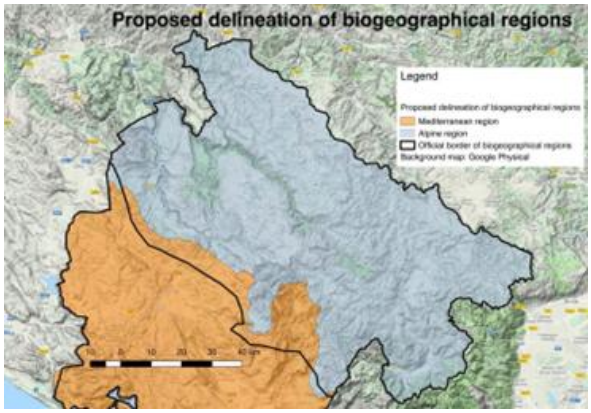


Figure 1: Border of biogeographical regions[1]

In addition to the above, Montenegro is divided into three regions: northern, central and southern.[2]

The proposed coverage for the nomination of the biosphere reserve predominantly, if not entirely, belongs to the Mediterranean biogeographical region. **It is certainly recommended that a GIS expert**

[1] Hošek M., Buskovic V. (2018), Proposal for Delineation of Biogeographical Regions in Montenegro, 'Establishment of Natura 2000 in Montenegro' project, Podgorica

[2] AGRICULTURE AND RURAL DEVELOPMENT STRATEGY 2023–2028, Ministry of Agriculture and Rural Development, (2023)

compare the borders of the proposed coverage and the available borders in GIS of biogeographic regions, and based on that the final statement on this matter is formulated.

LAND USE

9.1 Historical: (If known, provide a brief summary of past/historical land use, resource use and landscape dynamics of each zone of the proposed biosphere reserve).

The history of use of land and resources and landscape dynamics in the Skadar Lake basin reflect a rich and diverse history of human activity. This region has been home to different civilizations, resulting in diverse cultures and ways of land use. Traditional activities included agriculture, animal husbandry, fishing and forestry. Skadar Lake with its tributaries was an important source of water for irrigating agricultural lands and as a habitat for various species of fish and birds. In addition to Skadar Lake, fishing was also developed on the Bojana River.

In the scope of the area of the future biosphere reserve, areas under forest and agricultural land are dominant, the largest part of which belongs to uncultivable land (with the exception of the municipalities of Tuzi and Ulcinj).

Bjelopavlići and Zeta plain, as the central part of the future biosphere reserve, have been known throughout history as the granaries of old Montenegro, thanks to the plain terrain and favourable climatic conditions. Wheat and corn were mostly grown. Animal husbandry and beekeeping were also well developed. Historically speaking, fishing has always been an important and dominant activity of the users of the area in the vicinity of Skadar Lake. Going north and south, the terrain changes from plain to hilly, which to some extent conditioned the ways of using that area, which was dominated by cattle breeding, because these terrains are favourable for the summer climbing of cattle. Agriculture was also present. In the extreme south, in the area of the municipalities of Ulcinj and Bar, Ulcinj, Zoganj, Brisko and Anamalsko fields, were the main agricultural areas with Mediterranean and continental fruit growing, which was mainly reflected in the production of citrus fruits, olives, pomegranates, and figs.

The development of organized agricultural production in the area of the biosphere reserve can be traced back to the end of the 19th and the beginning of the 20th century, when agricultural activities intensified. This was the case until the war events of the 90s, when stagnation occurred and the appearance of new forms of land use. Over time, urbanization, industry and tourism have become significant factors that have influenced the use of land and resources in this area. Increased urbanization and infrastructural development since the late 1990s have changed the landscape, and tourism has become an important economic sector. Spatial planning documentation in the municipalities in the area of this scope also contributed to this, as it enabled the increase of areas under settlements and the conversion of agricultural land into construction land. In addition, the preservation of natural resources, especially water and biodiversity, has become a key issue for the sustainable development of this area. For example with the construction of a large number of houses on the bank of Bojana, estimated to be more than 350, due to the associated discharge of waste water

from these facilities into Bojana, the river was significantly polluted, which resulted in a decrease in the fish stock. The Bojana River was rich in grasshopper fish, eels, carp and mullet. In addition, due to the construction of weekend houses, the number of kalimera (fishing net) which were the symbol of this area and represented the traditional way of hunting fish was reduced.

However, despite the negative trends, the Bjelopavlići and Zeta plains, which dominate the areas of the municipalities of Danilovgrad, Podgorica and Zeta, have to this day remained one of the most important agricultural areas in Montenegro. Apart from them, the area of the Ulcinj field, in the hinterland of the Ulcinj salt pan and Šas Lake, has been recognized as an important agricultural area.

Below is some more detailed information and data in the form of quotes from the analysed documentation, which can be useful for completing the nomination form:

"Thanks to its natural features, especially the flat terrain and the sub-Mediterranean climate, the Bjelopavlići and Zeta plains were the granary of old Montenegro. Wheat and corn were grown the most, and barley, oats and rye were grown less. Animal husbandry was also an important branch of agriculture both in the plains and in the hilly part of the Bjelopavlići plain. It was a favourable that the herdsmen could take the cattle outside their own atar (rural area) in the summer, in the areas of Sinjajevina, Lukavica and Latično. Beekeeping was also significantly developed. Other branches of agriculture were less represented." https://www.danilovgrad.me/me/planska-dokumentacija Spatial and Urban Plan of the Municipality of Danilovgrad 2011 – 2020, Page 75.

"The beginning of organized agricultural production in the Municipality is linked to the opening of the first Royal Montenegrin Agricultural School in Danilovgrad on May 13, 1875. The school was of a general orientation, for plant and livestock production, which was later moved, i.e., rebuilt, in Podgorica. In the period between the two world wars, the development of agriculture was based on the same branches, with increasing attention being paid to the cultivation of vegetable crops (potatoes, beans, onions, etc.), fruit growing (fig, mulberry, wild pomegranate) and viticulture." https://www.danilovgrad.me/me/planska-dokumentacija Spatial and Urban Plan of the Municipality of Danilovgrad 2011 – 2020, Page 75.

From World War II to the breakup of the SFRY (90s), significant structural changes occurred in the agriculture of the entire country, including in this region. Relatively large complexes of land areas are formed through social property, which are used primarily for the establishment of large social farms, but also for other types of production, in accordance with production plans. This is the period when the varietal composition in plant production and the racial composition of livestock are qualitatively changing, as well as greater application of mechanization and modern farming methods. Productivity, per hectare of arable land and per breeding female in livestock production, is also increasing significantly. The disintegration of the SFRY in the early 1990s, war events, the economic embargo, the transition of the economy and the collapse of state farms had a negative impact on the development of agriculture as a whole." https://www.danilovgrad.me/me/planska-dokumentacija Spatial and Urban Plan of the Municipality of Danilovgrad 2011 – 2020, Page 75.

For the Podgorica area (including the two new municipalities of Tuzi and Zeta), the data in the Spatial and Urban Plan show the trend of land use conversion. "In the amendments to the Spatial Plan of Podgorica (consolidated state of Spatial Plan of the Municipality 2012), the planned area of the settlement increased by 200 ha, and the technical infrastructure by 61 ha, which is a total increase of 3%. Unfortunately, these areas are planned in the lowland part of the Capital City area and represent the conversion of mainly agricultural areas (204 ha). https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/ - pages 118-122.

Tabela 4.11: PUP Glavnog Grada Podgorica: planirana namjena površina

NAMJENA POVRŠINA	PPO 1990.		PPO 2012.		PROMJENE NA PPO 1990.
	ha	%	ha	%	ha
POVRŠINE NASELJA	**4.739**	**3,14%**	**4.715**	**3,13%**	**-24**
Građevinsko zemljište	4.670	3,10%	4.646	3,08%	-24
Izdvojeno građevinsko zemljište	69	0,05%	69	0,05%	0
TEHNIČKA INFRASTRUKTURA	**3.383**	**2,24%**	**3.444**	**2,28%**	**+61**
Saobraćajna infrastruktura	3.290	2,18%	3.294	2,19%	+4
Ostala infrastruktura	93	0,06%	93	0,06%	0
Sanitarna deponija			57	0,04%	+57
POLJOPRIVREDNE POVRŠINE	**23.759**	**15,76%**	**23.555**	**15,63%**	**-204**
ŠUMSKE POVRŠINE	**73.421**	**48,71%**	**73.418**	**48,70%**	**-3**
Privredne šume	21.737	14,41%	21.764	14,44%	+27
Šume sa posebnom namjenom	19.294	12,79%	19.297	12,80%	+3
Zaštitne šume	32.390	21,47%	32.357	21,47%	-33
VODNE POVRŠINE	**11.866**	**7,87%**	**11.866**	**7,87%**	**0**
OSTALE PRIRODNE POVRŠINE	**33.573**	**22,27%**	**33.743**	**22,38%**	**+170**
Mineralne sirovine	163	0,11%	163	0,11%	0
Ostale površine	33.560	22,24%	33.506	22,23%	+54
UKUPNO	**150.741**	**100,00%**	**150.741**	**100,00%**	**0**

For the Municipality of Danilovgrad: "On the territory of the Municipality, the largest share of land takes forest land 63.0% (31,481.07 ha), followed by agricultural land at 35.5% (17,802.00 ha), and the smallest share of 1.5% includes land classified in the category other (built-up areas, roads, water bodies, karst/rock, etc.). According to the data for 2010, the total agricultural land is 17,802.00 ha with the following structure: arable land 45.7% (8132 ha), pastures 54.3% (9,663 ha), and ponds, fishponds and reeds 0.04% (7 ha). The share of ploughland and gardens in arable land was 6.3% (510 ha), orchards 3.7% (299 ha), vineyards 1.9% (158 ha) and meadows 88.10% (7165 ha)." https://www.danilovgrad.me/me/planska-dokumentacija.

"Historically, in this area (Zeta Nature Park, author's note) agricultural and forest land occupied much larger areas. In the entire area, there are a large number of toponyms that indicate the former presence of forests (Kosovi lug (grove), Vukov Lug, Lješkopoljski lug, Zorski lug, etc.), which were cleared for agricultural purposes until the second half of the 20th century. They were converted partly into ploughland and orchards, partly into pastures and hayfields. In the last couple of decades, the volume of agricultural production has been declining. Agricultural land is abandoned and left to succession processes or converted to construction land. With the increase in the population in the

municipalities of Danilovgrad and Podgorica, settlements and the accompanying infrastructure are also expanding. The construction of residential buildings and accompanying infrastructure often does not comply with urban planning guidelines and regulations, or they are not set at all, which has consequences for natural habitats, ecosystem services, environmental quality and aesthetic and landscape values.

Among other forms of use, production areas are also growing, where facilities and plants for various industrial needs (e.g., food processing factories), storage and distribution of industrial products are established. Therefore, the trend of land use for agricultural and forest land is negative, and for settlements and other forms of use it is positive." https://www.auzp.me/wp-content/uploads/2021/09/Socio-ekonomska-analiza-PP-Rijeka-Zeta.pdf, page 27.

"Beside the changes in land use itself, in recent years there have also been changes in the way space is managed. This especially applies to agricultural land. Traditional forms of agriculture, which are characterized by crop rotation, diversity, dependence on ecosystem services for productivity and pest control, manual tillage, etc., are being replaced by intensive production, which is reflected in the consolidation of cultivated areas, the increase of areas under monocultures, the more intensive use of protective agents and artificial fertilizers and the use of machinery (for cultivation of the land and mowing). This type of production also requires more intensive irrigation, which is often achieved through pumps that draw water directly from river courses (Zeta) or from underground wells." https://www.auzp.me/wp-content/uploads/2021/09/Socio-ekonomska-analiza-PP-Rijeka-Zeta.pdf, page 28.

"Livestock production is also going in the direction of intensification - the number of farms breeding imported or hybrid breeds is increasing, with a decrease in grazing on natural habitats and an increase in the feeding of industrial animal feed." https://www.auzp.me/wp-content/uploads/2021/09/Socio-ekonomska-analiza-PP-Rijeka-Zeta.pdf, page 28.

"Ulcinj, Zoganj, Brisko and Anamalsko fields are listed as the main agricultural areas in the 1999 Spatial Plan of the Municipality of Ulcinj, i.e., areas of intensive agricultural production with high capacity. At that time, a large part of this area was still under the control of the state, under the competence of the Agropromet Company, so the degree of control over the development of agricultural land in local planning documents was limited, based on state policy and general purposes. However, in the graphic attachment of the Spatial and Urban Plan of the Municipality of Ulcinj, these areas were identified only as "green areas", so the exact position of the agricultural land could not be determined.

There is still no local strategy to protect agricultural land from unplanned construction.

The general urban plans from 1985 defined the coastal areas around the town of Ulcinj and the agricultural land in the Ulcinj field as an open space where the construction of residential and service facilities in the function of agricultural production was allowed, for which it was not necessary to obtain building permits. As a result, large-scale construction took place in agricultural zones, especially in

coastal areas, which had a great impact on the productivity of agricultural farms" https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a, page 91.

"The economy of the municipality of Ulcinj is very dependent on tourism, considering that 17.5% of the population is employed in the field of tourism, and around 90% of households offer private accommodation. It is for this reason that almost the entire economy of this town relies on tourism. The development of tourism in this municipality led to the construction of a large number of residential units. The results of the 2011 census show that in addition to inhabited apartments, there are a large number of temporarily uninhabited and abandoned apartments, as well as vacation and recreation apartments ("cottage houses"), which represent a significant tourist resource." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a, page 76.

"The problem of illegal construction is noticeable in the area of Ulcinj Municipality. Illegal construction of apartments in the municipality of Ulcinj occurred as a result of the absence or obsolescence of urban planning documents, as well as the lack of work of the competent inspection authorities. It manifested itself in the form of the construction of new buildings on land that was not intended for construction, then as new construction in places where construction is permitted but with exceeded urban planning parameters (storeys, occupancy and built-up indexes), ... It is known that the largest number of illegally built apartments is intended (and purchased) for tourist purposes, i.e., to serve as apartments (houses) for vacation." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a, Page 77.

"Another important issue is the loss of fertile agricultural land. This is a problem expressed at the state level, and especially in the territory of the municipality of Ulcinj. Analysing data from the end of the 1980s, when the most recent information date, it was concluded that the illegal construction of buildings significantly affected the volume of agricultural production." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a, Page 91.

"Freshwater and sea fishing as an economic branch are not largely developed. The Morača River, for now, has a minor and statistically insignificant contribution to the total fisheries in the Skadar Lake basin region. This river was known for its trout species (brook trout and marble trout), chub, common nase and eel. This was the case until the 90s of the last century, but during the last two decades, the number of population of almost all fish species from the Morača River has significantly decreased due to constant overfishing. Commercial fishing is present on Skadar Lake. According to the law, the traditional way of fishing is allowed in the national park. Fishing in the function of catch on Skadar Lake is shared by three municipalities (5 with the declaration of new municipalities Tuzi and Golubovci, author's note.) in Montenegro and the neighbouring country of Albania. This is an activity that the population of Vranjina and coastal settlements from Zeta are engaged in." https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/, page 70.

"Skadar Lake is the largest fishing area of the Balkan Peninsula." https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/, Page 168.

"Kalimere" fishing huts on the water, from which fish are caught with nets and other equipment, are characteristic of the Ulcinj municipality. This traditional form of fishing should be preserved as a specific characteristic of Ulcinj. Sport fishing is practiced at the sea, the Port Milena channel, the Bojana River and Šas Lake. Caught fish is used for own needs, for sale to the population and for the needs of hotels and restaurants." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a, Page 96.

The main flat agricultural areas in **Nikšić municipality** are located in karst fields, such as Nikšić field (about 4,000 ha), Župa Nikšićka (about 700 ha), Grahovo field (about 700 ha), as well as the northern part of the Zeta valley.

In addition to these, the mountain pastures of Krnova, Lukavice and Konjska, as well as larger valleys that have the character of smaller fields, and uvala (landform), ravines and sinkholes, from larger fields to very fragmented ones, represent significant whole areas.

Most of the mentioned territory is located outside the scope of the biosphere reserve, while the part that belongs to the catchment area of Skadar Lake includes larger slopes or plateaus of grasslands and pastures along the Zeta River that are very suitable for grazing, and some can potentially be cultivated.

In the structure of agricultural land in the area of the Nikšić municipality, pastures and meadows dominate (about 93%), while ploughland, orchards and vineyards make up only 7% of the total agricultural land. http://api.niksic.me/uploads/Strateski_plan_razvoja_opstine_Niksic_2023_2028_ab2968cddc.pdf, Page 43.

This municipality is characterized by quite extensive agricultural production, to a large extent, fragmentation of property, migration of the rural population to towns due to the development of industrial production, starting from the 50s onwards, mostly old households in the villages, small investments in infrastructure in the previous period, etc.

Recently, there has been a noticeable trend of people returning to neglected family property in the villages, an expansive growth in the production of cow's milk, and in addition, the development of organic agriculture, i.e., the production of organic food is on the rise, especially due to the establishment of a significant number of eco-camps and ethno-villages. Additionally, due to the evident decline in the industrial potential of the municipality, and, in this connection, the decline in the employment rate and the increase in the number of socially vulnerable categories of the population, agricultural production represents one of the basic activities of the majority of the rural population, where it is increasingly the only source of income.

Various documents, such as Municipal Spatial Plans, Strategic Development Plans and the Register of Agricultural Farms maintained by the Ministry of Agriculture, Forestry and Water Management provide an overview of the use of land, i.e., the structure of agricultural land by municipality. By the end of 2024, it is expected that data from the Population Census of the Statistical Office of Montenegro, which

was conducted at the end of 2023, will be available. From the analysis, it can be concluded that there is enough information available to fill out this part of the nomination form.

9.2 Who are the main beneficiaries of biosphere reserves? (For each zone, and the main resources used). If applicable, describe the level of involvement of indigenous people taking into account the United Nations Declaration on the Rights of Indigenous Peoples (http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf)

The main users of space in the subject area have not been separately analysed and described in any available document. By a detailed reading of the selected literature, it can be concluded that the users vary depending on the natural resources it offers as well as the protection regimes of the protected areas located in the basin. For example, in protected areas such as the Skadar Lake National Park, the main users may be local residents engaged in traditional activities such as agriculture, animal husbandry and fishing. In the last 10 years or so, tourism has become one of the leading activities of the population in the national park. Here we also need to distinguish the permanently inhabited local community from the seasonal visitors whose number is constantly increasing.

"According to the regimes for the protection of nature and the overall area, economic activities are reduced to tourism, which includes the use of a system of pedestrian, bicycle and educational trails, interaction with nature and education, fishing and extensive production of healthy food. The area of the National Park itself is located between the two most economically and touristically developed areas in Montenegro, in the continental part Podgorica capital, and in the south the Montenegrin coast. Quoted from "Draft Protection Study for Skadar Lake NP" (revision of the protected area of Skadar Lake NP), 13.1 Economic and social activities, page 111. The document is not yet available online, it is in the database.

In relation to the protection regimes and the proposed zoning in the biosphere reserve, the users of the space are as follows:

Core zone

It includes the protection zone I in protected areas, which includes a strict protection regime. There is no inhabited population in these zones and only scientific research and visits for educational purposes are allowed on a limited scale.

Buffer zone

It includes protection zone II and III in protected areas with regimes of active protection and regime of sustainable use, in this zone it is possible to carry out controlled use of natural resources, without consequences for the primary value of their natural habitats, populations, ecosystems, features of the area and geoheritage facilities, but also to develop settlements and accompanying infrastructure to the extent that does not cause damage to the basic values of the area;

There are no larger settlements and towns in the buffer zone. Within this zone, the population is predominantly engaged in agriculture and tourism. Forestry is not allowed in the area of the Skadar Lake National Park, while in other protected areas (nature parks and natural monuments) there are activities of commercial use of the forest, both by the local community that owns the forests and by the Forestry Administration as an administrative body under the Ministry of agriculture, forestry and water management, which is responsible for the issue of forest management. Hunting and fishing are also present under certain conditions and in accordance with hunting regimes and hunting seasons. Regarding the structure of ownership, both state and private ownership are present, with private ownership being much more represented in zone III compared to protection zone II.

The water of Skadar Lake at the Bolje sestre location is used to supply the Montenegrin coast with drinking water.

Transition zone

Larger settlements and towns are exclusively located in the transition zone. In addition to Podgorica as the capital, in the area of the biosphere reserve there are also larger towns: Danilovgrad, Cetinje and Ulcinj, as well as the smaller towns of Tuzi and Golubovci. All of them are administrative centres of their municipalities. Nikšić, Kolašin and Bar, as administrative centres of the municipalities that are included in the scope of the biosphere reserve, are located outside the borders of the scope. Spatial and Urban planning of municipalities in the area of the biosphere reserve provide an insight into the uses of areas with a tabular presentation and land use maps.

Comment: The main users of the area in question vary depending on the natural resources it offers as well as the level of protection of protected areas located in the basin but not described in detail within the analysed documents.

9.3 What are the rules (including customary or traditional) of land use and access to each biosphere reserve zone?

The rules of land use and access to each zone of the future Skadar Lake Biosphere Reserve may vary depending on the laws and regulations that will be established for the management of that area. However, customary and traditional rules can also play an important role, especially when it comes to local communities.

Customary rights may include rights of access to certain parts of the land for traditional activities such as agriculture, livestock, fishing or the collection of medicinal plants. These rights may be based on long-standing recognition of territorial rights and community customs.

“In the use of space, until the middle of the 20th century, there were traditional ways of regulating the use of land that was under different forms of ownership. Even during the time of the Turkish administration, there was private, fraternal, village and tribal property, and later with the connection of Old Montenegro and *Brda* (tribal region) into a kind of state union from which the Principality was then formed, these forms of property were consolidated and rounded up together with state and

church property." https://www.danilovgrad.me/me/planska-dokumentacija Spatial and Urban planning of the municipality of Danilovgrad 2011 - 2020, Page 31.

It is important to emphasize that local residents have played an important role in shaping the history of land and resource use, often relying on traditional practices and knowledge. Accordingly, it is important to take into account their perspectives and include them in the conservation and management processes of this area. (Author's note)

In Montenegro, the use of land within protected areas is regulated by a series of regulations and laws that are applied at different levels of government. The key regulations and laws that regulate the use of land within protected areas are:

Law on Nature Protection: This law establishes a framework for nature protection in Montenegro, including protected areas such as national parks, nature parks, natural monuments, reserves and other types of protected areas. The law prescribes measures for the preservation of biodiversity, the protection of natural habitats and wild species, as well as the regulation of human activity within these areas.

Article 31 of this law defines protection zones in which the following protection regimes are implemented:

- protection zone I – strict protection regime;
- protection zone II – active protection regime;
- protection zone III – sustainable use regime;

The protection zone I – strict protection regime shall be implemented on a protected area or on its part with slightly modified characteristics of a habitat of exceptional ecological importance. This protection enables natural biological processes, preserving the integrity of habitats and living communities, including exceptionally valuable cultural assets.

Within the protection zone I with the strict protection regime:

- use of natural resources and construction of facilities shall be prohibited;
- scientific researches, as well as monitoring of natural processes shall be restricted;
- visits for educational purposes shall be allowed in a restricted extent;
- in case of fire, natural disasters and accidents, plant and animal diseases and pest overreproduction, protection, rehabilitation and other necessary measures shall be implemented.

The protection zone II – active protection regime shall be implemented on a protected area in which the characteristics of natural habitats are slightly modified, up to the level that does not threaten functional and ecological importance of the habitats. This protection shall cover the valuable landscapes and objects of geoheritage.

Within the protection zone II with the active protection regime, the following actions may be implemented:

- intervening with the aim of restauration, revitalization and total improvement of protected area;
- controlled use of natural resources in the protected natural resource, without consequences for primary values of their natural habitats, populations, ecosystems, features of landscapes and objects of geoheritage.

Within **the protection zone III** with the sustainable use protection regime, the following actions may be implemented:

- intervening with the aim of restauration, revitalization and improvement of protected area;
- developing of settlements and accompanying infrastructure in an extent that does not impact negatively on the basic values of the area;
- refurbishing of the objects of cultural and historical heritage and traditional construction;
- preserving traditional activities of the local population;
- selective and limited use of natural resources.

Outside the borders of the protected area, if necessary, a buffer zone can be determined in order to prevent or mitigate external factors that can negatively affect the protected area, such as: waste water, solid waste, invasive species, illegal construction, tourism, leaching of pesticides , herbicides and other chemicals, fires, afforestation with non-native plant species and other possible factors.

The Law on National Parks ("Official Gazette of Montenegro", No. 028/14 dated July 4, 2014, 039/16 dated June 29, 2016) defines the borders of national parks, measures of protection, development and improvement as well as ways of using the assets of national parks. Article 16 of this law defines prohibited activities within National Parks, such as, for example, clearing and clear-cutting of forests. The law also defines the use of the assets of national parks (land, forests, water, flora and fauna and other natural resources) in such a way that they can be used in accordance with the law, the spatial plan for special purposes and the management plan, taking into account the preservation of biological and environmental diversity.

In the area of national parks, cultural, scientific research, educational, tourist, recreational, sports and other activities may be carried out in accordance with the law, which by their character, scope and method of implementation do not damage the natural values of national parks.

Law on Spatial Planning and Construction of Structures: This law regulates planning and land use at the national level, including spatial plans related to protected areas. It prescribes the manner in which land can be used in accordance with the objectives of nature protection and sustainable development.

Other regulations and acts on protected areas: In addition to the law, there are special regulations related to the management and use of land within protected areas, such as five-year Plans for the management of protected areas and Annual Programs. These documents regulate in detail the activities that are allowed or prohibited within those areas.

Local regulations: Local governments may have their own regulations and plans regarding the use of land within protected areas in their area. These are Local Development Strategies, then Biodiversity Strategies as well as Municipal Spatial and Urban Plans and Detailed Spatial Plans.

The use of land outside protected areas is defined by the Spatial and Urban Plans of the municipalities, which provide an overview of land use. Then it is determined further and more precisely at the level of Detailed Spatial Plans. The Spatial Plan of Montenegro is currently being developed. The previous one expired in 2020. The relevant law in this area is The Law on Spatial Planning and Construction of Structures ("Official Gazette of Montenegro", no. 64/17, 44/18, 63/18, 11/19, 82/20).

Water Law defines water management and its use ("Official Gazette of Montenegro", No. 84/2018), while the Water Management Strategy is a planning document that establishes long-term directions for water management and defines goals and guidelines for water management. The use of water in the fisheries sector is defined by the Law on Freshwater Fisheries and Aquaculture ("Official Gazette of Montenegro", number 17/18).

Other relevant laws and regulations that define the use and utilization of resources are:

Law on Forests ("Official Gazette of Montenegro", no. 74/10, 40/11, 47/15)

Law on Game and Hunting ("Official Gazette of Montenegro", number 52/08 and 48/15)

Law on Agricultural Land ("Official Gazette of the Republic of Montenegro", no. 15/92 and 59/92 and 32/11)

Law on Mining ("Official Gazette of Montenegro", number 65/08, 62/10, 40/11)

Law on Roads ("Official Gazette of Montenegro", No. 82/20)

Law on Tourism and Hospitality ("Official Gazette of Montenegro", no. 002/18, 004/18 and 013/18)

Comment: The rules for using resources in each future zone are clearly defined by the legal framework. Implementation is often lacking.

9.4 Describe the different levels of access and control over resources that women and men have. (Do men and women use the same resources in different ways (e.g., for survival, market, religious/ritual purposes) or do they use different resources?).

Sociocultural and economic factors influence women and men to have different levels of access and control over resources. In Montenegro, the customary right to renounce property in favour of male

family members is still present, especially in rural areas where women still renounce inheritance in favour of male family members, even though they are equal to men by law.

Traditionally, men were more involved in the sectors of forestry, fishing and agriculture, while women were more involved in the collection of fruits and medicinal plants. In some communities, especially where men have migrated in search of work, women take on a greater role in agriculture and animal husbandry. Statistical research on the structure of agricultural holdings conducted in 2016 by the Statistical office on the labour force on agricultural holdings by gender shows that 41,936 women and 57,300 men work on farms at the level of the whole of Montenegro. https://www.monstat.org/userfiles/file/fss/Saopstenje%20FSS.pdf Data from the agricultural census conducted in 2010 show that men are most often the owners of family farms, more precisely 87.1% of men are the owners of farms. The majority of other members of the household who work on the farm are women, 32,593 or 66.0%.

https://www.monstat.org/uploads/files/publikacije/Zene%20i%20muskarci%20u%20CG%20web%2026.12%20FIN.pdf

Comment: Levels of resource control in relation to gender are not described within the analysed documents. Statistics are available only at a very general level.

Consulted documents for parts of the text where no references are given:

Protection study for the Zeta River Nature Park, AGRICULTURE, pages 98-110, CULTURAL HERITAGE, pages 122 and 124
Socio-economic analysis of Zeta River Nature Park 2.4. Use of space, 2.4.1 Purpose of surfaces, pages 24 and 25
Strategic Development Plan of the Municipality of Ulcinj 2022-2028, chapter 6. Agriculture and fisheries, page 50
Draft Protection Study for Skadar Lake NP (revision of the protected area of Skadar Lake NP) 13.1 Economic and social activities, page 111
Spatial and Urban Plan of Danilovgrad, 2.4.2.1. Agriculture - Historical overview of the development of agriculture, page 75
Local Biodiversity Action Plan for Ulcinj, Agriculture, Forestry and Fisheries, page 40
Strategic Development Plan of the Municipality of Danilovgrad, 3.8.2. Agricultural production and potential, page 34
Strategic Development Plan of the Podgorica Capital City 2020-2025, 2.1.7 Agricultural production, page 32
Spatial and Urban plan of the municipality of Ulcinj 2020, Ministry of Sustainable Development and Tourism, November 2013

HUMAN POPULATION OF THE PROPOSED BIOSPHERE RESERVE:

The questions in the Nomination Form to be answered within the topic of population are formulated as follows:

[Approximate number of people living within the proposed biosphere reserve]

	Permanently	Seasonal
10.1 Core areas	_____	_____
10.2 Protection zone	_____	_____
10.3 Transitional zone	_____	_____
Total:	_____	_____

10.4 A brief description of local communities living within or near the proposed biosphere reserve. (Indicate ethnic origin and composition, minorities, etc., main economic activities (e.g., livestock, tourism) and the location of their main areas of concentration, with reference to the map (section 6.2)).

Data on the population and settlements within the future biosphere reserve can be obtained from the Census records[3] of the Statistical Office of Montenegro. The last population census was conducted in 2023, with the data being processed and expected to be available in September 2024. Therefore, the currently available data on this matter is from 2011. By comparing the borders of the proposed reserve and the list of settlements, data can be obtained by zone on the number of inhabitants, once the zones have been determined. It is also possible to be done by settlements in relation to ethnicity, language they speak, according to age and gender structure. Data on the main economic activities of the population in the data from 2011 were presented at the level of municipalities, while such data were not given for settlements. Therefore, only a general overview of key economic activities can be given and this represents the only shortcoming in terms of precise data. All documents listed in Sources used the 2011 census as a data source. Therefore, it is recommended that when the final precise borders of the biosphere reserve are determined, that a list of settlements be drawn up based on the overlapping of the area borders by a hired GIS expert and that after the publication of the results of the 2023 Census, the data be presented in the nomination form.

10.5 Name(s) of the main settlements within and near the proposed biosphere reserve with reference to the map (section 6.2):

In the available documentation, there is no list of settlements for the proposed coverage of the biosphere reserve. Certainly, the list can be obtained by overlaying the borders of the proposed

[3] Statistical Office of Montenegro, MONSTAT https://www.monstat.org/cg/page.php?id=1992&pageid=1992

biosphere reserve when they are finally determined with the map and data from the Statistical Office, from which a list of settlements can be obtained. It is therefore recommended that after determining the borders of the proposed future biosphere reserve, the GIS expert should overlay them with a map (ortho photo, google maps) etc., and thus determine the list of settlements within the proposed scope of the biosphere reserve.

10.7 List the number of spoken and written languages (including ethnic, minority and endangered languages) in the biosphere reserve. (Consult, for example, the UNESCO Atlas of the World's Languages in Danger (http://www.unesco.org/culture/languages-atlas/index.php)).

Data on the use of languages within the future biosphere reserve can be obtained from the Census records[4] of the Statistical Office of Montenegro. The last population census was conducted in 2023, with the data being processed and expected to be available in September 2024. Therefore, the currently available data on this issue is from 2011 and only data on languages in use and the number of inhabitants at the municipal level who use them is available. Therefore, it is recommended that after the publication of the results of the 2023 Population Census, data on the languages in use at the level of the municipalities included in the future TBR should be presented.

10.6 Cultural importance: (Briefly describe the importance of the proposed biosphere reserve in terms of past and present cultural values (religious, historical, political, social, ethnological) and others, if possible with a distinction between tangible and intangible heritage (cf. UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage from 1972 and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage from 2003. (http://portal.unesco.org/en/ev.php-URL_ID=13055&URL_DO=DO_TOPIC&URL_SECTION=201.html http://portal.unesco.org/en/ev.php-URL_ID=17716&URL_DO=DO_TOPIC&URL_SECTION=201.html)).

When it comes to the cultural values of the area, they are given in the sense of an inventory and a brief description of the cultural heritage (tangible and intangible) for the municipalities in all of mentioned plans (spatial and urban plans, local action plan for environmental protection and in some municipalities such as the Municipality of Danilovgrad and in the Local Action plan for biodiversity) and strategic documents (strategic development plans). In protection studies of individual areas (Skadar Lake NP, Zeta River Valley) and management plan of the Skadar Lake National Park. The aforementioned documents lack a description in terms of the cultural, historical and religious significance of all the mentioned objects, however, that information can be found in detail in the documents of the Institute for Cultural Heritage, which are available on request, specifically the studies for determining the cultural value of an element of intangible cultural heritage, the studies on revaluation of immovable and movable cultural property and studies on the protection of cultural property for the needs of the spatial urban plan (for the municipalities of Cetinje, Bar, Kolašin and Ulcinj). It is recommended that, in the future process, a cultural heritage expert be engaged, who will

[4] Statistical Office of Montenegro ,Monstat, https://www.monstat.org/cg/page.php?id=1992&pageid=1992

select the most important tangible and intangible cultural assets on the basis of the available documentation and describe them in a way that is adequate for the nomination form.

Sources:

Census 2013, Statistical Office - Monstat, https://www.monstat.org/cg/page.php?id=1992&pageid=1992
2021-2025 Management plan for Skadar Lake NP, Montenegro National Parks, 2022
Draft Revision Study of Skadar Lake, Environmental Protection Agency, 2023
Spatial and Urban Plan of the Municipality of Bar, Municipality of Bar, 2018
Spatial and Urban Plan of the Podgorica Capital City, Podgorica Capital City, 2014
Spatial and Urban Plan of the Old Royal Capital of Cetinje, Old Royal Capital of Cetinje, 2014
Protection Study for Natural Monument of Cijevna River Canyon, Environmental Protection Agency, 2017
Protection Study for Zeta River Nature Park, Environmental Protection Agency, 2019
Sackl P., Schneider-Jacoby M., Schwarz U., Dhora D., Saveljić D., Stumberger B. (2006) "Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)" Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) - Socio-economic analysis of Zeta River Nature Park, The Nature Conservancy Dimitris F., Marković M., Shipman B (2015), Integrated Resource Management Plan of the Bojana Delta
Spatial and Urban Plan of Municipality of Ulcinj, Ministry of Sustainable Development of Tourism, 2016
Spatial and Urban Plan of Municipality of Danilovgrad, Municipality of Danilovgrad, 2011
Local Environmental Protection Plan of the Capital City of Podgorica, Capital City of Podgorica, 2019
Local Action Plan for Biodiversity of the Capital City of Podgorica, Capital City of Podgorica, 2023
Sustainable Development Action Plan of the Capital City of Podgorica, Capital City of Podgorica, 2017
Strategic plan for the development of the Capital City of Podgorica, Capital City of Podgorica, 2020
Draft Local Environmental Protection Plan of Tuzi Municipality, Tuzi Municipality, 2023
Draft Strategic Development Plan of Tuzi Municipality, Tuzi Municipality, 2021
Strategic Development Plan of the Municipality of Bar, Municipality of Bar, 2020
Strategic Development Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2019
Local Environmental Protection Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2021
Local Biodiversity Action Plan of Municipality of Danilovgrad, Municipality of Danilovgrad, 2020
Local Biodiversity Action Plan of the Old Royal Capital of Cetinje, Old Royal Capital of Cetinje, 2020
Draft of the Local Environmental Protection Plan of the Old Royal Capital of Cetinje, Old Royal Capital of Cetinje, 2021
Strategic Development Plan of the Municipality of Ulcinj 2022-2028, Municipality of Ulcinj, 2022
Draft Local Biodiversity Action Plan of Municipality of Ulcinj, Municipality of Ulcinj, 2020
Draft Local Environmental Protection Plan of Municipality of Ulcinj, Municipality of Ulcinj, 2020
Study on the protection of cultural property for the needs of the spatial and urban plan for the old royal capital of Cetinje, Administration for Protection of Cultural Property, 2012
Study on the protection of cultural property for the needs of the spatial and urban plan of the municipality of Bar, Administration for Protection of Cultural Property, 2018
Study on the protection of cultural property for the needs of the spatial and urban plan of the municipality of Kolašin, Administration for Protection of Cultural Property, 2023
Study on the protection of cultural property for the needs of the spatial and urban plan of the

municipality of Ulcinj, Administration for Protection of Cultural Property, 2016
Study for determining the cultural value of elements of intangible cultural heritage, Administration for Protection of Cultural Property
Study on the revaluation of immovable and movable cultural property, Administration for Protection of Cultural Property

BIOPHYSICAL CHARACTERISTICS

The questions in the Nomination Form to be answered within the topic of biophysical characteristics are formulated as follows:

11.1 General description of the characteristics of the location and topography of the area: (Briefly describe the main topographic features (swamps, ponds, mountain ranges, dunes, etc.) that most often characterize the landscape of the area)

The landscape of the proposed biosphere reserve is a combination of water bodies (Skadar lake, Šas lake, Ulcinj salt pan) and the surrounding mountain reliefs between which there are plains (Bjelopavlići and Zeta plains and Ulcinj field in the south) formed by the rivers of Zeta, Bojana and Morača. In addition, Morača and its tributaries Mala Rijeka and Cijevna have cut canyons of exceptional beauty and rich biodiversity. “According to V. Radulović, the area of the Skadar Lake basin is 5,490 km², of which 4,460 km² is on the territory of Montenegro” (Draft Protection Study for Skadar Lake NP, page 6 - page 7). It covers the hinterland of Bar Municipality, the entire territory of the Capital City of Podgorica (including the new municipalities of Tuzi and Zeta) and Danilovgrad, significant parts of Cetinje and Nikšić and a smaller part of Kolašin Municipality (Rovac and Morača).

“The Balkan Peninsula experienced a strong orogenic period that resulted in the creation of the Dinaric Mountains. The Skadar lake basin is a depression located south of the Dinarides and is oriented in the northwest-southeast direction, parallel to the coast of the Adriatic Sea. Limestone and related karst processes determine the geomorphology. On the northern and north-eastern side of the lake is the flat Zeta plain and the main river tributaries. Their sediments (delta) and the lower part of the plain created a wide belt of swamps that regularly flood. In the southwest, Skadar Lake is separated from the Adriatic Sea by steep hills: the Taraboš and Rumija mountains. This zone is only 10 to 15 km wide, but has peaks up to 1600 m. There are elongated islands along the shore of the lake. Many karst springs can be found in the south-western part of the lake. The lake area is drained by the Bojana River to the Adriatic Sea." https://iwlearn.net/documents/4120, page 2

Skadar Lake is a border lake between Montenegro and Albania and is the largest lake in the Balkans, thus the largest freshwater area in Montenegro. Its surface varies depending on the water level. According to the data from the **Draft Protection Study for Skadar Lake NP**, it covers an area of 25,400.00 ha of water surfaces (free water and floating vegetation) and 14,600.00 ha of peripheral land and wetlands. The length of the lake is 43 km, and the greatest width is 26 km on the line Beška-Lićeni and Hotit. The length of the coast is 76 km, of which 15 km are islands. At the lowest water level

(elevation below 5 meters above sea level), it covers an area of 370 km², while at the maximum water level (elevation around 10 meters above sea level) it covers an area of 505 km². The greatest depth was measured in the estavelle of the lake, the so-called "eye", 90 m, which makes it one of the most famous crypto-depressions, while the average depth of the lake is 4 m. In the past, Skadar Lake was a large tectonic basin, which was once a sea bay. With the rise of Taraboš and Rumija mountains, this sea bay was separated from the sea and thus turned into a lake. With the creation of the Bojana River, the lake retreated and became smaller, so it began to look like a swamp. The area declared a national park in 1983 is 40,000 ha, while the revision of the Protection Study proposes to increase the area according to the natural borders to 47,029.5 ha. (Draft Protection Study for Skadar Lake NP, page 6) It is expected that the Review Study will be adopted in 2024.

"The coast of Skadar Lake, which belongs to the municipality of Bar, stretches from the inlet northeast of Virpazar, towards Šestani and Krajina, and all the way to the Albanian border. The length of the coast is 76 km, of which 15 km are islands. The coast starts from Virpazar and goes towards Godinje, where the Lučice beach is located. From this bay, the coast stretches towards Jasenički Cape, Pristan Cape, Raduš Cape to Petrova Ponta with Brod cove. Southeast of the Brod cove is the Vučedabit inlet, with the islands of Veliko and Malo Starčevo. Going further east, you reach Đurović and Murić cove, where a pier has been built. There is a beach of the same name, 490 meters long, and another one, 560 meters long and 7 meters wide, below the village of Donji Murići, which is the largest beach on our part of the lake. In the immediate vicinity are the islands: Mali and Veliki Moračnik and Gorica Omerit. Further on are Mrčiluka cove, suitable for boat docking, Blajca cove, with a pier, Smokvice pier, Ostros cove with a pier. There are a large number of islands in Štitar liman, the most famous of which are: Tophala, Planik, Gorica, etc. The most significant pier in this part of the lake is Ckla cove, opposite of which is the large island of Duga." https://bar.me/wp-content/uploads/2020/02/STRATESKI-PLAN-RAZVOJA-OPSTINE-BAR-2020-2025-nacrt.pdf , page 7.

"**Šas Lake** is located in the north of Ulcinj municipality, in the Anamalsko region. It is located between the limestone hills of Šas hill and Briska Gora. The Medjureč river flows into the lake from the northwest, and the inflow of the lake in Bojana river (St. Đorđe channel) is located in the extreme south-eastern part of the terrain. The surface and volume of the lake changes during the year depending on the hydrological conditions. The greatest depth of the lake is about 10 m, and the average is about 5-6 m, and along the coast 1-3 m. At medium water, the surface of the lake is about 3 km^2."

"**Zoganjsko Lake** is a relic of hydrological historical conditions. There are many theories about the origin of this alluvium, but it is certain that during the great floods in the Bojana and Drin basin in November 1886, it took the form of a hydrographic natural object with its inflow in the Adriatic Sea - Port Milena. Later, human interventions in this area, especially the construction of the salt pan and salt pan embankments, formed the current form of this alluvium." http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf, page 12

The **Ulcinj salt pan** is located in the extreme south of Montenegro. It occupies about 14.5 km² of salt pools. It is 1 km from Ulcinj and the same distance from the border with Albania. The surface of the

protected area with the protective belt is 1,477.00 ha. The borders of the Ulcinj Salina Nature Park extend to 18.68 km from the perimeter of the site, 16.55 km along the drainage channel - the channel is included in the border - and 2.13 km from the northern bank of the Port Milena channel near the administrative and factory buildings of the salt pan. The border follows the man-made structures around the site and includes the whole of salt pan and the surrounding canals, but excludes the Port Milena canal and the remnants of the former lagoon. https://www.prirodainfo.me/Forma#/osnovnipodaci/79

"The area consists of 235 pools plus Štoj 1, 2 and Zoganj 1, 2, embankment which is 35-40 cm high and 60 cm wide, while the channel width is 1.0 m. Pools form larger areas that have specific names." http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf, page 46

The area of the **Bjelopavlići plain** is 72 km², 28 km long and up to 8 km wide, it is the second largest plain in Montenegro. The north-western part represents a tectonic basin, lowered along two, and in one part, several parallel tectonic lines, while the more extensive south-eastern part has the character of a karst field. https://www.danilovgrad.me/me/planska-dokumentacija (Spatial and Urban Plan of the Municipality of Danilovgrad 2011 – 2020, page 20). Along the north-eastern side of the valley stretches a narrow zone of paleogene flysch (shales, plate and marly limestone, which turn into marls and sandy clays), wedged under the Upper Cretaceous limestone and accompanied by the appearance of a number of smaller springs. The south-western side is built mainly of Upper Cretaceous limestone.

The formation of the Zeta valley also created fluvial terraces of limestone plains around Bogetić, Srednja gora, Zagreda at heights of about 450m, and a little lower around Martinići and between Sušica and Mareza at heights of about 150m. https://www.auzp.me/wp-content/uploads/2021/09/studija-zeta-zavrseno.pdf, page 11

The Zeta plain of 250 km² (https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/, page 152) covers the area on the northern side of Skadar Lake. Previously, it belonged as a whole to the capital - Podgorica. However, after the independence of the municipalities of Tuzi and Zeta, this area is now administratively located on the territory of three municipalities.

The basin of the Zeta River occupies an area of 1,215.7 km², the circumference of the basin is 184 km, and the length is 68 km. The length of the Zeta River course to the water measuring station of Danilovgrad is 58 km (the hydrological station is at 42° 33' 16'' N and 19° 06' 44'' E at an altitude of 33.4 masl), and the length of all streams in the basin is 110 km. The density of the river network is 0.09 km/km², the average drop of the basin is 15.9, the average drop of the flow is 1.1, and the average altitude is 937 m. Through the Nikšić field, where it originates and sinks, it flows as Gornja Zeta, and under the name of Donja Zeta, it reappears downstream from Bogetić, at the extreme NW of the Bjelopavlići plain. The Donja Zeta watercourse starts from the place Glava Zete, where it emerges from the Oboštica and Glava Zete watercourses, and flows through the Bjelopavlići plain in the SE direction until it flows into the Morača river, in a length of about 51 km, with an average bed width of 45-50 m (the widest bed is in the area of Slap and is 90 m). https://www.danilovgrad.me/me/planska-dokumentacija - Page 20

The Bojana River is a partly navigable, international river. It is 43 km long and has two main tributaries: Morača in Montenegro, and the Drin branch in Albania. It flows from Skadar Lake for 8 km through Albanian territory, and the remaining 25 km represent the border between Montenegro and Albania. The average depth of Bojana is about 3 to 5 m, and in some parts it exceeds 8 m. http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf – page 11

The Morača River is the main watercourse on the territory of the Capital City; it originates in the northern part of the Municipality of Podgorica, emerges under the mountains of Zebalac and Javorje and flows towards the south. The length of the river course is 97.1 km; the basin covers an area of 3,200 km^2 and is characterized by large oscillations in the water level. Its main tributary is the Zeta River, which is of particular importance because it feeds the waters of the Morača. https://www.sekretarijat-za-plurzs.podgorica.me/wp-content/uploads/2020/05/LEAP-Konacna-verzija.pdf - page 26

The basin of the Cijevna River extends from its source in the mountainous part of Prokletije on the territory of Albania, to the mouth of the Morača River on the territory of Montenegro. The length of the river is 58.8 km, of which 32.3 km flows through Montenegro, and 26.5 km through Albania. It is located on average at 1,237 meters above sea level. The Cijevna River has two main tributaries covering an area of 234 km^2: Cijevna Vuklitska (17.9 km long and 132 km^2 in area) and Cijevna Selčanska (22.5 km in length and 102 km^2 in area). These two tributaries join at the bridge in Tamara and cover a basin of 21 km^2 up to the border with Montenegro (Grabon). https://starisajt.podgorica.me/db_files/Urbanizam/Dokumenta/cijevna_decembar_javna_rasprava.pdf - page 7

"According to the adopted division of Montenegro into geomorphological areas, the territory of the Old Royal Capital of Cetinje belongs to the old Montenegrin karst plain. The largest part of Old Royal Capital includes the Katunska karst plain, which descends to the east along the Riječka nahija towards Skadar Lake and the Zeta Plain. These areas are separated from the sea by the Lovćen mountain massif. In the northeast, they are separated from the deep Zeta valley by the Garač massif.

With the exception of a small part of the area in the south, next to Skadar Lake, the rest of the area of the Old Royal Capital of Cetinje is the sinuous holokarst of Katunska Nahija with an average altitude of 800 - 1000 m. Njeguši and Cetinje field are the only larger areas with flat terrain. Smaller flat areas are still found in karst coves and sinkholes, which are found throughout the territory of the Old Royal Capital. Flat terrains make up only 1.4%, hilly and steep terrains over 80% of the surface." https://www.cetinje.me/cetinje/cms/public/image/uploads/staro/doc/2015/Izdata%20rjesenja/Prostorno%20urbanisticki%20plan/01.%20Prostorno%20urbanisticki%20plan%20Prijestonice%20Cetinje/Tekstualni%20dio/PUP%20Cetinje%20-%20knjiga%201%20(plan%202014)%20ANALITICKI%20DIO.pdf page 41

1.2 Altitude range:

11.2.1 The highest altitude: __define_____ meters

11.2.2 The lowest altitude: ____0_____ meters and belongs to the sea coast in the area of Ulcinj Municipality

11.2.3 For coastal/marine areas, maximum depth below mean sea level _define___ meters

SUP Podgorica states that for the municipality of Podgorica (as the territorially largest municipality in the subject area), the altitude ranges from 4.6 masl (minimum level of Skadar Lake) to 2,487 masl (Kučki Kom). https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/ - page 152

In the northern part of the Municipality of Danilovgrad there is an area of high mountains and plateaus, consisting of Prekornica (the highest peak of Kula 1,927 masl) and Lisac (the highest peak of Bobija 1,563 masl) and the plateau between them.

The highest parts of the area are under mountain pastures and meadows, while on the highest mountain ridges and peaks there is a zone of bare karst, sipar (geomorphological form), rocky parts with rare vegetation adapted to the harsh climatic and pedological conditions of the habitat. The highest peaks in the area of Danilovgrad municipality are Jablanov vrh up to 2,203 masl, Starac 2,021 masl, M. Starac 1,921 masl, Borova Glava 1,850 masl. Spatial and urban plan of Danilovgrad https://www.danilovgrad.me/me/planska-dokumentacija - Page 27

"The analysis of the relief of the Old Royal Capital of Cetinje indicates that the terrain of the Old Royal Capital is mostly located between 700 and 1000 meters above sea level, that is, about 42%. A small part of the area in the zone of Skadar Lake is in the area of lower terrain of up to 100 masl (3%), i.e., high mountain terrain above 1300 masl (2.7%) in the area of Lovćen, Pusti Lisac and Garča. Only the highest peaks penetrate the zone above 1600 masl (0.22%). The biggest height difference is between Skadar Lake at an altitude of 6 meters above sea level and Štirovnik (1,749 meters above sea level) on Lovćen and is 1743 m. The average altitude of the Old Royal Capital is 827 m." https://www.cetinje.me/cetinje/cms/public/image/uploads/staro/doc/2015/Izdata%20rjesenja/Prostorno%20urbanisticki%20plan/01.%20Prostorno%20urbanisticki%20plan%20Prijestonice%20Cetinje/Tekstualni%20dio/PUP%20Cetinje%20-%20knjiga%201%20(plan%202014)%20ANALITICKI%20DIO.pdf page 41

"On the territory of the municipality of **Bar** there are mountains: Rumija - with the highest peak of 1,596 meters above sea level, Sozina, Sutorman and Lisinj, and they are all located in such a way that they divide the municipality into the sea and lake parts." https://bar.me/wp-content/uploads/2020/02/STRATEGIC-PLAN-RAZVOJA-OPSTINE-BAR-2020-2025-nacrt.pdf - page 6

Comment: There are necessary data to fill out this part of the nomination form. However, the lowest and highest point of this area will be determined only after the precise borders of the biosphere reserve proposal have been determined.

11.3 Climate:

(Briefly describe the climate of the area; you can use the Köppen regional climate classification recommended by the World Meteorological Organization (WMO) (http://www.wmo.int/pages/themes/climate/understanding_climate.php).

11.3.1 Average temperature of the hottest month: _greater than_22 _____ °C
11.3.2 Average temperature of the coldest month: __greater than -3 and less than 18 _____ °C

According to data from the "Climate Atlas of Montenegro", the subject territory according to Köppen belongs to the Cs climate type, with both Csa and Csb subtypes present.

Zeta-Bjelopavlići plain with the Skadar lake and the coastal area, which includes the area of municipalities of Bar and Ulcinj belong to subtype Csa.

It is characterized by a moderately warm rainy climate with hot summers and pronounced summer dry periods. The average temperature of the coldest month is higher than -3°C and lower than 18°C. The average temperature of the hottest month is higher than 22°C.

The region of Nikšić, Cetinje, the southwest of Montenegro and the isolated core around Kolašin belongs to subtype Csb. This subtype is characterized by a moderately warm rainy climate with hot summers but without a pronounced dry period. The average temperature of the hottest month is less than 22°C, but at least 4 months of the year have an average monthly temperature over 10°C. https://canupub.me/knjiga/atlas-klime-crne-gore/

"The average annual temperature of the sea is 17.1°C. The temperature of the deep water layers ranges around 11°C and the surface water layer up to 25°C during the summer period. For more than six months, the water temperature is above 18°C, and for over 4 months above 20°C (from May 6 to November 4, i.e., 182 days)" http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf - page 12

Comment: Data on climate and average temperatures are available and complete.

11.3.3 Annual average amount of precipitation: _____ mm, recorded at an altitude of _____ meters

The Climate Atlas of Montenegro https://canupub.me/knjiga/atlas-klime-crne-gore/ provides an overview of average annual precipitation by town.

Tabela 21.1. Srednja godišnja količina padavina u mm, sa statistikama

	sr. vr.	max	min	stdev	P20	P50	P90
Žabljak	1471.3	2093.5	1039.0	263.1	1255.2	1391.6	1830.7
Pljevlja	802.1	1083.8	541.0	131.4	660.3	816.3	945.1
H. Novi	1920.5	2591.6	1136.9	340.6	1603.2	1936.1	2328.4
Nikšić	1985.6	2993.7	1270.2	373.8	1677.5	1936.6	2361.4
Bar	1390.9	1861.6	947.9	234.0	1233.5	1384.6	1687.2
Podgorica	1653.7	2317.5	1018.1	299.0	1413.0	1660.1	1960.5
Kolašin	2150.9	3200.9	1404.4	400.1	1767.6	2160.9	2540.5
Berane	926.1	1156.3	732.4	116.3	821.3	933.5	1078.9
B. Polje	908.4	1177.1	567.7	146.0	838.6	902.5	1093.5
Cetinje	3236.6	4695.0	2188.9	626.6	2646.8	3368.2	3886.9

Comment: In addition to the table above, data on average rainfall for each of the municipalities within the Skadar Lake basin are available in various strategic and planning documents. Precise data can be obtained from the Institute for Hydrometeorology and Seismology, and in cooperation with them, it is necessary to determine the average amount of precipitation in the new basin of Skadar Lake since it is a large area with several measuring stations.

11.3.4 Is there a meteorological station in or near the proposed biosphere reserve? If so, what is its name and where is it located, and how long has it been in operation?

Comment: In the subject area, there are several meteorological stations that are part of the basic network of stations of the Institute for Hydrometeorology and Seismology. These are meteorological station in the area of Kolašin in operation since 1947, Cetinje since 1946, Nikšić since 1927, Podgorica since 1946, Bar since 1948, Ulcinj since 1949. There is no meteorological station in the area of the Municipality of Tuzi, while the station in the area of the Municipality of Golubovci dates back to 1976, but it is not part of the network of stations managed by the Institute for Hydrometeorology and Seismology, but belongs to it Airport of Montenegro.

11.4 Geology, geomorphology, soil:
(Briefly describe important formations and conditions, including rock geology, sedimentary deposits, and important soil types).

Consolidated data on the geology and geomorphology of the area in question are given in the book called The Skadar/Shkodra Lake Environment, Vladimir Pešić · Gordan Karaman, Andrey G. Kostianoy - Editors, which served to prepare the text on the geomorphology and geology of the Skadar Lake basin. Data at the municipal level are available in Spatial and Urban Plans. Data for individual locations are described in the Protection Study for Protected Areas in the subject area as well as in the Spatial and Urban Plans of the Municipalities located in the area of the future biosphere reserve. The most detailed description of Skadar Lake is given in the Draft Protection Study for Skadar Lake NP, which is applicable to the Zeta-Bjelopavlići Plain. When it comes to specific geomorphological forms such as canyons, the description for the Cijevna River area is given in the Protection Study for that area. Data for Morača and Mala Rijeka can be found in the spatial and urban plan of the Municipality of Kolašin. Below is a complete description of the geomorphology and geology of the Skadar lake basin.

Geomorphology of the Skadar Lake Basin

Geomorphologically, Montenegro can be divided into seven regions. Skadar Lake is located in the Inland Depression, which includes four zones starting from the Nikšić high field, the valley of the Zeta river, the plain of Podgorica formed on the alluvial fan of the Morača River, and Skadar Lake. Skadar Lake is located in the lowest part of the Inland Depression zone (Picture below). This geomorphological zone represents one of the largest karst depressions in the area of the Dinaric Alps and includes the system of karst depressions that form the Skadar Basin - Zeta Valley, Bjelopavlići Valley, Nikšić Field and Duga Canyon. The Inland Depression zone is surrounded by the High Karst zone, the largest

geomorphological region in Montenegro, which is mainly composed of Cretaceous limestone. This region is characterized by phenomena, processes and forms that are characteristic of the holokarst and includes the most typical forms of karst relief - limestone pavement, joints, sinkholes, coves, fields, pits and caves. The well-known geographer Jovan Cvijić wrote: "There is no deeper and more thorough karst development than Herzegovina-Montenegro's karst between the Neretva valley, Skadar Lake and the Adriatic Sea. Not a drop of water drains off from its surface, all water instead sinking into pits, ponors, sinkholes, and fissures." Indeed, despite the high rainfall reaching 2,000 mm/year, bodies of water such as springs and rivers are extremely rare in this zone, and most of them are occasional and/or ephemeral in nature. This is especially true for the karst plateau, which extends southwest from the Inland Depression zone.

Along the border of the High Karst zone with the coastal region, there is a mountain chain consisting of the Lovćen (1,749 m), Sutorman (1,180 m) and Rumija (1,595 m) mountains. This area is characterized by the formation of various underground karst formations, among which the most famous are the caves belonging to the so-called system of Cetinje caves (Cetinjska, Obod and Lipa pećina) and Trnovica caves (Grbočica, Bobotuša and Spila). On the other hand, the characteristic features of the part of the karst plateau that stretches towards the northeast include the canyons of the Morača, Mrtvica, Mala Rijeka and Cijevna rivers.

Geology of the Skadar lake basin

In the wider area of the Skadar Lake, four geotectonic zones can be distinguished: (1) Para-autochtonous (Adriatic–Ionian) zone that stretches along the coast of the Adriatic Sea; (2) Budva-Čukal zone, located between the Para-autochtonous and the High Karst zone; (3) Dinaric zone of high karst (High karst zone) located between the Budva-Čukal zone and the inner zone of the Dinaric Alps; and (4) the Durmitor zone (or the inner zone of the Dinaric Alps), which extends northeast of the High Karst Zone and occupies the northern part of the territory of Montenegro and Albania. Skadar Lake is located in the High Karst Zone, which is the largest geotectonic unit, composed of Mesozoic (Triassic, Jurassic and Cretaceous) sediments (dolomite and limestone), and is characterized by a high degree of karstification.

The south-western parts of the Skadar lake basin belong to the anticlinorium of the Katunski karst (Old Montenegro), the continuation of which is Rumija Mountain, which towards the northeast turns into the central synclinorium. Further to the northeast, on the synclinorium of the central part, there is the anticlinorium of Žijovo, Prekornica, Vojnik and Golija (Picture below). Along the south-western anticlinorium, the dolomite zone extends along the coastal sides, and the Paleozoic slates, impermeable rocks that make up a significant part of the deep karst, orient the water towards the Skadar Lake. The north-eastern edge of the basin is a considerable area of Durmitor flysch sediments, which, due to its lower permeability, also orients the waters towards the Skadar Lake. The structure of the rocks caused the rock layers to fall towards the northeast, which, along with the gradual slope of the central valley towards the southeast, had a significant impact on the orientation of the underground and surface water circulation in that direction, i.e., towards the Skadar Lake. Since

Neogene sediments (clay, sandstone and marl) were found only in the deepest parts of the basin (e.g., in a well in the village of Gostilj in the valley of Donja Zeta), the largest part of the basin, as well as the surrounding areas, are made of limestone and chalk. At the contact of limestone with less permeable rocks (dolomites, Paleogene flysch and Durmitor flysch), from which rivers deposited fine material and created flood levels, and in the presence of favourable climatic conditions, as was the case at the end of the Neogene (i.e., high temperatures and abundant precipitation), an intense process of marginal corrosion and plateau expansion followed. On the plateau, the rear parts are built of less pure limestone or dolomite, which still rises from the plain as hills and mounds. Pleistocene fluvioglacial sediments lie in the largest part of the Podgorica-Skadar basin, across a limestone ravine.

Based on recent studies, the Skadar lake basin and the Zeta-Skadar depression were formed as a result of complex folding and faulting within the north-eastern wing of the anticlinorium of Old Montenegro (High Karst Zone) during the Cenozoic. On the other hand, the lake basin was formed as a result of block sinking in the Neogene or even the Paleogene. During the Younger Pliocene, the connection between Skadar Lake and the sea was broken.

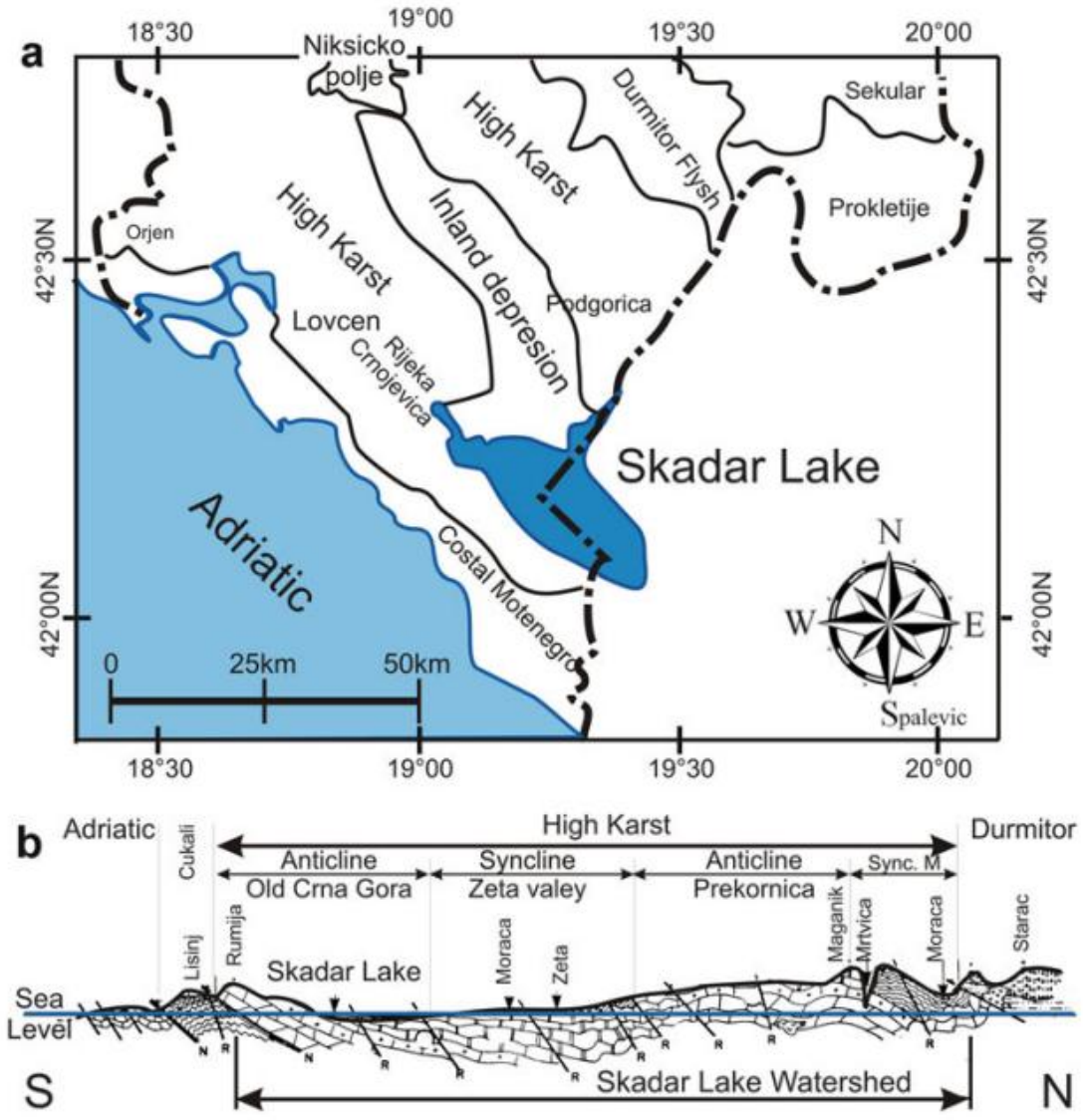


Fig. 1 (**a**) Geomorphological regionalization of the Lake Skadar catchment area (modified after [2]); (**b**) geological cross section of the Lake Skadar watershed (modified after [4])

Source: The Skadar/Shkodra Lake Environment, Vladimir Pešić · Gordan Karaman, Andrey G. Kostianoy – Editors

11.5 Bioclimatic zone:

(Indicate the bioclimatic zone in which the proposed biosphere reserve is located, see the table below and check the appropriate box for each area of the biosphere reserve).

Areas	Average annual rainfall/mm	Aridity index		Core area(s)	Buffer zone(s)	Transition area(s)
		Penman	(UNEP index)			
Hyper-arid	P<100	<0.05	<0.05			

Arid	100-400	0.05-0.28	0.05-0.20			
Semi-arid	400-600	0.28-0.43	0.21-0.50			
Dry Sub-Humid	600-800	0.43-0.60	0.51-0.65			
Moist Sub-Humid	800-1200	0.60-0.90	>0.65			
Per-humid	P>1200	>0.90				

Table 1: Aridity index resulting from the use of P/ETP

*Mean annual precipitation (**P**)/mean annual potential evapotranspiration (**ETP**)*

Comment: After finalizing the range and determining the zonation, it is necessary to collect and process data from the Institute for Hydrometeorology and Seismology

11.6 Biological characteristics:

List the main habitat types (e.g., tropical evergreen forests, savannahs, alpine tundra, coral reefs, and marine forests) and land cover types (e.g., residential areas, agricultural land, pastures, croplands, pastures).

For each type, indicate:

REGIONAL if the habitat or land cover type is widespread within the biogeographical region in which the proposed biosphere reserve is located, in order to assess the representativeness of the habitat or land cover type.

LOCAL if the habitat or land cover type is of limited distribution within the proposed biosphere reserve, in order to assess the uniqueness of the habitat or land cover type.

For each habitat or land cover type, list the characteristic species and describe important natural processes (e.g., tides, sedimentation, glacial retreat, wildfires) or human influences (e.g., grazing, selective logging, and agricultural practices) that affect the system. If necessary, refer to the vegetation or land cover map attached as additional documentation.

This data at the level of the basin does not exist as such. Taking into account the relief, climate, geological and pedological characteristics, soil cover, homogeneity and recognition, the regions of Montenegro are classified into five regions:

- Areas of the coastal region;
- Areas of the Skadar basin;
- Areas of canyons and plateaus of the central region;
- Areas of the karst region;
- Areas of mountains and Valley Rivers of the northern region.

The area of the Skadar basin is dominantly present in the proposed coverage of the biosphere reserve, while a smaller part of the coastal basin, which belongs to the municipalities of Ulcinj and Bar, is also included, as well as the canyons and highlands of the central region with the canyons of Morača,

Mrtvica and Mala Rijeka and the gorges of Donja and Gornja Morača. Areas of the karst region are only a small part of the coverage.

The document of Mapping and typology of areas of Montenegro https://www.gov.me/dokumenta/bc1290b5-2461-479e-9206-c4a505ef28f3 provides detailed descriptions with accompanying maps of these areas, which include land cover, types of vegetation, cultural patterns as well as areas of regional and local character.

For example, for the **area of the Skadar basin**, in addition to the description of the relief and climate, the following data are given:

Dominant land cover:

Types of vegetation:

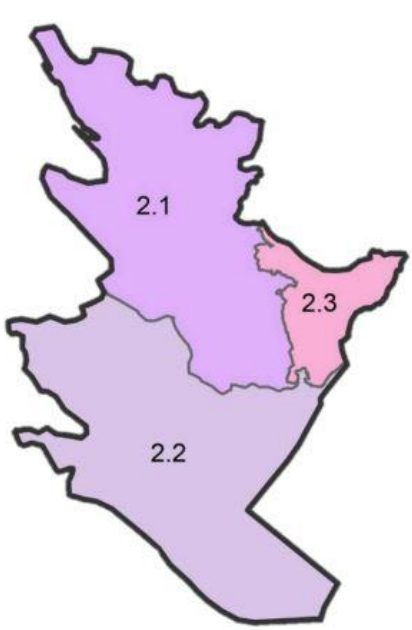
Rusco - *Carpinetum orientalis* and Rusco - *Carpinetum quercetosum*.

In the Skadar lake basin, there are hydrophilic willow, heather and Skadar oak forests.

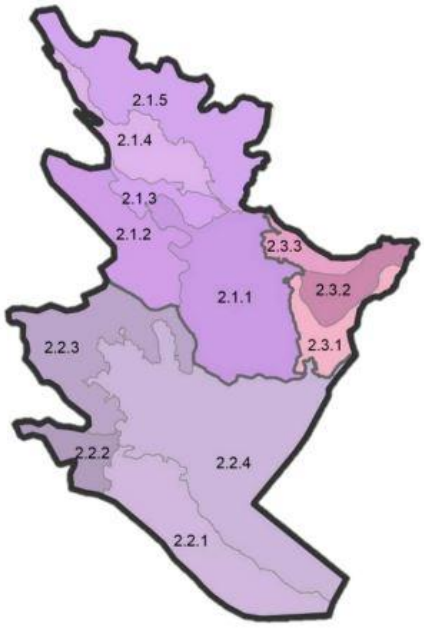
Cultural pattern:

- urban settlements
- suburban settlements with agricultural fields, orchards and vineyards
- coastal and rural settlements with traditional terraces in the Skadar Lake area
- rural settlements in the hilly area
- industrial zones, storage and service areas

Areas of landscape character



Regional level



Local level

Regional level

2.1 Plain areas of the Zeta-Bjelopavlići plain

2.2 Areas of Skadar Lake

2.3 The area of the Cijevna river canyon

Local level

2.1.1 Plain region of the Podgorica area

2.1.2 Hilly areas of Koman

2.1.3 Hilly areas of Velje Brdo and Zagač

2.1.4 Anthropogenic areas of the Bjelopavlići area

2.1.5 Hilly areas of Piperi and Martinići

2.2.1 Hilly areas of Krajina

2.2.2 Plain agricultural areas of the Crmnica area

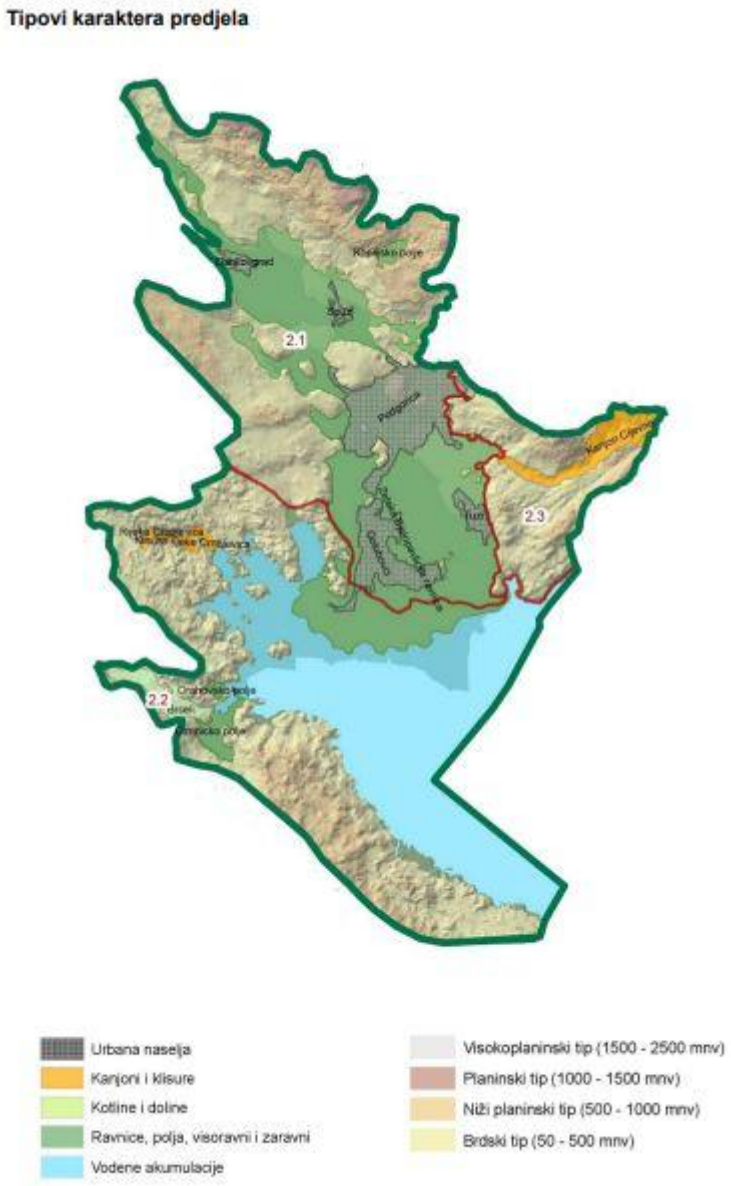
2.2.3 Hilly areas of Riječka nahija

2.2.4 Skadar Lake

2.3.1 Hilly areas of Drume and Hoti

2.3.2 Cijevna river canyon

2.3.3 Hilly areas of Kakaricka gora, Doljani and Fundine



According to the same principle, data are given for the other regions in the area

Areas of canyons and plateaus of the central region

Dominant land cover:

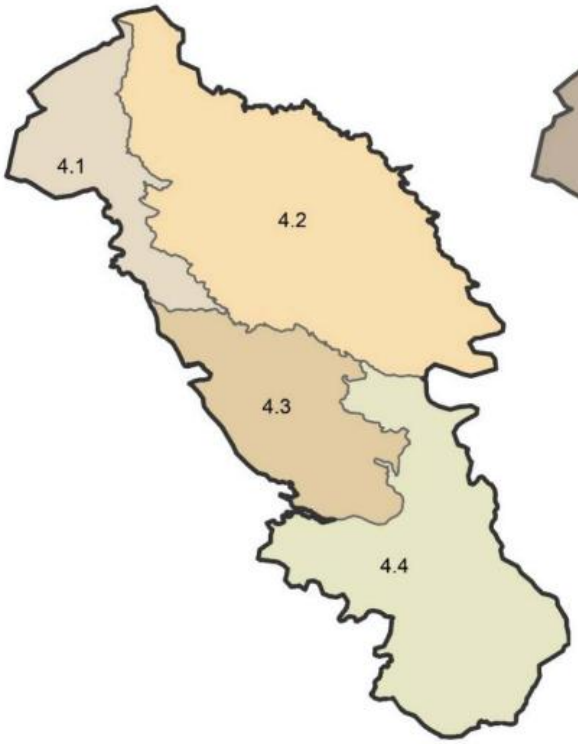
Types of vegetation: Querco - Ostryetum carpinifoliae, Fageto - Abietosum, Fagetum montanum seslerietosum, Pinetum heldreichii – Bosnian pine forest and Aceri - Carpinetum orientalis

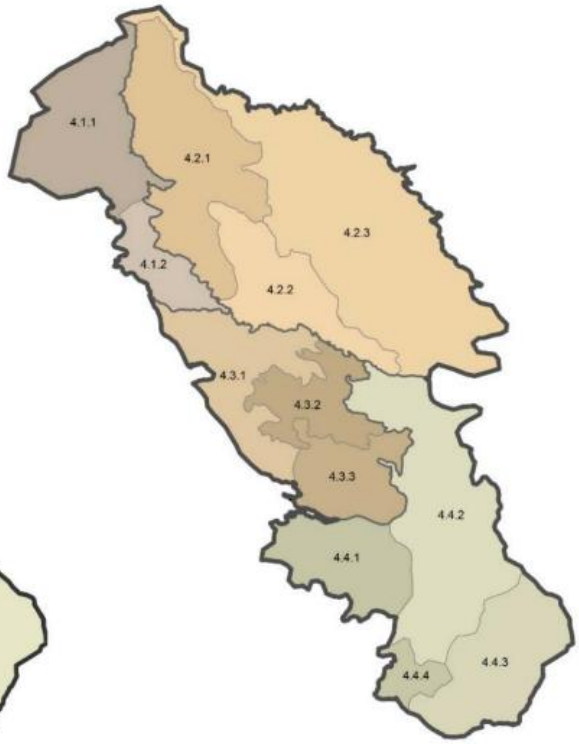
Cultural pattern:

- Numerous rural mountain settlements with small agricultural holdings (agricultural fields, mowed meadows)
- Katun with authentic buildings and cattle pens

Područja karaktera predjela

Regionalni nivo





Lokalni nivo

Regional level

4.1 Regions of the Piva Canyon
4.2 Regions of Durmitor and Sinjajevina
4.3 Mountain areas of the Nikšić and Šavnik regions
4.4 Regions of the Morača canyon

Local level

4.1.1 The highland areas of Maglić, Volujak and Bioče with the Piva canyon
4.1.2 The area of the Piva plateau
4.2.1 Highland areas of Piva Mountain, Durmitor and Sušica canyon
4.2.2 Mountain areas of Drobnjaci and Uskoci (Komarnica gorge, Šavnik, Tušina, Boan, Semolj)
4.2.3 The highland areas of Sinjajevina with the Tara canyon
4.3.1 Mountain and highland areas of Vojnik
4.3.2 The regions of the Krnova, Lukavica and Konjsko plateaus
4.3.3 The highland areas of Štirovik and Maganik

Types of landscape character

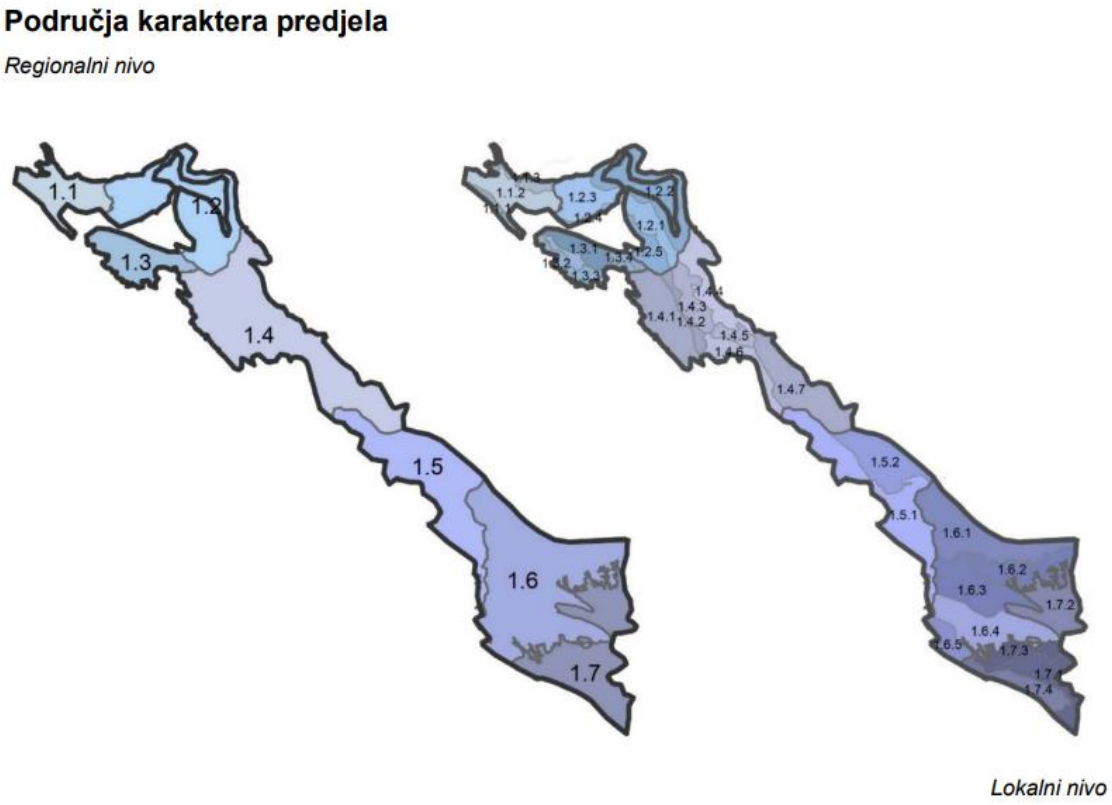

4.1
4.2
4.3
4.4
Urbana naselja
Kanjoni i klisure
Kotline i doline
Ravnice, polja, visoravni i zaravni
Vodene akumulacije
Visokoplaninski tip (1500 - 25
Planinski tip (1000 - 1500 mnv
Niži planinski tip (500 - 1000 m
Brdski tip (50 - 500 mnv)

Areas of the coastal region

Dominant land cover: Vegetation types*: Orno - Quercetum ilicis, Rusco-Carpinetum orientali*

Cultural pattern:

- rural settlements on traditional agricultural fields,
- rural settlements with traditional terraces,
- traditional terraces with olive groves
- seaside urban and suburban settlements, semi-urban settlements
- industrial zones, storage and service areas
- devastated areas (quarries, landfills)



Regional level

1.1 Areas of the Herzegovina region

1.2 Areas of the Bay of Kotor

1.3 Areas of the Luštica region

1.4 Areas of the Budva region

1.5 Areas of the Bar region

1.6 Hilly parts of the Ulcinj region

1.7 Plain areas of the Ulcinj region

Local level

1.5.1 Coastal areas of the Bar region

1.5.2 The lower mountainous regions of Rumija

1.6.1 Mountain regions of Rumija

1.6.2 The hilly regions of Anamalsko

1.6.3 Plain areas of Mrkovsko and Goransko fields

1.6.4 The hilly areas of Briska Gora and Možura

1.6.5 The hilly parts of the coastal area of Ulcinj

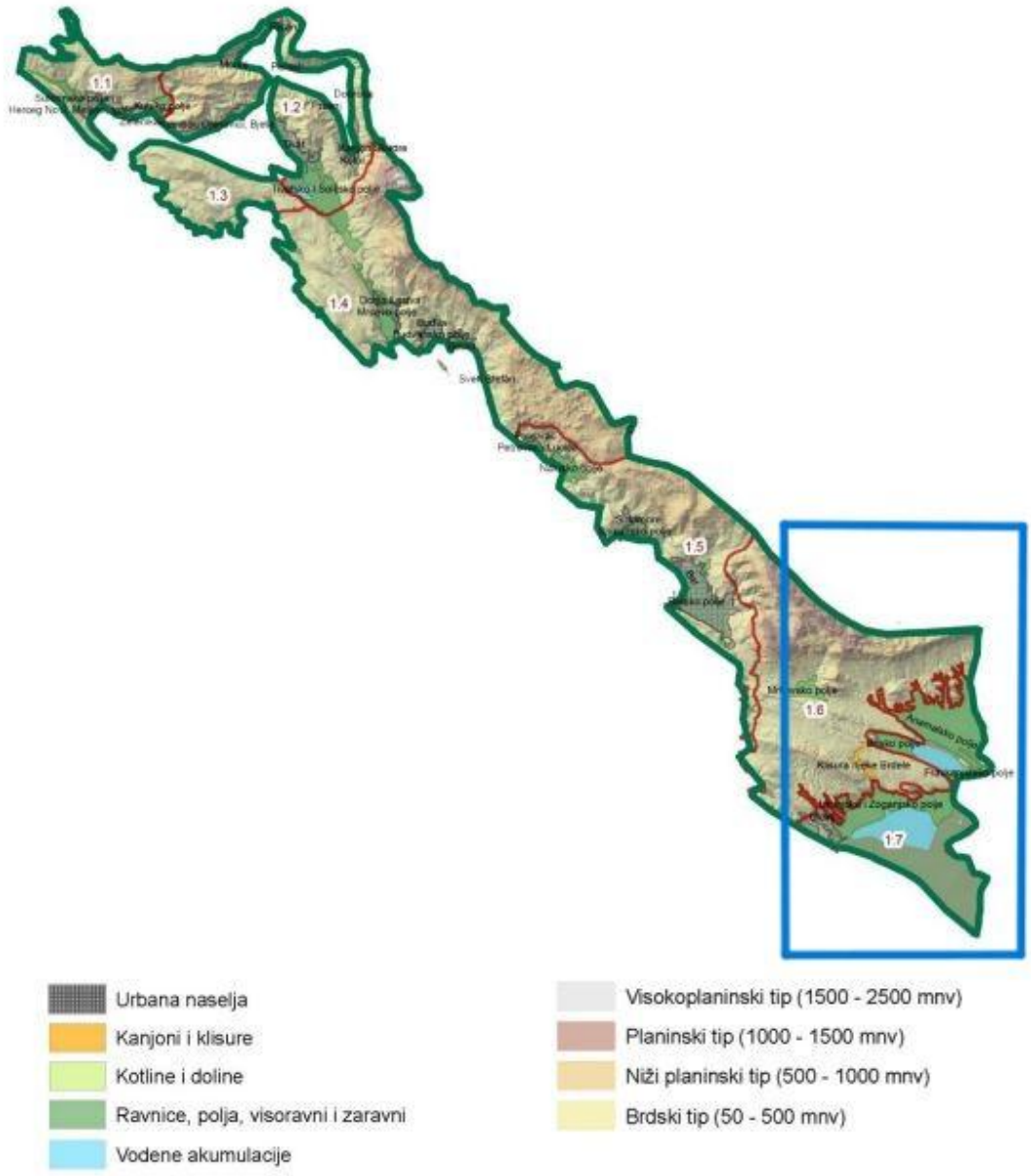
1.7.1 Wetlands of the Ulcinj salt pan and Bojana Delta

1.7.2 Plain areas of Anamalsko and Šas fields

1.7.3 Plain areas of Ulcinj and Zoganj fields

1.7.4 Alluvial areas of the Long beach

Tipovi karaktera predjela



Comment: Additionally, the spatial and urban planning plans of the municipalities in the subject area offer detailed descriptions of the typology and character of the area. Additional efforts are needed to analyse and describe the processes and human influences on the system.

Recommendation: There is no unique map of the types of areas and land covers for the proposed coverage of BR, and it needs to be created in the process of drafting the nomination form. It is necessary to engage a GIS expert, and the data and maps from the document of Mapping and typology

of areas of Montenegro can be used as a basis (https://www.gov.me/dokumenta/bc1290b5-2461-479e-9206-c4a505ef28f3). In that process, it is necessary to analyse and process the data in comparison with the data on the identification of the Natura 2000 network (if available (contact the Environmental Protection Agency) or with the data on the habitats recognized in the Protection Studies of protected areas. The data below in the document within section 14 provide useful information on ecosystems, habitats and species.

In addition, for all types of habitats, it is necessary to analyse natural processes, trends and human influences, because there is no document in which this is fully recognized. Individual pressures are recognized in available socio-economic analyses for individual protected areas or in Management Plans. However, the driving forces of pressures are either not stated or are not directly related to habitat or land cover types.

Consulted documents for parts of the text where no references are given:

Draft of the Skadar Lake Revision Study, Geographical Location, page 11, 3. GEOLOGICAL CHARACTERISTICS, pages 8-13
Protection Study for Natural Monument of Cijevna River Canyon, I. 1 Basic information about the area that is the subject of the Study, page 7
Zeta River Nature Park Protection Study, Geographical characteristics of the area, page 9, Geological and geomorphological characteristics, page 11
Rapid assessment of the ecological values of the Bojana Delta, 7 Threats to the Bojana - Buna delta, page 58
Socio-economic analysis of the Zeta River Nature Park 2.5. State of the Environment, page 30
Integrated resource management plan of Bojana Delta, 10.1 Pressures on the natural values, page 117
Spatial and urban plan of the Municipality of Ulcinj
AMENDMENTS – SPATIAL AND URBAN PLAN OF THE MUNICIPALITY OF KOLAŠIN, analytical part - draft plan, Engineering - geological characteristics of the terrain, page 35
Strategic development plan of the municipality of Ulcinj, Šas Lake, page 12
Protection study for the Ulcinj Salina Nature Park
Local Environmental Action Plan of Podgorica, 4.3.1. Surface waters, page 26
Spatial and urban plan of Podgorica, 4.4.1.1. Geographical location, page 152,
Spatial plan for special purpose area of the Skadar Lake National Park, page 24, 4.4.1.2. Geological structure of the terrain, page 153
Spatial and urban plan of Danilovgrad, 2.1.5. Hydrographic characteristics, page 20, 2.1.2. Geological characteristics, page 6
Climate Atlas of Montenegro, page 126
Mapping and typology of areas of Montenegro

ECOSYSTEM SERVICES:

The questions in the Nomination Form to be answered within the theme of ecosystem services are formulated as follows:

12.1 If possible, identify the ecosystem services provided by each biosphere reserve ecosystem and the users of those services. (Please refer to the Millennium Ecosystem Assessment Framework and the Economics of Ecosystems and Biodiversity Framework (TEEB) (http://millenniumassessment.org/en/Framework.html and http://www.teebweb.org/publications/teeb-study-reports/foundations/)).

12.2 State whether ecosystem service indicators are used to evaluate the three functions (protection, development and logistics) of biosphere reserves. If yes, which one and give details.

Indicators of ecosystem services are not used to evaluate the three functions of biosphere reserves in the sense that they are not yet defined and in use. Certainly, the most comprehensive information on ecosystem services for the proposed area, in terms of their inventory and description, is given in the document of Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin[5], and the following ecosystem services are recognized:

Agriculture

Agriculture is in the process of concentration and intensification in lowland areas with access to irrigation water, while it is being abandoned in mountainous areas in favour of livestock. At the same time, fertile land is being taken over by urbanization and infrastructure. Fertile land should be better protected for agriculture through effective spatial planning. At the same time, it is necessary to introduce more sustainable irrigation and agricultural practices in order to prevent negative impacts of agriculture on biodiversity and ecosystems.

Fisheries and aquaculture

Fisheries have deteriorated significantly in Montenegro and Albania due to overfishing and illegal practices, which were very current such as the use of explosives and electricity. In Albania, large dams on the Drin break the connectivity of habitats, while in Montenegro river habitats are damaged by excessive gravel extraction. According to the available documentation, which is synthesized in the Initial Characterization Report (ICR, 2015 - Volume of Annexes), there are no reliable data on fish catches in the last 25 years due to the lack of appropriate data collection methods.

Animal husbandry based on traditional local or semi-nomadic grazing is practiced throughout the mountainous areas of the river basin and to a lesser extent in the lowland areas. Due to the

[5] Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP-Med, 2019

depopulation of mountainous areas, grazing pressure on pastures is generally decreasing, leading to the succession of grasslands to forests. This can lead to loss of grassland biodiversity. In some areas (e.g., Pastrik, Rusolija, etc.) there is still a risk of overgrazing and destruction of grassland habitats.

In the future, the intensification of animal husbandry can be expected, similar to practices in the EU. It is important that grazing and farming practices are regulated in a way that preserves grassland biodiversity and avoids water pollution.

Wood industry

Wood supply from forests is considered sustainable in Montenegro, while the sustainability of forests in Albania is seriously threatened due to uncontrolled overuse. Countries have forest management agencies that are responsible for planning and permitting logging, but Albania recently introduced a logging ban and implemented a major reform delegating forest management to local communities. Illegal logging is a concern in countries due to the high demand for firewood and construction wood and the limited capacity of forest agencies to effectively enforce the law. Reform and strengthening of the forestry sector must continue to ensure the sustainability of forest management for multiple forest functions, including soil protection, climate regulation, biodiversity and recreation. Forests in the river basin also have significant potential for carbon sequestration.

Collecting food and medicinal plants

There is a strong tradition of collecting food and medicinal plants in the basin, especially collecting mushrooms, blueberries and medicinal plants. High demand from the EU with buyers located in the countries has increased collection above sustainable levels in certain areas and for certain high value species such as *Gentiana lutea*.

Deliberate forest fires are sometimes associated with the belief that mushroom yields will increase after the fire. On the other hand, collecting pressure is decreasing in remote areas due to depopulation, and collecting food and medicinal plants is not currently a viable economic activity, but could become so for local populations if properly regulated and managed. It could also contribute to the maintenance of certain habitat types and species conservation. The most effective would be the regulation and training of collectors through the companies that purchase the products.

Gravel

Due to the high demand for construction materials, the extraction of gravel from riverbeds is an important activity related to watercourses. Although in some cases it is desirable, e.g., to prevent reservoirs from filling, excessive gravel extraction has adverse effects on river habitats (especially destruction of gravel beds where fish spawn and oxbow lake where young fish develop) and can cause additional erosion of rivers downstream, as well as erosion of coastal beaches because they do not regenerate naturally. Due to the high level of new urbanization and related construction, the effect of

gravel extraction on rivers is most significant in Morača and around Skadar Lake, where practically all available gravel deposits are exploited to the maximum.

Drinking water

All countries have sufficient water resources to ensure an adequate supply of drinking water, but water supply infrastructure requires serious investment to ensure a constant supply of safe drinking water for every household. The quality of water supply in Montenegro is adequate. At the same time, the most available groundwater resources are threatened by pollution from urban areas without wastewater treatment plants and from agriculture. The problem is aggravated by unplanned and scattered urbanization as well as by uncontrolled extraction of water for irrigation. Existing drinking water resources should be protected from pollution and depletion. The infrastructure for water supply needs to be improved.

Irrigation

Irrigation is important for agriculture because of dry summers. Individual extraction of irrigation water from rivers, lakes and groundwater is widespread and largely uncontrolled. This can lead to severe destruction of aquatic and wetland habitats in dry summers and conflicts between different water users. Control of water intake is necessary to avoid habitat destruction. Introducing water prices can reduce pressure by providing an incentive to irrigate more efficiently or plant less demanding crops to cover investment and maintenance costs.

Waste disposal

A significant part of the solid waste in the basin is not collected and disposed of in landfills or recycled, but ends up on the ground or in rivers and streams. The result is that all rivers, lakes and coastal beaches are polluted with solid waste. Therefore, it is crucial to consider waste disposal as one of the ecosystem services.

In order to rid the waters of solid waste, the first priority should be the introduction of universal waste collection systems and treatment facilities that serve all households. Awareness-raising activities aimed at the population should also be considered in order to regard waste disposal as morally unacceptable. This need not be linked to the development of expensive sanitary landfills and recycling facilities, as landfills with at least the minimum required sanitary equipment would be an improvement over the current dispersed waste disposal, since the waste would not be dispersed into rivers and streams in most of the area and sea, but it would be locally limited.

Reducing the impact of climate change

Compared to EU member states, the countries have low carbon emissions per capita and at the same time high emissions per unit of GDP. This is the result of low industrial activity on the one side and low

energy efficiency on the other. There is high potential for energy efficiency and renewable energy sources in countries (solar, wind and heat pump systems) to reduce carbon emissions.

At the same time, countries have, or could have, a significant positive carbon balance in land use, land use change and forestry (LULUCF) due to land abandonment and growing forest stocks. Sustainable forest management, which is a requirement for the productive and protective functions of forests, pastures and wetlands, can result in high levels of carbon sequestration as the carbon stock gradually increases. Increasing the quality and quantity of forests would also have positive effects on water regulation and erosion control. This increase could be partly financed by global funds linked to the UN Convention on Climate Change.

Moderation of extreme weather effects

Increased weather variability due to global warming, poorly planned urbanization in high-risk areas such as floodplains, and forest degradation lead to increasing vulnerability to the effects of extreme weather events. Such events in the recent past include severe flooding, heavy snowfall, as well as severe droughts combined with heat waves and wildfires. The effects of these weather events are moderated by natural habitats, including forests, water and wetlands in the landscape, as opposed to urban areas and intensive agriculture.

This service is threatened by the degradation of forests and riverbeds. It should be improved by strengthening the protection of forests, riverbeds and wetlands, and by spatial planning that provides space for water and natural habitats based on the precautionary principle.

Prevention of erosion and maintenance of soil fertility

The level of soil erosion due to the degradation of forests and pastures, as well as erosion of river banks due to changes in the water regime and gravel extraction, is significant. Soil fertility is relatively high, but is negatively affected in places with intensive agriculture and poor irrigation practices.

Erosion prevention and maintenance of soil fertility can be improved by better management of forests and pastures, quality spatial planning that protects fertile soil from urbanization and low-impact agriculture.

Waste water treatment

Most wastewater ends up in rivers, streams or on the ground. This leads to water pollution and eutrophication of watercourses, which affects drinking water supplies, as well as habitats and species in the aquatic environment. The level of pollution and eutrophication is quite low in sparsely populated mountainous areas, but significant in densely populated lowlands, where the demand for clean water is the highest.

Significant investments are needed to provide sanitary services to the population. Some infrastructure projects are planned and under construction, but will require adequate funding to make them work.

Local climate and air quality

Forests, other greenery and water bodies have an impact on local climate and air quality by influencing air temperature, humidity and absorbing pollutants including dust. Lakes and large rivers moderate temperature fluctuations, but can cause more fog due to humidity. Forests moderate temperatures and wind and provide cleaner air.

Countries have problems with air pollution due to the use of coal and wood for heating, as well as increased emissions from traffic. Coastal lowlands away from the sea suffer from severe heat waves during the summer. Due to degraded forests, the ability of natural vegetation to moderate the local climate is the lowest in Albania. At the same time, Albania has the largest water reservoirs in the Drin Valley, which affects the local climate there. As part of adaptation to climate change, all countries should ensure an increased ability of natural systems to moderate local climate and contribute to air quality.

Habitats for species

There are significant and diverse aquatic and terrestrial habitats in the basin. Among terrestrial habitats, alpine habitats are well preserved, and there are also large areas of forest, some of which are well preserved. The Bojana-Skadar lake-Morača system is one of the best-preserved continuous freshwater ecosystems in Europe connected to the sea. Populations of many fish and animal species are lower than expected due to poaching and overfishing. However, with available habitats, conservation actions, more sustainable management of forests and fisheries, and habitat restoration, the basin has the potential to be one of the most biodiverse areas in Europe.

Recreation and health

Due to the high level of landscape diversity and scenic beauty, the basin has a high value for recreation and health of the local population. This factor is increasingly recognized in the countries and more and more people enjoy outdoor recreation, in terms of not only picnics, but also walking, hiking, climbing, cycling, swimming or rowing. The development of infrastructure for visitors and the education of the public should go hand in hand in order to ensure a positive experience for visitors and to avoid negative impacts of visitors on nature.

Tourism

Tourism is a rapidly growing economic sector, with the focus shifting from summer tourism by the sea and lakes to tourism based on nature and culture. On the other hand, the development of tourism is hampered by a high level of pollution, e.g., solid waste on Albania's beaches, along rivers and in lakes, lack of tourism infrastructure and lack of qualified tourism service providers in nature-based tourism. The development of this ecosystem service is closely related to recreational activities and the health of the local population. There is significant potential for generating income that can cover or economically justify investments in nature conservation.

For individual areas within the proposed scope of the biosphere reserve, specifically the Zeta Valley Nature Park, Cijevna Canyon Nature Monument, Skadar Lake National Park, Ulcinj Salina Nature Park and the Ulcinj area with the lower course of the Bojana River, including Šas, the description of ecosystem services is most often given descriptively as in the examples below:

In the Socio-Economic Analysis of the Zeta River Nature Park[6], the following ecosystem services for the Zeta River area are given:

Supply services

Food - Zeta River is one of the main agricultural areas in Montenegro. In this area, there are agro systems, including aquaculture, where food of plant and animal origin is produced. The local population experiences benefits, as well as the whole of Montenegro, and the region to which certain food products are exported.

Food for animals - A large part of the agricultural land is covered by meadows and pastures that provide food for domestic animals. Animal farms benefit from this service directly, and processors and users of meat and milk products indirectly.

Fuel - Biomass as an energy source is not exploited for commercial purposes in this area. Nevertheless, individuals take biomass for firewood needs in their own households, whereby this service is mainly provided by the oak species found here. Sporadic felling of individual trees for this purpose takes place on estates along the Zeta, while it is somewhat more intensive in the part of the Park that belongs to Podgorica, i.e., in the area of Velje Brdo, above Tološi and Mareza. The local population benefits from this service.

Regulation services

Climate regulation - The cover under which the land is located plays an important role in climate regulation at the local level, because it affects the absorption and emission of heat, solar radiation, and water, and thus also the temperature, air humidity and volume and cycle of precipitation. It will depend on the type of cover, whereby natural vegetation - especially forests - mitigates high temperatures and temperature oscillations and extremes, maintains air humidity, provides shelter from strong solar radiation.

The Zeta Valley is under the influence of the Mediterranean climate, which is characterized by hot and dry summers, and the presence of natural vegetation - gallery forests around the Zeta, groves, and meadows - certainly mitigates the effects of such a climate. The local population benefits from this because the harmful effects of high temperatures and solar radiation are reduced. Winegrowers have

[6]Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio-economic analysis of Zeta River Nature Park, The Nature Conservancy

a special benefit from this service, because Zeta and the gallery forests that surround it create microclimatic conditions that are very favourable for the production of certain grape varieties.

Carbon sequestration (fixation) - This service is reflected in the fixation of carbon from the atmosphere in organic compounds through biological processes, primarily photosynthesis. Vegetation takes carbon in inorganic form (carbon dioxide) and through the process of photosynthesis converts it into organic compounds in which it remains locked. In this way, the amount of carbon dioxide in the atmosphere as a greenhouse gas is reduced, which has the potential to mitigate climate change, the benefits of which are felt at the global level.

According to this rough estimate, ecosystems within the Park store 1,661,186 tons of carbon. In order to illustrate this data, we will take the estimate of the average annual emission of a passenger car in the EU of 1.8 tons of CO2 (estimated by the European Federation for Transport and Environment AISBL 2018). Combining these data, we arrive at the information that the Park space fixes the equivalent of annual carbon emissions for 922,880 cars, which is 3.7 times more than the total number of cars registered in Montenegro in 2019 (source: MONSTAT).

Regulation of the hydrological regime - Vegetation acts as a regulator of water runoff by absorbing it, preventing rapid runoff, reducing evaporation, and thus contributes to the regulation of the hydrological regime of the Zeta River, its tributaries, and wetlands. For the area of the Bjelopavlići plain it is characteristic that the water level oscillates - falls during the dry period, and then due to precipitation, a surplus occurs when certain areas flood. In the absence of natural ecosystems, these oscillations would certainly be much more drastic.

As previously stated, the local population uses captured local water sources and their own wells for water supply, and water from the Zeta and its tributaries for irrigation, whereby the vegetation contributes both to the amount of water itself and to its availability throughout the year, especially in the dry season. The benefits of this service are felt by almost the entire population of this area.

Flood protection - Vegetation located near water bodies when the water level rises can act as a sponge and thus absorb excess water and mitigate the effects of floods. The Zeta river is prone to seasonal overflows and the vegetation on its banks plays the role of a buffer, in the absence of which the effects of floods would be much more pronounced and the damage greater.

Erosion and sedimentation control - The Zeta River is dynamic, and as a result of fluctuating water levels and changing flow, there is erosion of the river banks and sedimentation. Coastal vegetation plays the role of a stabilizer, reducing the risk of erosion. On the parts of the coast where the vegetation was cleared, the river washed away the soil in a short period of time. The benefits are mainly for the local population, primarily the owners of properties along the Zeta.

Regulation of species reproduction - The Zeta River is a habitat for rare, endemic and commercially important fish species, and along its course, there are hatcheries where their populations are restored.

In other ecosystems within the Park, there are also habitats important for the reproduction of other species (threatened and migratory species of birds, mammals, amphibians, insects, fungi, etc.).

Decomposition of harmful substances and pollutants - The plant leaves take gases and particles from the air, their roots absorb the introduced substances, and in this way, the vegetation filters the air, water and soil. The existence of vegetation along roads is particularly important because it absorbs gases and particles emitted by vehicles. Hedges that divide properties can prevent the spread of pesticides from neighbouring agricultural areas.

Vegetation of wet habitats absorbs dissolved substances that reach the river or soil through surface and underground water. The local population benefits from this service because it affects the quality of air and water at the local level.

Pollination - The success of many agricultural crops depends on the presence of pollinators - insects, birds and other organisms that pollinate plants. Natural ecosystems are a habitat for pollinators, and they represent the source of this service, which is very important for an agricultural region such as the Zeta Valley. Bees are also raised in this area, which contribute to the provision of this service.

Agricultural producers, especially the fruit-growing sector, and thus the wider population of Montenegro, which uses the products of this region, have direct benefits from pollination.

Cultural services

Opportunity for science and education - the accessibility of ecosystems in the Park area, the richness of their biodiversity and the presence of endemic and other important species and habitats represent an ideal location for carrying out educational and research activities. Local educational and scientific-research institutions and the NGO sector benefit from this service, and ultimately the regional and global scientific community.

The possibility for recreation and tourism - the presence of preserved ecosystems makes it possible to perform various recreational activities and forms of tourism (hiking, swimming, boating, fishing, cycling, bird watching...) which is what this area is known for. This contributes to the physical and mental health of the local population, which is currently the main user of this service.

This service also represents the basis for the development of the region as a tourist destination, from which the local population, municipalities and the entire economy of Montenegro can benefit.

Support Services

Habitat for wild species of plants and animals – Ecosystems represent a habitat for wild species and thus enable not only their survival, but also the development of important ecological processes that form the basis for providing other ecosystem services. Aquatic ecosystems of Zeta are a habitat for fish species, the most important of which are salmonids. Zeta is one of the two known habitats of the Zeta soft-mouth trout. Grassland ecosystems support diversity of species including pollinators, together

with forest and wetland ecosystems and their specific vegetation are habitats for important and threatened species of birds, mammals and other groups of organisms.

Certain species, such as the Levant sparrowhawk, are associated with the river course and riparian vegetation. The builder of this vegetation in the past was the oak (Skadar oak), which provided much better conditions for reproduction, growth and development of populations. Today, its habitats are fragmented due to urbanization, industrialization, agriculture and logging for firewood.

The aforementioned service enables other ecosystem services such as tourism, recreation, pollination, science and education, food production.

When it comes to Skadar Lake NP, the analysis of ecosystem services is given briefly in the Analysis of synergies, gaps and complementarities on integrated environmental management at regional level Skadar Lake - Montenegro - Study 2[7] and the Assessment of the effectiveness of biodiversity protection in the Skadar Lake National Park[8], which states: Skadar Lake is rich in resources, the most important of which are fish. The lake is the largest fishing area in Montenegro, with an annual catch that is greater than the catch from the sea. The most important commercial species are carp, bleak, twaide shad, and eel, and hunting is possible with a permit issued by the National Park and held by local fishermen.

The land around the Lake is an agricultural resource, and various forms of agricultural production take place on it. It is predominantly of the extensive type, with mixed cultures, dominated by annual fruit and vegetable crops and vineyards. Animal production is small-scale, reflected in keeping a small number of cattle, sheep and goats. Agricultural products are mainly for personal use, for sale on the local market, and recently they are marketed through tourism as products with benefit.

The aesthetic values of Skadar Lake have been valorised through the development of tourism, which in recent years has become the dominant economic activity in this area. The number of visitors in the period before the pandemic was constantly growing, which is best evidenced by the number of tickets sold, which in the period from 2015-2019 more than doubled (from 71,488 to 145,237). The development of tourism encouraged the establishment of various tourist products - from classic cruises on the Lake, through cultural, gastronomic and wine tourism, walking and cycling tours, water sports, various forms of accommodation, festivals...

As the largest freshwater basin in the Balkans, the Lake is an important source of water used for irrigation and drinking. The source of Bolje sestre in Malo Blato is of particular importance, from which water is supplied to the Montenegrin coast.

Among the other resources, medicinal plants should be mentioned, primarily sage, which is present in the southern parts of the Park, and from the harvesting of which the local population benefits

[7] Vugdelić M. (2012), Analysis of synergies, gaps and complementarities on integrated environmental management at regional level Skadar Lake - Montenegro - Study 2, Project EMA Plan- Green Home
[8] Assessment of the effectiveness of biodiversity protection in the Skadar Lake National Park, CZIP and CEPF, 2022.

economically. In addition to the mentioned direct benefits, regulation services include microclimate regulation, flood regulation, water purification, pollination, carbon sink, regulation of species reproduction (hatcheries and nesting sites). Cultural services include opportunities for recreation and tourism, science and education, space aesthetics, inspiration for art, a sense of belonging, part of the local cultural identity.

For the area of Ulcinj and the lower Bojana river basin, including Šas, an analysis of ecosystem services is given in the document of Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity[9] - 5. Ecosystem services and human well-being, where specific indicators and quantitative data are listed as well.

Therefore, in the mentioned documents, you can find a list and description of ecosystem services that are not harmonized and made according to the TEEB or MEA methodology. Additionally, Ecosystem Service Indicators are not used to evaluate the three functions of biosphere reserves in the sense that they are not yet defined and in use.

12.3 Describe the biodiversity involved in the provision of services in the biosphere reserve (e.g., species or groups of species).

In most of the mentioned documents, there is no assessment of ecosystem services, nor is there a detailed description of the biodiversity involved in the provision of services (only the connection between terrestrial and aquatic habitats and the services mentioned in the document of Transboundary Diagnostic Analysis - thematic report on biodiversity and ecosystems of the extended Drin river basin is given). The document of Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity is an exception, where for certain ecosystem services, where relevant, the species and habitats that provide them are given.

12.4 Indicate whether any assessment of ecosystem services has been carried out for the proposed biosphere reserve. If so, is that assessment used to develop a management plan?

A quantitative assessment of ecosystem services for the biosphere reserve has not been done. The first analysis of the value of protected areas in Montenegro was done in 2010, but only for the areas of national parks and for all national parks in total, with the provision of individual quantitative data for individual ecosystem services and areas. In the document of Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity, data are given on the quantities, where applicable, of the components that provide ecosystem services, but no financial assessment was made. Therefore, the above is a shortcoming and the recommendation would be to carry out an assessment of ecosystem services in future activities of nominating biosphere reserves.

[9] Lončarević N, Katnić A. & Šundić D. (2022). "Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity". NGO Environmental Program

Conclusion: Information on ecosystem services for the proposed area in terms of inventory and description is most comprehensively provided in the document of Transboundary Diagnostic Analysis - thematic report on biodiversity and ecosystems of the extended Drin river basin. Additionally, the information can be found for individual areas within the scope, but they are presented most often not following the TEEB and MEA methodology and descriptively without quantitative data, indicators and a connection with the three functions of the future biosphere reserve, which is a deficiency in relation to the information expected in the nomination file. In addition, the mentioned information has not been included in the management of protected areas within the reserve. Therefore, it is necessary to perform a complete analysis of ecosystem services in the entire planned area in accordance with the TEEB and MEA methodology and to establish a clear connection with the indicators and 3 functions of the future reserve. Sources of data and basis for analysis can be information in existing, mentioned documents, but certainly the subject of a further consultative process both in terms of their complete identification, quantification possibilities and in the context of recommendations for resource management of the future reserve. Therefore, it is recommended to engage an ecosystem services expert in the further process.

Sources:

Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin[10]
Socio-economic analysis for the Cijevna Canyon Nature Monument, Municipality of Tuzi, 2023 - 4.1 Identification and assessment of ecosystem services in the protected area of Cijevna Canyon - pages 25-29
Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio-economic analysis of Zeta River Nature Park, The Nature Conservancy - page 78
Montenegro: the economic value of biodiversity and ecosystem services[11]
Assessment of the effectiveness of biodiversity protection in the Skadar Lake National Park, CZIP and CEPF, 2022. – page 10
Protection Study for Ulcinj Salina Nature Park - Chapter 6.4
Lončarević N, Katnić A. & Šundić D. (2022). Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity. NGO Environmental Program – Chapter 5

13. MAIN OBJECTIVE FOR BSR DESIGNATION – to be added from the WS reports!

14. PROTECTIVE FUNCTION

The questions in the Nomination Form to be answered within the topic are as follows:

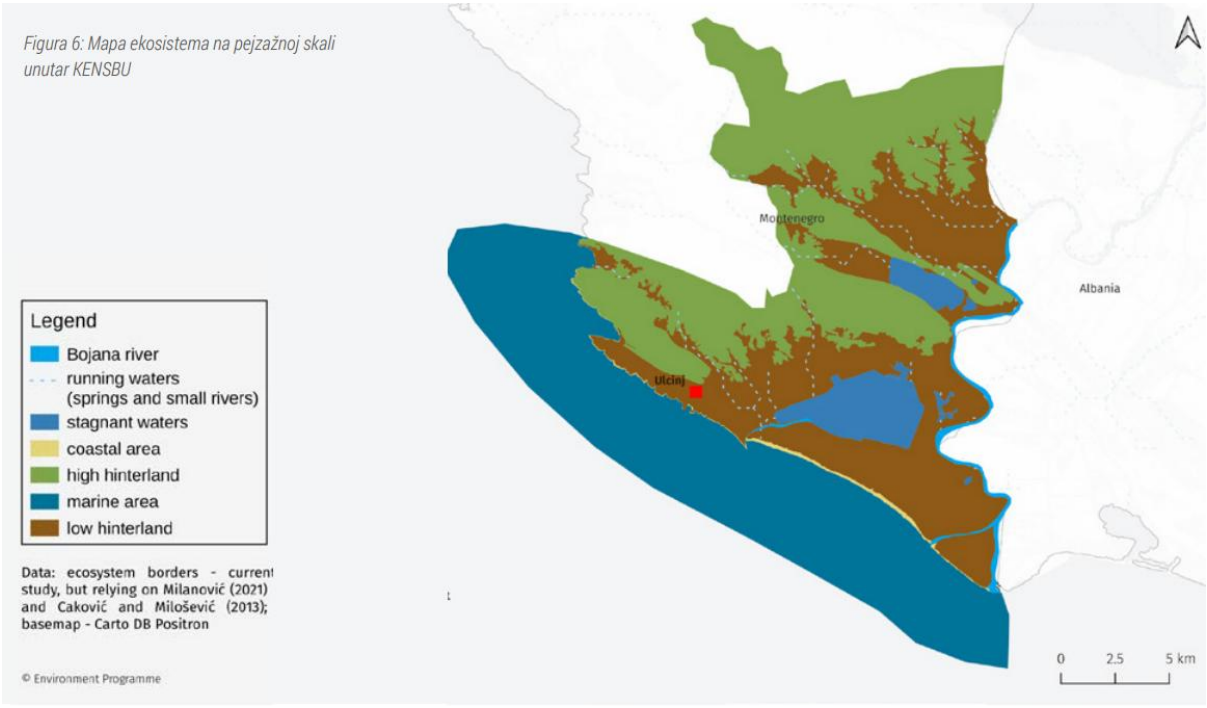
14.1. At the landscape and ecosystem level (including soil, water and climate):

[10] Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP-Med, 2019
[11] Emerton L. (2013), Montenegro: the economic value of biodiversity and ecosystem services Technical Report, GEF UNDP

The basin of Skadar Lake includes various ecosystems and types of land cover which, based on the available literal data, can be grouped into five main groups: a) Ecosystems of water, swamps and peat, b) Forest ecosystems and Mediterranean maquis, c) Agroecosystems, d) Open mountain ecosystems and pastures, and e) Sea and coastal area with low hinterland. [12]

These ecosystems are recognized and extensively described in relevant documents such as Protection Studies for protected areas belonging to this basin, Management Plans, Local Biodiversity Action Plans, Local Environmental Protection Plans, as well as various strategies, planning documents, project analysis and reports. For example, the Local Biodiversity Action Plan of the Municipality of Danilovgrad 2020 - 2024l recognizes four ecosystem units: 1. the basin of the Zeta and Matica rivers with the Bjelopavlići plain; 2. Mountain (karst) ecosystem; 3. Forest ecosystem; 4. Open mountain ecosystem. For each recognized ecosystem unit, LBAP provides a detailed description of the condition of the recognized habitat types and indicates the preservation or endangerment of the species that live in them. This plan indicates the importance and benefits of initiating conservation measures as soon as possible, the need for further and more detailed research, and for the declaration of valuable and sensitive protected areas and other relevant elements that affect the maintenance or achievement of ecosystem functionality. **However, there is no single document that consolidates information on this issue for the entire proposed area. Additionally, for some parts of the basin, there are maps of ecosystem distribution (for example, the Bojana Basin), while no such maps are available for other parts. It is necessary to hire a GIS expert to create a unique map of the distribution of ecosystems in the area in question.**

Figura 6: Mapa ekosistema na pejzažnoj skali unutar KENSBU



[12] Ecosystem grouping done by the author of the document

https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf

14.1.1. Describe and indicate the location of the ecosystem and/or land cover types of the biosphere reserve.

The description and location of ecosystem can be found in available literature and documents. The data can be supplemented with data collected as part of the process of identifying and establishing Natura 2000 habitats in Montenegro.

a) Ecosystems of water (stagnant and flowing), swamps and peat,

They include the areas of Skadar Lake, Šas Lake, Ulcinj Salt Pan, then the Zeta, Bojana, and Morača rivers, with their tributaries, the most important of which are Cijevna and Mala Rijeka. These ecosystems have already been described in more detail in section 11.1. and numerous available documents provide detailed descriptions of these ecosystems.

The northern coastal part of Skadar Lake is covered by deluvial, alluvial and **wetlands**, due to the importance of which the Skadar Lake National Park was, in accordance with the provisions of the 1995 Ramsar Convention, entered in the List of Wetlands of International Importance, especially as habitats of wetland birds.

The most important wetland areas in the Bojana River Basin are the areas of Ulcinj salt pan and Šas Lake, described previously in 11.1. https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf also offers a good description of the ecosystems of these lakes.

"The Scirpo-Phragmitetum association is represented in the wider area of **Moromiš** (Protection zone I of the Zeta River Nature Park) where it takes stagnant and slow-flowing waters that are present there during most of the year. In this area, there used to be larger scrubs with white willow - *Salix alba*, but a good part of them has been cut down. The area was dominated by reeds, and species from the lower floor of the forest managed to survive in it, so the community is quite rich. In addition to the natural filling of ponds and summer drying, humans also affect the reduction of marsh vegetation by digging canals to increase areas for land reclamation and mowing, and by building residential buildings in the area near the marsh." https://www.danilovgrad.me/me/planska-dokumentacija

Small wetlands (Alb. knete) are the remains of the former lagoon of Zoganj Lake, and there are six of them in the Bojana delta: Darza, Ćurke, Velika, Mala, Fraskanjel, Donja Klezna (Schneider-Jacoby et al., 2006). *Knete* are habitats with extreme ecological conditions, which form a gradient between brackish and freshwater habitats. A small part is always covered by water, while a large part is occasionally flooded. They consist of dense rows of tamarisk (*Tamarix dalmatica*) that create a mosaic with alluvial coniferous forests such as Polish ash (*Fraxinus angustifolia*), Skadar oak (*Quercus robur ssp. scutariensis*), or rows of reeds (*Phragmites australis*) (Caković D. & Milosevic D, 2013). https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf - page 77

The largest areas of **peat soils** are located near Skadar Lake and Malo Blato. The stocks of peat are the largest in the Podhum Bay. In the Podhum Bay, their thickness is from 0.5 to 7 m, and in Malo Blato up

to 3.7 m. It has been estimated that in the Podhum Bay there are about 31,000,000 m^3 of peat reserves. It is dominated by layers with 50-70%, or even more, organic matter. The presence of carbonates was also registered in them. Organomineral soils, overgrown with marsh vegetation that accumulates in water and decomposes slowly in anaerobic conditions, turn into peat. Peatlands that are 4-5 m thick occur under the clay layer in the localities of Podhum, Gornje Blato and Rzavac. Peatlands are among the most fertile soil types, and occupy large areas. (**Draft Protection Study for Skadar Lake NP**).

b) Forest ecosystems and Mediterranean maquis

The forest ecosystems in the Skadar lake basin belong to the Mediterranean type. The dominant climazonal vegetation in the area of SkadarLake is represented by sub-Mediterranean deciduous forests, which are mostly present in the southern and western parts of the lake basin. There are two dominant thermophilic deciduous plant communities: one (*Querco-Carpinetum orientalis*) consisting of oak and oriental hornbeam, and the other community of Macedonian oak (*Q. trojanae*).

In the wide area of the Skadar lake basin, there is a widespread community of oriental hornbeam (*Carpinetum orientalis)* that rises up to approx. 600 meters above sea level. It mainly covers the northern and northeastern part of the lake shore.

The forest community of Skadar pedunculate oak (*Quercus robus ssp. scutariensis - Fraxinus oxicarpa - Periploca graeca*) belongs to the pedunculate oak forest type of the *Alneto-Quercion roboris* association. It is located on the floodplain of Skadar Lake. It covers a smaller area. It was considerably exploited by the surrounding villagers and it was preserved in smaller patches around the villages of Gostilja, Golubovci and in Crmnica field. Its exploitation has been especially intense recently, so we point out the need for better protection. (**Draft Protection Study for Skadar lake NP**)

In the altitude zone from the Podgorica plain to 1,000 m above sea level, there are hills and heights, with terraces and slopes where villages are usually located. In terms of vegetation, this zone is inhabited by thermophilic deciduous forests dominated by the following species: oriental hornbeam (*Carpinus orientalis*), ash (*Fraxinus ornus*), holm oak (*Quercus ilex*), downy oak (*Quercus lanuginosa*), field maple (*Acer campestre*), Montpellier maple (*Acer monspessulanum*), Turkey oak (*Quercus cerris*), in slightly higher zones hop-hornbeam (*Ostrya carpinifolia*), and in some habitats linden (Tilia - three species) and others. In the area from Malesia, through Kuči, Bratonožići and Piperi, in the zone around 500-600 meters above sea level, there is a very distinct vegetation belt dominated by the endemic shrub - laburnum (*Petteria ramentacea*), which in all phenological phases gives a distinct impression to the limestone landscape. In localities where the forest vegetation has degraded, sage (Salvia officinalis) is dominant, and it has multiple importance in nature and for humans: it protects steep slopes from erosion, is a very good bee pasture, and has a high concentration of quality essential oils, which is why it is used in pharmaceutical industry and folk medicine. https://starisajt.podgorica.me/db_files/Urbanizam/PUP/pup.pdf - page 167

The forests in the mountainous area of Kamenik, then through Žijevo to Komovi, which is the zone above 1,000 m above sea level, were until recently very spacious, diverse (with the characteristics of a rainforest) and with great natural and economic potential. The belt begins with the zone of beech

(Fagus silvatica) which climbs up to about 1,600 m. They occur as pure beech forests or together with silver fir (*Abies alba*) and spruce (*Picea excelsa*). In limestone habitats and at higher altitudes, from Kamenik to Komovi, the endemic Bosnian pine (*Pinus heldreichii*) is widespread, building different types of communities. https://starisajt.podgorica.me/db_files/Urbanizam/PUP/pup.pdf - page 168

In the Cijevna canyon, the relict remains of evergreen holm oak forests (*Quercus ilex*) are characteristic, which together with strawberry tree (*Arbutus unedo*) and other Mediterranean elements form a true maquis.
https://starisajt.podgorica.me/db_files/Urbanizam/Dokumenta/cijevna_decembar_javna_rasprava.pdf

The areas of the Danilovgrad municipality are dominated by the thermophilic sub-Mediterranean *Querco-Carpinetum orientalis* community, represented up to 300 m above sea level. The dominant oak species in this community are *Quercus trojana, Quercus cerris and Quercis pubescens*.

The altitude zone of 300-800 m is characterized by the thermophilic association Q*uercetum cerris mediterano-montanum*, which includes a considerable number of sub-Mediterranean and xerophilic woody species, which indicates the penetration of the Mediterranean influence (e.g., Macedonian oak - *Quercus trojana*, Turkey oak - *Quercus cerris*, downy oak - *Quercus pubescens*, Oriental hornbeam - *Carpinus orientalis*). At heights of 600 and more meters above sea level, the hop-hornbeam (*Ostrya carpinifolia*) begins to prevail over the Oriental hornbeam, and at a height of about 700 m, stands of beech begin to appear, and this is a kind of transition from the sub-Mediterranean to the continental area. These forests are mostly privately owned and used mainly for firewood, and their original composition has been changed. In the northern part of Bjelopavlići, specifically on Štitovo, Maganik and Prekornica, in the height zone of 800-1000 m, the largest part of the forest cover is made up of communities of *Fageto-Aceretum visianii* and *Abieto-Fagetum moseiacea*, while in the zone of 1000-1800 m pure beech stands dominate, as well as mixed stands of beech and pure stands of Bosnian pine. Bosnian pine in this community mostly occurs in pure stands, although mixed communities with beech are also evident. https://www.danilovgrad.me/me/planska-dokumentacija - Spatial and urban plan of the municipality of Danilovgrad 2011 – 2020, page 22. “Bosnian pine forests are present on the mountains Prekornica and Maganik, in the zone between 1200 and 2000 m above sea level, most often on rocky and sloping terrain.” https://s3.eu-central-1.amazonaws.com/danilovgrad-media/files/1689840190-lokalni-akcioni-plan-za-biodiversitet.pdf - page 54

Alluvial forests cover 670 ha of the Bojana delta on the Montenegrin side, and extend up to 9 km upstream from the mouth, forming the largest complex of floodplain forests on the eastern part of the Adriatic coast. These forests are often inhabited by the rhinoceros beetle (*Oryctes nasicorus*), the great capricorn beetle (*Cerambyx cerdo*), stag beetle (*Lucanus cervus*) and hermit beetles (*Osmoderma ermita/barnabita*), as well as European roller (*Coracias garrulus*) that nest in isolated willows, white poplars and narrow-leaved ash (*Salix spp, Populus alba, Fraxinus angustifolia*). https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf

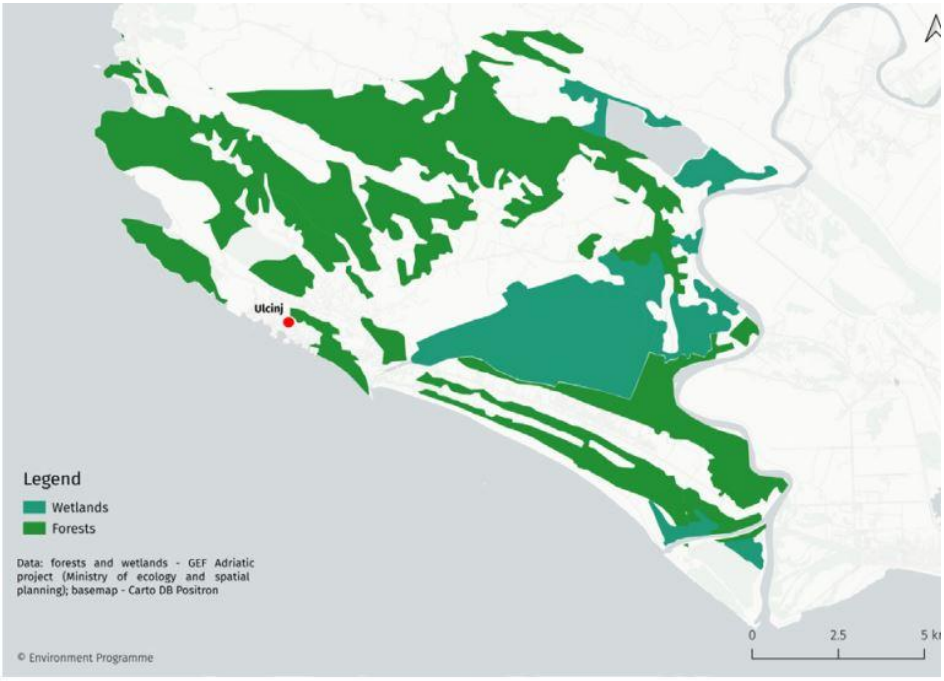


Figura 10: Šume i močvare (Ministarstvo ekologije i prostornog planiranja, 2021)

Forests and wetlands in the areas of the lower Bojana basin https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf

c) Agroecosystems

Agroecosystems in the Skadar Lake basin include diverse areas used for agricultural purposes. These agroecosystems include:

Agricultural lands: This area includes areas used for the cultivation of various agricultural crops such as cereals, fruits, vegetables, and vines. They are concentrated in the Bjelopavlići and Zeta plains. A larger percentage of the population in this region used to work in agriculture, and it had the role of producing food for the household, i.e., the basic support of the family. Then, from the 50s of the last century, there was a trend of forming peasant cooperatives, which is characterized as an unsuccessful attempt to collectivize villages. After the 90s of the last century, which had a negative impact on agriculture, in the last twenty years, through privatization, production in farms and related businesses has been renewed. It is reflected in the transition from production for own needs and communal cultivation of the land and herding of livestock to the professionalization and commercialization of agricultural production. The number of households professionally engaged in agriculture is decreasing, but estates and farms are consolidating and the volume of production on individual farms is increasing. Farmers are increasingly introducing modern agrotechnical measures and mechanization in order to increase yields, and are becoming beneficiaries of programs and support projects implemented by the relevant Ministry.

"According to statistical data, available agricultural areas in the territory of the Old Royal Capital of Cetinje occupy 19,267 ha, or 21.2% of the territory. The structure of agricultural land is dominated by

pastures and meadows (96%), while ploughland, gardens, orchards and vineyards make up only 3.3% of the total agricultural land, with flat terrain making up only 1.4%.

The main flat agricultural areas are located in the karst fields, such as Cetinje and Njeguši fields and part of the territory around Skadar Lake, where settlements are located and are expanding. Smaller and fragmented arable areas are located in coves, sinkholes and valleys, isolated on the walls. The pasture areas are separated on the high katuns and the flooded Ceklinsko field." https://www.cetinje.me/cetinje/cms/public/image/uploads/staro/doc/2015/Izdata%20rjesenja/Prostorno%20urbanisticki%20plan/01.%20Prostorno%20urbanisticki%20plan%20Prijestonice%20Cetinje/Tekstualni%20dio/PUP%20Cetinje%20-%20knjiga%201%20(plan%202014)%20ANALITICKI%20DIO.pdf - page 84

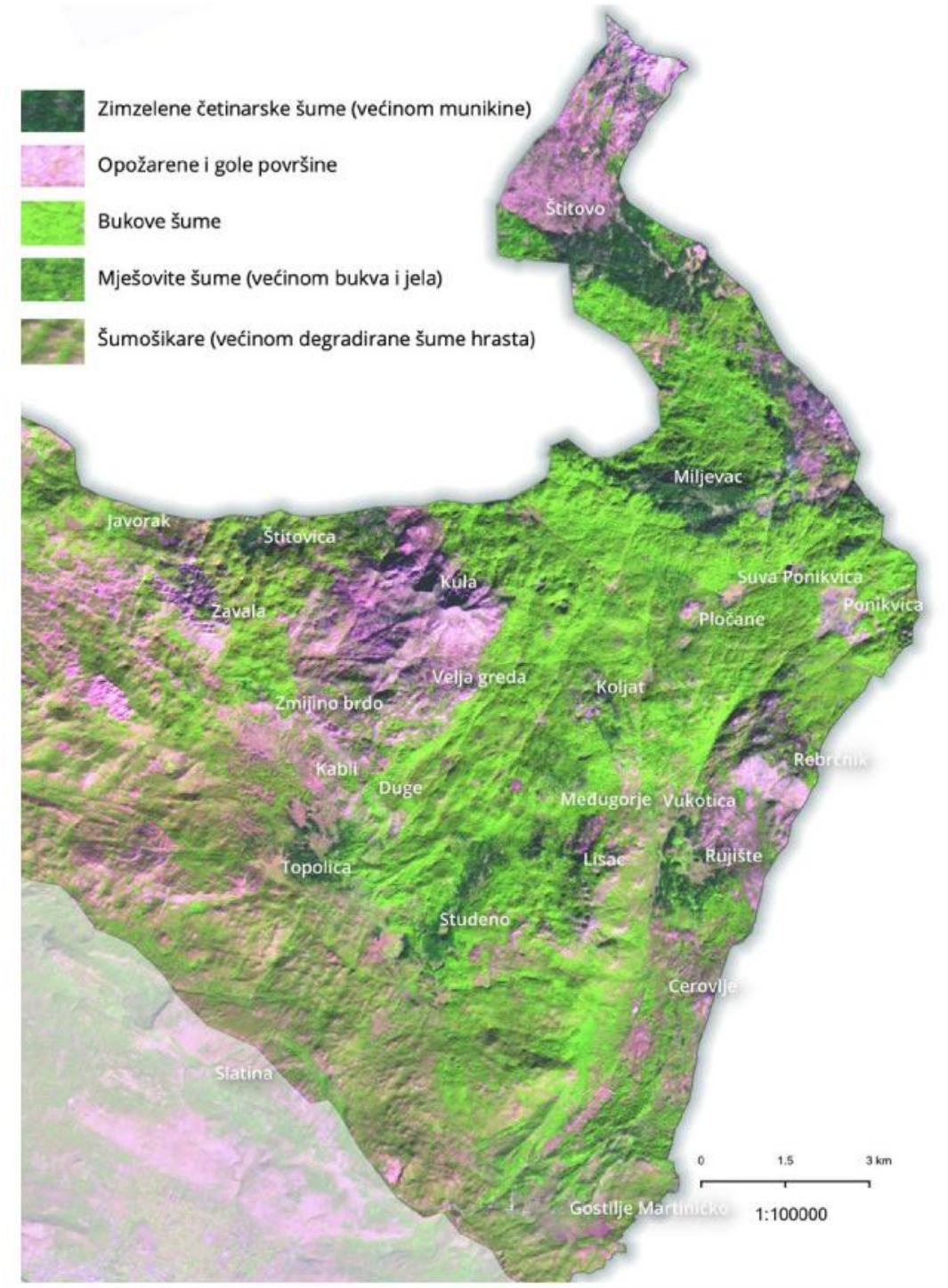
Fishing: Fishing is also an important activity in the agroecosystems around Skadar Lake. Fishing is often practiced as a traditional activity, providing sources of food and income for the local population.

Traditional farming practices: This region often retains traditional farming techniques and practices that have been passed down from generation to generation. These practices include the use of local plant varieties, traditional methods of cultivation of the land and maintenance of soil fertility.

d) Open mountain ecosystems and pastures

They belong to the zone with an average height of 800-1000 meters above sea level, and as such represent the lower part of the mountainous area of Montenegro. They are predominantly located in the northern part of the Skadar basin. Mountain vegetation is represented, in which deciduous trees predominate in the lower parts of the terrain, with the increase in altitude, mixed stands appear, and the higher parts are overgrown with conifers. The highest parts of the area (above 1000m above sea level) are covered with mountain pastures and meadows, while on the highest mountain ridges and peaks there is a zone of bare karst, sipar, rocky parts with sparse vegetation adapted to the harsh climatic and pedological conditions of the habitat. "Mountain forest ecosystems are present (in the areas of the Municipality of Danilovgrad, author's note) above 600 m above sea level, where larger complexes appear, first of all the Turkey oak forest, then the beech, Bosnian pine, beech and fir, spruce forests, all the way to the upper forest border, which is at about 2,000 m, and the cover of which is built by the Bosnian pine tree, and in places by the mountain pine tree." https://s3.eu-central-1.amazonaws.com/danilovgrad-media/files/1689840190-lokalni-akcioni-plan-za-biodiversitet.pdf - page 53

Forest cover, bareness and open high mountain habitats in the area of Danilovgrad are presented on the map below.



Forest ecosystems in the area of Danilovgrad - source: Local Biodiversity Action Plan

Livestock grazing is often practiced here on open pastures and meadows. Animal husbandry involves raising livestock such as sheep, goats, cattle and pigs.

The forest type of ecosystem is also present in the south-western part of the nature reserve. “It covers the largest and main part of the Lovćen NP area, as well as the slopes of Rudina and Garač mountains with Lastva and Bijele fields.

This landscape is dotted with glades, pastures and meadows in smaller complexes as well as zones of greater anthropogenic influence with mixed landscape compositions (on Ivanova korita, Kuk and Majstori)"
https://www.cetinje.me/cetinje/cms/public/image/uploads/staro/doc/2015/Izdata%20rjesenja/Prostorno%20urbanisticki%20plan/01.%20Prostorno%20urbanisticki%20plan%20Prijestonice%20Cetinje/Tekstualni%20dio/PUP%20Cetinje%20-%20knjiga%201%20(plan%202014)%20ANALITICKI%20DIO.pdf
- page 53

e) Sea and coastal area, with low hinterland.

It is located in the extreme south, on the territory of the Municipality of Ulcinj, as part of the lower basin of the Bojana River. The complex of marine ecosystems includes the benthic zone (seabed) and the pelagic zone (open sea), as well as smaller ecosystems of bays and coves, sea islands and rocks. The coastal area is occupied by a complex of habitats under the influence of sea water, within which there are four small ecosystems: estuaries, sandy beaches, sea cliffs with vegetation and coastal lagoons.

The low hinterland includes habitats that are at 0 m above sea level or thereabouts, the area (from south to north) from the hinterland of Long beach, after the direct influence of the sea, to the beginning of the ecosystem of maquis and forests in the northern and western part of the municipality of Ulcinj, on the wide plains of Ulcinj and Šas. Coastal dune habitats are characteristic of this habitat. They are replaced lower in the hinterland by grasslands, mostly pseudosteppe habitats and Mediterranean and sub-Mediterranean grasslands. This type of ecosystem is described in detail in the document Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity, Threats and Strategies https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf

The description of these ecosystems was made based on the insights of the available data. Detailed information can be found in the following documents:

- Management Plan on Skadar Lake National park 2021-2025, 2.1.3. Hydrological system-surface and underground waters, Page 15. 2.1.4 Landscape features of the national park and the wider area, Page 15-16. NATURA 2000 habitats, Page 18, 2.1.5.1. Forests, Page 19 (link)
- Draft of Study for Skadar Lake Nature Protection: 6. Pedological characteristics of the terrain, Page 19-21, 8.Biological Values of NP Skadar Lake 8.1. Flora And Habitats of Skadar Lake, Page 26, 8.1.1. Characteristics and richness of the flora of the Skadar lake area, Page 27, 8.1.4. NATURA 2000 habitat types in the area of the Skadar Lake National Park, Pages 38-40, 8.2 Vegetation map of Montenegro, Page 44, 8.2.2. Vegetation characteristics of Skadar Lake, Page

45-49, 8.2.3. Aquatic vegetation, Pages 49-51, 8.2.4. Vegetation around Skadar lake, pages 51-55 (not available online- database)

- Nature Protection Study "Monument of Nature of Cijevna River Canyon" III. 4. 5 Vegetation of Cijevna Canyon, Pages 44-50, III. 4.5.2 Characteristic plant communities, Pages 51-66, III 7. Landscape and landscape features, Pages 96-100, III. 7. 6 Types of landscape characters / landscape elements, Pages 102-105 (link)
- Nature Protection Study for River Zeta Nature Park, BIOLOGICAL DIVERSITY - Flora and vegetation, Pages 21-31, LANDSCAPE VALUES, Pages 117-127, (link)
- Integrated resources management plan (IRMP) for the Buna / Bojana area, 9. NATURAL ENVIRONMENT AND RESOURCES, 9.1.2 Habitats Pages 91-95 (link)
- Local Environment Plan of Municipality of Danilovgrad 2021-2025, 1.4. Landscape typology, Page 9, 6. Protected area of Zeta valley river Nature park, types of ecosystems, Page 22 (link)
- Local Action Plan for Biodiversity Municipality of Danilovgrad 2020-2024, Analysis of natural values, stresses and threats by biodiversity, page 45, Map of ecosystems Page 46 (link)
- Draft of Local Action Plan for Biodiversity of Municipality of Ulcinj, Landscape, Pages 28- 29 (link)
- LOWER BOJANA RIVER BASIN AND ULCINJ ECOSYSTEM COMPLEX BIODIVERSITY 4. Ecosystems, Biodiversity and Key Environmental Attributes, pages 51-94 (link)
- Spatial and urban plan of Podgorica until 2025, 4.4.1.7 Biodiversity, page 167 (link)
- Spatial and urban plan of Danilovgrad, 2.1.7 Flora, page 22,page 27 (link)
- AGRICULTURE AND RURAL AREAS DEVELOPMENT STRATEGY 2023-2028 - DRAFT 2.3.2. Agricultural land, page 25 (link)

14.1.2. Describe the state and trends of the ecosystems and/or land cover types listed above, as well as the natural and anthropogenic drivers of those trends.

a) Ecosystems of water, swamps and peat

"Agriculture has the biggest negative impact on aquatic ecosystems. Lake waters in agricultural catchment areas are subject to the accumulation of nitrogenous and phosphorous compounds, causing the intensification of the eutrophication process, which leads to a decrease in water quality, a decrease in abundance and changes in the composition of species in the zooplankton community.

Additionally, a growing pressure is the growing development of settlements and tourism, and the issue of wastewater treatment, solid waste removal, which has not been adequately resolved, represent a significant source of adverse impacts on ecosystems." (**Draft Protection Study for Skadar Lake NP, page 57**)

"Wastewater is considered the most prominent and financially demanding problem in Montenegro, and it is also very prominent in the area of Ulcinj. The National Strategy for the Integral Management of the Coastal Area 2015-2030 (MORT, 2014) provides an analysis of the situation: pollution above the permitted limits (in relation to the prescribed quality classes) was recorded in the Bojana River. Bojana is already burdened with a significant amount of pollution at its source, but due to the large amount of water, the quality parameters remain within the prescribed limits (classes A2, C, II) all the way down to the lower course, where (at the station Fraskanjel) exceedances are recorded in the concentrations

of certain pollutants. The slow flow and the closing of the bed profile at the very mouth of Bojana (due to the deposition of sediment and relatively shallow depth) increase the effect of pollution". https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf - page 140

b) Forest ecosystems and Mediterranean maquis

"In Montenegro, the natural expansion of forested areas is evident, not only as a result of artificial afforestation, but also the spontaneous expansion of forest vegetation at the expense of agricultural land. However, the data on the state of the forests are incomplete because an adequate system for monitoring and controlling changes in the field has not been established. So, for example, monitoring and control is done through ten-year forest management programs, which is insufficient." https://www.gov.me/dokumenta/67dc487e-097d-41d2-8fd5-7827a19a1f5a - page 65

"It can still be assessed that large-scale deforestation has largely been avoided so far, but certain forest areas have been degraded or impoverished due to unsustainable logging plans and/or illegal logging. Forest fires and forest diseases represent significant problems....Forests are threatened by climate change and increased risks of droughts, fires and biotic pests, and it is expected that this trend will continue." https://www.gov.me/dokumenta/67dc487e-097d-41d2-8fd5-7827a19a1f5a - page 66

"The high hinterland of the Bojana basin is dominated by a variety of forests, maquis and shrubs, which are intersected by stony pastures (Table 6). Until about 30 years ago, the area of the high hinterland, from sea level to about 350 m above sea level, was dominated by evergreen Mediterranean forests, with holm oak (*Quercus ilex*) and holly oak (*Quercus coccifera*) near the coast, and Macedonian oak (*Quercus trojana*) in the further hinterland (Milanović et al. 2021). In the past few decades, due to the exploitation of forests and urbanization, most of the well-preserved forests were cut down, and today it is almost impossible to find these forests in the Mediterranean, especially the coastal ones where the most urbanization took place. However, some, not the most representative, remains are present in KENSBU". https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf - page 94

c) Agroecosystems

Agroecosystems in the Skadar Lake Basin play a key role in sustaining rural economies, supporting the local community and providing basic resources for life and survival. However, these agroecosystems are also subject to challenges such as climate change, urbanization, and changes in agricultural practices, and require sustainable management to ensure their long-term sustainability.

The Statistical Office (MONSTAT) has data on the area and percentage of agricultural land for each municipality. Data on agricultural land in Montenegro are not completely unique - data from MONSTAT (2016) show that the available land for agriculture in the territory of Montenegro is 334 thousand ha, while the initial layer of land use digitalization by LPIS (SIZEP) (2017) estimated it at 418.8 thousand ha. It should be taken into account that the initial layer of LPIS is based on an old orthophoto (2017), and the quality validation of LPIS has not been carried out.

"Historically, in this area (Zeta Nature Park, author's note) agricultural and forest land occupied much larger areas. In the entire area, there are a large number of toponyms that indicate the former

presence of forests (Kosovi lug (grove), Vukov Lug, Lješkopoljski lug, Zorski lug, etc.), which were cleared for agricultural purposes until the second half of the 20th century. They were converted partly into ploughland and orchards, partly into pastures and hayfields. In the last couple of decades, the volume of agricultural production has been declining. Agricultural land is abandoned and left to succession processes or converted to construction land. With the increase in the population in the municipalities of Danilovgrad and Podgorica, settlements and the accompanying infrastructure are also expanding. The construction of residential buildings and accompanying infrastructure often does not comply with urban planning guidelines and regulations, or they are not set at all, which has consequences for natural habitats, ecosystem services, environmental quality and aesthetic and landscape values... Therefore, the trend of using space for agricultural and forest land is negative, and for settlements and other forms of use it is positive." https://www.auzp.me/wp-content/uploads/2021/09/Socio-ekonomska-analiza-PP-Rijeka-Zeta.pdf - page 27

d) Open mountain ecosystems and pastures

They represent sparsely populated or only seasonally populated areas. These areas are generally characterized by a trend of depopulation in Montenegro. Additionally, as a result of the abandonment of such traditional forms of farming and animal husbandry, pastures become overgrown.

Spatial planning documents of the municipalities for these areas foresee mainly the development of rural, ecological, ethnic, excursion, health, sports-recreational and "active vacation" tourism.

e) Sea and coastal area with low hinterland

For the ecosystem complex of the lower basin of the Bojana river and Ulcinj, in the document https://envpro.me/docs/LBBUEC%20studija%20-%20MNE-compressed.pdf, the environmental stresses recognized in that area are analysed in detail.

Comment: Data on trends and their causes are not described for all ecosystems. For more consolidated information on land cover change and land conversion, *Land Corine* data should be analysed and compared for the years 2006 and 2018. In addition, in order to unify the data in GIS, create a map of the distribution of the most important ecosystems in the new basin.

14.1.3. What types of protection regimes (including customs and traditions) exist for core and buffer areas? DESCRIBED IN MORE DETAIL IN THE LAND USE SECTION

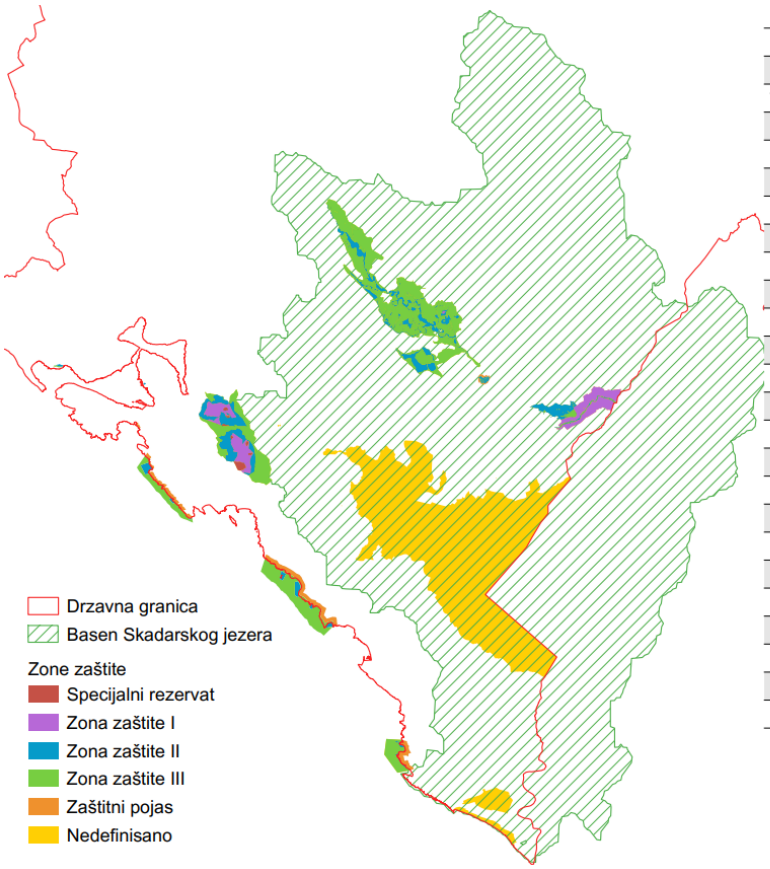
The basis for the protection of these ecosystems is contained in the Law on National Parks ("Official Gazette of Montenegro", No. 39/16), the Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16, 18/19), the Law on Forests ("Official Gazette of Montenegro", no. 74/10, 40/11, 47/15), as well as other sectoral laws.

Protection regimes, including core zones and buffer zones, are defined for those ecosystems located within the borders of protected areas (such as Skadar Lake National Park (IUCN cat. II), Zeta Nature Park (IUCN cat. V), Ulcinj Salina Nature Park (IUCN cat. V), and the Cijevna River Canyon Nature Monument (IUCN cat. II)). The protection studies clearly prescribe the protection regime, the protection zones (Zone I, Zone II and Zone III) and the activities that can be carried out within them. The basis for this is contained in the Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16, 18/19), Article 31. It is described in detail in part 9 - Land use.

On the portal of nationally protected areas https://cloud.gdi.net/smartPortal/zppCG it is possible to gain insight into all protected areas within the biosphere reserve, as well as their borders and protection zones.

Protection regimes and measures are fully ensured for the areas of the Skadar Lake and Lovćen National Parks through the existence of Management Plans for these areas for the period 2021-2025, as well as the functional manager, the Public Enterprise for National Parks of Montenegro. However, the Skadar Lake NP area lacks defined and confirmed protection zones in accordance with the Law on Nature Protection ("Official Gazette of Montenegro", no. 54/16, 18/19). Specifically, the Special Purpose Spatial Plan for this area defined the zoning, but the plan was not adopted. The new zoning and borders of this protected area are defined by the revision of the Draft Study of the Skadar Lake NP, which is expected to be published this year.

As for other protected areas where there are no functional managers (known as paper parks), although there are defined protection zones, protection regimes for these ecosystems are not fully ensured in practice. Management plans for these areas are also lacking.



Ime	Kat. ZP	IUCN
Park prirode "Rijeka Zeta"	V	V
Velika plaža kod Ulcinja	III	III
Spomenik prirode "Kanjon Cijevne"	III	III
Pecina Globočica	III	III
Pecina Babatusa	III	III
Plaža Valdanos	III	III
Mala ulcinjska plaža	III	III
Park u dvorištu dječje bolnice na Cetinju		III
Park prirode "Ulcinjska solana"	II	V
Park 13 jul	III	III
Njegošev park na Cetinju	III	III
Rezervat Pančeva oka	Ia	Ia
Manastirska Tapija	Ia	Ia
Lipska pećina	III	III
Pecina Magara	III	III
Pecina Spilja kod Trnova Virpazar	III	III
Mrijestilište ukljeve na Skadarskom jezeru	Ia	Ia
Nacionalni park Lovćen	II	II
Nacionalni park Skadarsko jezero	II	II
Hrast medunac (Quercus pubescens)		III
Hrast medunac (Quercus pubescens)		III
Hrast prnar (Quercus coccifera)		III
Spomenik prirode "Park šuma Gorica"	V	V
Park prirode "Stari Ulcinj"	IV	IV

Map of protected areas within nature reserve with protection zones prepared for the needs of GAP analysis

Comment: Data availability, protection regimes and measures are fully ensured through the legal framework.

14.1.4. Which indicators or data are used to assess the effectiveness of the applied measures/strategies?

An integrated and comprehensive system for monitoring progress and efficiency in the management of protected areas has not yet been established for all core zones and buffer zones. The assessment of the success and efficiency of the management of protected areas can be monitored through the report on the implementation of the annual management program, which managers are obliged to submit to the relevant Ministry or relevant local bodies by March 1 of the current year for the previous year. This obligation is detailed in the Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16, 18/19), Article 58.

Comment: It is necessary to develop methodology and indicators for assessing success in order to ensure long-term control of habitat development, as well as effective control of nature protection measures.

Consulted documents and data sources:

Management Plan for Skadar Lake National park 2021-2025
Draft Study for Skadar Lake Nature Protection
Nature Protection Study for Cijevna River Canyon Nature Monument
Nature Protection Study for Zeta River Nature Park
Integrated resources management plan (IRMP) for the Buna / Bojana area
Natura 2000 Habitat Mapping of the Skadar Lake National Park in Montenegro
Local Environment Plan of Municipality of Danilovgrad 2021-2025
Local Action Plan for Biodiversity of Municipality of Danilovgrad 2020-2024
Draft Local Action Plan for Biodiversity of Municipality of Ulcinj
The Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity
Law on National Parks ("Official Gazette of Montenegro", No.39/16)
Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16, 18/19)
National Strategy on Sustainable Development until 2030

14.2.1 At the level of species and ecosystem diversity:

Identify major groups of species or species of particular interest for conservation objectives, especially those endemic to the area of the future biosphere reserve, and provide a brief description of the communities in which they occur.

Comprehensive consolidated information on the biodiversity value of the greater part of the proposed scope of the future biosphere reserve is given in the document Transboundary diagnostic analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin. Certainly, the key species within the area have not been identified either by this or other individual documents (Skadar Lake National Park Management Plan 2021-2025, Lovćen National Park Management Plan 2021-2025, Skadar Lake Protection Study Draft, Protection Study for Cijevna River Canyon Natural Monument, Protection Study for Zeta River Nature Park, Natura 2000 Habitat Mapping of the Skadar Lake National Park in Montenegro, Integrated resources management plan (IRMP) for the Buna / Bojana area, Rapid assessment of the ecological value of the Bojana-Buna delta (Albania / Montenegro), Local action plan for biodiversity of the Capital City of Podgorica, Protection Study for Ulcinj Salina Nature Park).

In the document Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin [13], the following data are given for the area's biodiversity, which may be of importance for further consideration of key species:

Flora

[13] Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP-Med, 2019

In the Skadar Lake region, 1,396 taxa (1,299 species and 97 subspecies) and 7 hybrids, from 131 families and 588 genera, were recorded (Hadžiablahović, 2018). Such species diversity can be attributed to the diversity of habitats within the area, including both aquatic and terrestrial habitats such as:

- Open waters, where the dominant plant elements are algae (mainly *Chara spp, Nitella spp*) and submerged macrophytes, which form associations. *Najadetum marina, Potameto-Najadetum, Potametum perfoliati and Potametum lucentis* are dominant.
- Wetlands - areas of shallow water along northern shores and bays. They are dominated by submerged, floating and emergent macrophytes. Dominant species include coontail (*Ceratophylum demersum*), water chestnut (*Trapa natans*), white water lily (*Nymphaea alba*), yellow water lily (*Nuphar luteum*) and common club-rush (*Scripus lacustris*).
- Floodplains with meadows and forests of willow (*Salix alba, S. cinerea*) and poplar (Populus deltoides). There are forest fragments of endemic Skadar oak (*Quercus robur ssp. scutariensis*) together with ash (*Fraxinus angustifolia*) and silkvine (*Periploca graeca*).
- Terrestrial habitats along the southern coasts are dominated by garigue vegetation and degraded forests, mostly composed of combinations of hornbeam with oak and other species (*Carpinetosum orientalis punicetosum, Phillyreo carpinetum orientalis troiana, Phillyreo carpinetum orientalis punicetosum and Phillyreo carpinetosum orientalis*) (Public Enterprise for National Parks of Montenegro, 2016).

Magnoliophytes are the most represented group in the Skadar Lake region with 75.1% (1049 taxa from 96 families), followed by liliopsida with 22.8% (318 taxa from 23 families), while 82 species and subspecies of the Skadar Lake region are considered endemic and/ or subendemic for the Balkans (Hadžiablahović, 2018). Some of the endemic species are protected at the national and international level. In addition, 45 plant species are protected by national legislation, twenty-five plant species are listed in Appendix II of the CITES Convention, while nine species are listed in Appendix II, IV and V of the Habitats Directive (Hadžiablahović, 2018).

The Skadar Lake area and its immediate surroundings have been declared an Important Plant Area (IPA) due to the presence of some important and endangered plant species, including: liverworts (*Mannia triandra*), cymbalaria (*Cymbalaria ebelii*), marsh gladiolus (*Gladiolus palustris*), several species of orchids (*Himantoglossum caprinum, Ophrys oestriphera*), water clover (*Marsilea quadrifolia*), sandwort (*Minuartia velenovsky*), nodding waternymph (*Najas flexilis*), and water chestnut (*Trapa natans*).

The IPA areas that are located in the vicinity of the Skadar lake and fall within the scope of the proposed biosphere reserve also include:

Kakaricka Gora, which is located on the territory of Podgorica, covering an area of 2.5 km^2. It is a mosaic of rocky habitats and fragmented natural forests. Typical plant species include sage (*Salvia officinalis*), winter savory (*Satureja montana*), Macedonian oak (*Quercus trojana*), hornbeam (*Carpinus orientalis*),

green olive tree (*Phillyrea media*), juniper (*Juniperus oxycedrus*), and golden feather grass (Stipa pulcherimai). Endemic species include buckhtorn (*Rhamnus orbicularis*), vincetoxicum (*Vincetoxicum huteri*), shrub (*Genistas ericea*), *Astragalus illyricus*, and violet (Crocus dalmaticus). There is also a population of the endemic subspecies *Romulea linaresii subsp. gracea*.

Rumija Mountain is located between Skadar Lake and the Adriatic Sea. It includes different habitats: dry meadows, beech, oak, hornbeam and chestnut forests, limestone slopes with stone vegetation habitats, caves, etc. Approximately 800 plant taxa have been identified on its slopes. The most important among them are the endemic rock-bell (*Edraianthus wettsteini*) and woodruff (*Asperula baldaccii*). This is also the place where the largest part of the population of the endemic Ramonda (Ramonda serbica) in Montenegro is found. It is also the southern habitat of the endemic Bosnian pine (Pinus heldreichii).

Vrsuta is a mountain that belongs to the massif on the southern edges of the Drin basin in Montenegro. It is a floristically rich area - about 500 species of vascular plants have been recorded, 57 of which are endemic. The most important are *Gymnospermium scipetarum* - endemic to Montenegro and Albania, and was recorded only in this locality; tulip (*Tulipa grisebachiana*) - also endemic to Montenegro and Albania and the only species of its genus in Montenegro. On Vrsuta, the population of this species is the most numerous. Other important species include rock-bell (*Edraianthus wettsteini*), *Cachrys ferulacea*, thistle (*Centaurea incompta*), Knapp's carnation (*Dianthus knappii*), orchid (*Himantoglossum caprinum*) and wild daffodil (*Narcissus angustifolius*) (Important areas for plants in Montenegro - Program IPA).

The valley of the Zeta River is surrounded by rugged mountains in the central part of Montenegro with altitudes from 50 to 1,500 meters. In this area there are various habitats - riverine, lowland grasslands, forests and mountains.

Outside the Zeta valley and the Nikšić field, the area is covered by Mediterranean mixed oak forests that have appeared since the abandonment of grazing after the Second World War.

The Morača river is the longest river in Montenegro, and the altitude in its basin varies between 20 and 2,100 meters. In the upper part of the basin, the river drains water from the mountains of central Montenegro, breaking through a deep canyon. This area is characterized by forests, grasslands and rocky habitats. After the mouth of the Zeta, the Morača becomes a lowland river that flows through plain areas.

In terms of importance to flora, there are two sites of particular diversity within this area designated as Important Plant Areas (IPAs):

Mrtvica river canyon - Mrtvica is one of the tributaries of Morača river. Dominant vegetation includes beech forests, oak-hornbeam forests, hard water springs and rocky habitats. The river breaks through a canyon that reaches a depth of 1,600 meters. This river canyon is important because it has a great diversity of mosses - it contains 122 species of mosses, which makes up a fifth of Montenegrin mosses.

Babji zub - is located in the northern part of the eco-region, on the border with the central mountains, where the Morača River originates. It is a mountainous landscape with grasslands, forests of beech, oak and hornbeam, black pine (*Pinus nigra*), Bosnian pine (*Pinus heldreichii*), caves and rocky slopes with cosmophytic vegetation. More than 700 taxa of vascular plants have been discovered on Babje Zub, with a high level of endemism - 84 Balkan endemics have been registered here. It is the habitat of a significant population of the endemic species *Daphne malyana*. Other important plant species present here include: thistle (*Centaurea incompta*), cephalaria (*Cephalaria pastricensis*), *Daphne malayana*, spurge (*Euphorbia montenegrina*), checkered lily (*Fritillaria montana*), great yellow gentian (*Gentiana levicalyx, Gentiana lutea*), valerian (*Valeriana pancicii*), violet (*Viola orphandris*), Bulgarian avens (*Geum bulgaricum*), etc. (Important areas for plants in Montenegro - IPA program).

The most important places in the coastal region of the proposed area are Šas Lake, the Ulcinj Salt Pan and Long beach with Ada Bojan in Ulcinj. These areas have been floristically explored to a certain extent.

Šas Lake is part of the Buna/Bojana river system, with which it is connected via a channel through which water flows during water level fluctuations. The diversity of habitats in this area enables the presence of plant species with different ecological requirements (hydrophytic, mesophytic, xerophytic, etc.) and thus provides a large plant diversity. The vegetation of this area consists of underwater, floating and emergent plants within the lake and heterogeneous communities in the surroundings (flooded meadows, bushes, forest fragments). It is estimated that 450 plant species live in the area of this lake. These include 17 Balkan endemics, 14 CITES-listed species and two Habitats Directive species - snowdrop (*Galanthus nivalis*) and butcher's-broom (*Ruscus aculeatus*), both of which are abundant there. Water pennyworts (*Hydrocotyle vulgaris*) and frog-bit (*Hydrocharis morus ranae*), two species with IUCN status (endangered and vulnerable, respectively), are also found in the lake, as well as some orchid species in the surrounding area (*Orchis palustris, Orchis laxiflora, Serapias vomeracea*). (Caković et al., 2016).

The Ulcinj salt pan is an artificial ecosystem, which favored the settlement of special species due to its specific ecological conditions. The salt pans themselves are characterized by a high level of salinity and are inhabited by halophyte species, primarily *salicornia herbacea* and *sueda maritima*. Different salinity levels caused by the flood regime, elevation along the embankment, and distance from the solar pools allow for the presence of other halophytic and non-halophytic species. So far, 114 plant species have been recorded in this area (Environmental Protection Agency of Montenegro, 2015).

Long beach, with its 12 km, is the longest sandy beach on the Adriatic Sea. It forms a complex with the Buna/Bojana River since it is directly connected to its mouth and depends on it. It is a diverse coastal ecosystem, with habitats varying from the coastal zone, the beach itself, sand dunes in the immediate hinterland, depressions with acidic and freshwater habitats, and fragments of oak forests. The sand dune system is the only such habitat in Montenegro. It is a habitat for psammophytic vegetation and the last refuge for such species in Montenegro, for example beach morning (*Calystegia soldanela*) and sea daffodil (*Pancratium maritimum*). Ada Bojana is a river island at the mouth of the Buna/Bojana

river, which forms the delta of this river. It is covered with alluvial forests. Due to the diversity of species and the presence of specific and rare habitats, Long beach and Ada have the status of Important Area for Plants (IPA) of Montenegro.

According to the works of Bulić (1994, 1993 (1998)), 813 species of vascular flora were found in the canyon of the Cijevna river, and the most represented families are *Asteracea* with 78 (9.59%) taxa and *Fabaceae* with 69 taxa (8.48% of the total flora of Cijevna). The families that follow are: *Lamiaceae (62) Poaceae (61), Brassicaceae (43), Caryophyllaceae (42), Apiaceae (31), Liliaceae (28), Rosaceae (27), Ranunculaceae (26), Scrophulariaceae (25), Orchidaceae (23) Boraginaceae (19), Euphorbiaceae (15), Rubiaceae (13), Campanulaceae (12), Crassulaceae (11), Cyperaceae (10), Polygonaceae (10), Gerraniaceae (9), Chenopodiaceae (9), Iridaceae (9), Dipsacaceae (7), Fagaceae (7), Oleacae (7), Solanaceae (7), Cistaceae (7)* etc. The most represented genera in the flora of the Cijevna canyon are: *Trifolium (17), Euphorbia (12), Ranunculus (11), Campanula (9), Orchis (9), Lathyrus (8), Geranium (8), Potentilla (7), Medicago (7), Veronica (7), Silene (6), Dianthus (6), Sedum (6), Stachys (6), Carex (6), Minuartia (6), Quercus (6), Chenopodium (6), Vicia (6), Thymus (6), Salvia (5), Galium (5), Bromus (5), Cardamine (5), Centaurea (5), Hieracium (4), Cerastium (4)* and so on.

Endemic plant species of the Cijevna Canyon: In the area of the river canyon, the following endemic species of the Balkan Peninsula were found: *Achillea abrotanoides (Vis.) Vis., Asperula scutellaris Vis., Astragalus illyricus Bernh., Athamanta turbith (L.) Brot. subsp. haynaldii Borbás & Uechtr., Bupleurum karglii Vis., Centaurea nikolai Bald., Chaerophyillum coloratum L., Cirsium candelabrum Griseb., Crocus dalmaticus Vis., Crocus tommasinianus Herb., Crocus weldenii Hoppe & Fumr. f. lutescens Pulević, Danthoniastrum compactum (Boiss. & Heldr.) Holub, Dianthus nikolai Beck & Szyszyłowicz, Edraianthus tenuifolius (Waldst. & Kit.) A.DC. & DC, Euphorbia glabriflora Vis., Euphorbia capitulata Reich., Fritillaria messanensis Rafin. subsp. gracilis (Ebel) Rix, Genista sericea Wulf. & Jacq., Genista sylvestris Scop. subsp. dalmatica (Bartl.) Lindb., Geranium dalmaticum (Beck) Rech., Helleborus multifidus Vis., Hieracium waldsteinii Tans. subsp. plumulosum Kerner, Hyacinthella dalmatica (Baker) Chouard, Iris reichenbachii Heuff., Moltkia petraea (Tratt.) Griseb., Micromeria longipedunculata Bräuchler, Petteria ramentacea (Sieber) Presl, Pinguicula hirtiflora Ten., Portenschlagiella ramosissima (Porten) Tutin, Ramonda serbica Pančić, Rhamnus intemedius Steud. & Hochst., Rhamnus orbiculatus Bornm., Seseli globiferum Vis., Satureja subspicata Bartl. ex Vis., Stachys menthifolia Vis., Staehelina uniflosculosa Sibth. & Sm., Tanacetum cinerariifolium(Trev.) Schultz Bip., Teucrium ardunii L., Tulipa grisebachiana Pant., Vincetoxicum huteri Vis. & Ascherson, Viola orphanidis Boiss. subsp. nicolai (Pant.) Val.*

As particularly significant elements of the flora of the canyon of the Cijevna river, relict plant species stand out, of which the presence of the following taxa is particularly noteworthy: *Pinus heldreichii* – Bosnian pine, *Quercus trojana* - Macedonian oak, *Moltkea patraia* - Balkan borage, *Ramonda serbica* - Serbian ramonda, *Edraianthus tenuifoli, Edraianthus ginzbergeri* – grassy bell, *Iris illyrica* - Illyrian iris, *Campanula pyramidalis* - chimney bellflower, *Rhamnus orbiculata* - buckthorns. The area in question is characterized by the presence of plant communities, which as a whole represent relicts or endemorelicts and are described in a separate chapter of the Protection Study.

Fauna

Skadar Lake is an important habitat for aquatic invertebrates. Bearing in mind their important ecological role, a comprehensive survey was prepared, including the latest findings on all groups of invertebrates. So far, a total of 1011 species of invertebrates have been registered from the following groups: zoobenthos (Pešić et al., 2018), zooplankton (Shumka et al., 2018) and parasites (Radujković and Šundić, 2018).

According to Pešić et al. (2018), 555 species from 22 zoobenthic groups have been registered so far: C*nidaria, Porifera, Turbellarians* and *Temnocephalans (Platyhelminthes), Nemerteans (Nemertea), Gastrotricha, Horsehair Worms: Gordioidea (Nematomorpha),* Freshwater bryozoan *(Bryozoa),* Freshwater snails and shells (*Mollusca: Gastropoda and Bivalvia*), Earthworms (*Oligochaeta*), Leeches *(Hirudinea*) and freshwater leech-like clitellates *(Branchiobdellida*), Spiders, ticks and mites (*Chelicerata: Aranea i Acari*), Crustacea (*Copepoda, Cladocera, Ostracoda*), Malacostraca (*Decapoda, Mysida, Amphipoda, Isopoda*), Mayfly (*Ephemeroptera*), Dragonflies (*Odonata*), Beetles (*Coleoptera*), Heteroptera (*Hemiptera*), Fly (*Diptera*), *Megaloptera*, Stoneflies (Plecoptera), Caddisflies (Trichoptera), winged insects (*Lepidoptera*) on this area. The zoobenthic communities of Skadar Lake show different patterns in the extent and composition of communities in the open zones of the lake, as well as on the coast. The highest level of diversity of zoobenthic communities was found in the coastal environment. Oligochaetes and chironomids dominate in relation to other groups (Karaman and Nedić, 1981; Šundić, 2007). Snails predominate in springs (Pešić and Glöer, 2018). Benthic organisms inhabit different types of substrate. Mayflies and caddisflies dominate the benthic communities of small streams and tributaries of Skadar Lake, while the abundance of Hirudine and scorpions is greater on rocky substrates. In addition, tributaries that are enriched with organic compounds are inhabited by oligochaeta, snails and taxa that feed by filtration (Pešić et al., 2018). In the Skadar Lake region, there are 18 endemic species of snails and 15 in the malakofauna. Among the oligochaeta populations, three endemic species are present in the region (Pešić et al., 2018), two of which are on the list of nationally protected species. Four species of stoneflies and three species of mites are also endemic.

The species with the largest recorded populations are the zebra mussel (*Dreissena polymorpha*), swan mussel (*Anodonta cyanea*), and the freshwater snails (*Viviparus viviparus and Lymnaea fragilis*). Endemic species found here include malacofauna species: *Laurogamarus scutariensis, Diamysis lacustris, Sphaeromides virei montenegrina, Niphargus asper, Niphargus sketi, Niphargus inclinatus, Niphargus vulgaris, Niphargus podgoricensis, Niphargus vranjinae, Niphargus zorae, Niphargus kusceri, Laurogammarus scutarensis, Bogidiella montenegrina, Gammarus roeselii, Asellus aquaticus* and 18 species of snails, several of which are recorded and described here for the first time (*Gyraulus meierbrooki, Bithynia zeta, Bithynia skadarskii, and Valvata montenegrina*). The endangered species of depressed river mussel (*Pseudanadonta complanata*) is also found here. Aquatic insects are mainly represented by species from the orders *Trichoptera* (caddisflies), *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies) and *Diptera* (fly) (Skadar Lake National Park Management Plan 2016–2020).

Although complete inventories and studies of the ecology of all these groups are still lacking, some of the benthic groups have been well researched in terms of their scope, seasonal changes, potential as bioindicators (indicators of eutrophic level, saprobic level, assessment of water and sediment quality) (Šundić, 2007 ; Šundić and Radujković, 2012; Šundić et al., 2017).

The three most common and numerous groups of freshwater zooplankton in the Skadar Lake region are Copepods, Cladocera and Rotifers. Rotifers dominate the number of species, numbering 205, followed by Cladocera with 54 species, protozoa with 44, and copepods with 29 species (Dhora, 2016; Shumka et al., 2018).

The total number of parasitic invertebrates in the Skadar Lake region is 123 species. These species parasitize 28 species of vertebrates (10,522 individuals) from Skadar Lake (18 fish, 3 amphibians, 2 reptiles and 5 bird species). Eight new parasite species from the genera *Dactylogyrus and Gyrodactylus* have been described in this region, such as: *Dactylogyrus ivanovici, Dactylogyrus martinovici, Dactylogyrus petkovici, Dactylogyrus rosickyi and Dactylogyrus sekulovici* (host: *Pachychilon pictum*), *Dactylogyrus erhardovae* (host: *Rutilus prespensis*), *Dactylogyrus rysavyi* (host: *Alburnoides ohridanus*), and *Gyrodactylus stankovici* (host: *Cyprinus carpio*). The host fish, *Anguilla anguilla*, carry the largest number of parasites (Radujković and Šundić, 2018).

Regarding fish, the Skadar Lake region has a rich diversity of species due to several factors - the lake is old and large, has heterogeneous micro-conditions (shallow, warm wetlands, as well as deep and cold water, river tributaries, etc.), and is connected to the sea by the Bojana river. Due to such factors, the fish composition of the lake is a unique combination of species typical of cold and warm freshwater, as well as marine species. The total number of species recorded so far is about 50 (literature sources vary from 45 to 50). Of those, 37 species are autochthonous. There are seven species that are endemic and currently present in this region: trout species (*Salmo zetensis*), Zeta stone loach (*Barbatula zetensis*), Skadar gudgeon (*Gobio skadarensis*), freshwater goby (*Knipowitschia montenegrina* and *Ninnigobius montenegrensis*), and chub (*Rutilus albus*) (Mrdak et al.,2014). In addition, the species *Chondrostoma scodrensis* (common nase) was endemic in the earlier period, but is now extinct (Marić, 2018). The greatest diversity was recorded within the family *Cyprinidae* with 24 species, then *Mugillidae* with 5, and *Gobiidae* with 4 species.

Skadar Lake is considered one of the last natural freshwater habitats that preserves the connection between the sea and mountain rivers, which is crucial for the migration of fish species. Migratory species include twaite shad (*Alosa fallax*) and eel (*Anguilla anguilla*). Historically, two species - *Acipenser naccarii and Acipenser sturio* were present in the lake, with the last records of *A. naccariiu* in the early 1990s. Both species are currently considered extinct in the area.

The number of fish species in the lake system has increased in the last 40 years due to the uncontrolled introduction of non-native fish species, which were originally introduced from the Black Sea, mainly for fishing purposes. So far, 13 introduced species have been identified, including silver carp

(*Hypophthalmichthys molitrix*), Prussian carp (*Carassius gibelio*), common perch (*Perca fluviatilis*) and others (Mrdak 2009, Marić and Milošević 2011).

Fish are commercially exploited in the lake; the most important commercial species include carp (*Cyprinus carpio*) and bleak *(Alburnus sp*), which together account for 70% of the total catch. The rest of the catch consists of Prussian carp (*Carassius gibelio*), twaite shad (*Alosa fallax*), eel (*Anguilla anguilla*), common nase (*Chondrostoma nasus*) and others (Mrdak 2009).

In this region, about 15 species of amphibians have been recorded. These include frogs of the genus *Rana*, such as *Rana dalmatina, Rana graeca*, *Rana temporaria*), and (*Pelophylax ridibundus*), (*Pelophylax kurtmuelleri*) (*Pelophylax shqipericus*), frogs, such as (*Bombina variegata and Bufo bufo* and the green toad (*Bufotes viridis*), fish lizards, such as the alpine newt (*Ichthyosaura alpestris*) and the crested newt (*Triturus carnifex*), and snakes, such as amphibians (*Salamandra salamandra*) (Pulević et al., 2001; Crnobrnja-Isailović et al. 2018). The Skadar frog, crested newt, the common and green toad and the lizard (*Hyla arborea*) are endangered and of special conservation interest. Only one amphibian species (*P. shqipericus*) in the Skadar Lake region is designated as globally threatened and categorized as endangered (EN).

A total of 36 species of reptiles were recorded in the Skadar Lake region, 13 of which are included in the annexes of the EU Habitat Directive. There are several representatives of aquatic reptiles such as the European pond turtle (*Emys orbicularis*), the Balkan terrapin (*Mauremys rivulata*), and *Natrix natrix* and *Natrix tessellata*, but most of the reptiles are found along the southern shores of the lake, especially on the islands, where high levels of polymorphism have been recorded. Species include turtles, snakes (genera *Vipera, Typhlops and Colubridae*) and lizards (families *Lacertidae, Ophidia*). Other important species in this region include Mediterranean endemics, such as *Hemydactylus turcicus, Podarcis melisellensis, Lacerta sicula, Algyroides nigropuctatus, Ophysaurus apodus, Elaphe situla, Elaphe quatuorilineata, Telescopus fallax, Vipera ammodytes*, and Adriatic endemics, such as *Lacerta oxycephala* (Pulević et al., 2001, Skadar Lake National Park Management Plan 2016–2020).

Two species of reptiles (*Vipera ursinii and Dinarolacerta mosorensis*), both categorized as vulnerable (VU), are considered globally threatened according to the IUCN criteria. The other two species, *Testudo hermanni and Vip ursinii*, are on CITES annexes, several species are on HD, II/IV annexes, while 23 species are nationally protected ("Official Gazette of Montenegro", no. 76/06: Crnobrnja-Isailović et al., 2018). In the herpetofauna of the lake region, 4 species are endemic: *Triturus macedonicus, Pelophylax kurtmuelleri, Pelophylax shqipericus and Rana graeca* (Crnobrnja-Isailović et al. 2018).

So far, 281 species of birds have been recorded there, which is about 55% of the total number of European bird species (Pulević et al., 2001). Most of these species are migratory, some of them nest in the area, while others only spend the winter. A total of 46 autochthonous species are waterfowl (16.3% of the total number of species). Nesters include the endangered Dalmatian pelican (*Pelecanus crispus*) and pygmy cormorant (*Phalacrocorax pygmeaus*), but also other important species such as the great crested grebe (*Podiceps cristatus*), the little grebe (*Tachybaptus ruficollis*), the great

cormorant (*Phalacrocorax carbo*), the gray heron (*Ardea cinerea*), the little egret (*Egretta garzetta*), the squacco heron (*Ardeola ralloides*), the Eurasian bittern (*Botaurus stellaris*), the black-crowned night heron (*Nycticorax nycticorax*), the Eurasian coot (*Fulica atra*), the whiskered tern (*Chlidonias hybrida*) and the yellow-legged gull (*Larus michahellis*). Skadar Lake is an important wintering place for coots, great grebes, black-legged grebes (*Podiceps nigricollis*), swamp chicken (*Gallinula chloropus*), water rail (*Rallus aquaticus*), seagulls (*L. ridibundus*), several species of ducks, such as mallards (*Anas plathyrynchos*) , common teal (*A. crecca*); Northern pintail (*A. acuta*), widgeon (*A. penelopa*), tufted duck (*Aythya fuligula*), pochard (*A. ferina*), ferruginous duck (*A. nyroca*) and others. Due to the presence of these species and many migratory flocks, the lake has the status of an Important Bird Area (Pulević et al., 2001; Keukelaar et al., 2006, Important Bird Areas of Montenegro), as well as a Ramsar wetland of international importance.

A total of 57 species of mammals have been recorded in the lake area, and most of them can be found in the Annexes of the Habitats Directive and the lists of the relevant conventions. The list of mammals includes one aquatic species - the otter (*Lutra lutra*). Most of the other species are small mammals - rodents and insectivores, such as different types of mice (fat dormouse (*Glis glis*), garden dormouse (*Eliomys quercinus*)), shrews (lesser white-toothed shrew (*Crocidura suaveolens*), bicolored shrew (*Crocidura leucodon*), common shrew (*Sorex araneus*), the Eurasian pygmy shrew (*Sorex minutus*), and the Etruscan shrew (*Suncus etruscus*)). Carnivores are represented by the wolf (*Canis lupus*), the red fox (*Vulpes vulpes*) and the marten (*Martes foina, Martes martes*). Skadar Lake is an important habitat for bat species (*Chiroptera*), with more than 20 recorded species, all nationally and internationally protected (Pulević et al., 2001, Skadar Lake National Park Management Plan 2016–2020).

The area of the Morača river canyon is not a widely researched area in terms of biodiversity, with fish and birds being the most researched taxa in this region. The presence and distribution of species within these two groups are affected by the differences in environmental conditions along the course of the river as it passes through the mountainous regions of the central part of Montenegro, through the narrow canyon of Platije, to the lowland areas from Podgorica to Skadar Lake.

As for fish, recent research has identified 28 species, 23 of which are indigenous. The most abundant species are berbel (Barbus sp), *Phoxinus lumaireul* and *Telestes montenigrinus*. Salmonids are present, but have a more limited presence in the upper courses. The rarest salmonids are *Salmo marmoratus* and *Salmo obtusirostris*; the latter has an endangered status, together with Skadar gudgeon (*Gobio skadarensis*) and eel (*Anguilla anguilla*). Two new species of gobies - endemic to the Morača River - were found here - *Knipowitschia montenegrina* and *Pomatoschistus montenigrensis* (Šanda et al., 2009).

As for earthworms (*oligochaeta*), a total of 31 species from 4 families were recorded in the region of the Morača River: (*Aulodrilus pigueti, Chaetogaster diaphanous, Dero obtusa, Eiseniella tetraedra, Embolocephalus velutinus, Enchytraeus buchholzi, Ilyodrilus templetoni, Isochaetides michaelseni, Limnodrilus hoffmeisteri, L. profundicola, Mesenchytraeus armatus, Nais behningi, N. barbata, N. bretscheri, N. communis, N. elinguis, N. pardalis, N. simplex, N. variabilis, Potamothrix hammoniensis,*

Pristina bilobata, Pristina menoni, Pristina osborni, Psammoryctides albicola, Rhyacodrilus coccineus, Rhynchelmis limosella, Slavina appendiculata, Stylodrilus heringianus, Stylodrilus lemani, Stylodrilus parvus i Tatriella slovenica) (Šundić and Radujković, 2012).

The species of water mites found in this region are: *Lebertia longiseta, Oxus strigatus, and Unionicola aculeata* found in the lower courses of the Morača River (Pešić et al. 2018).

So far, 24 species of flies have been recorded in this region: *Ameletus inopinatus, Siphlonurus abraxas, Baetis alpinus, Baetis fuscatus, Baetis lutheri, Baetis muticus, Baetis rhodani, Baetis vernus, Centroptilum luteolum, Ecdyonurus helveticus, Ecdyonurus venosus, Heptagenia longicauda, Epeorus assimilis, Epeorus yougoslavicus, Rhithrogena semicolorata, Habroleptoides confusa, Habrophlebia fusca, Paraleptophlebia submarginata, Ephemera danica, Potamanthus luteus, Ephemerella ignita, Serratella ikonomovi, Torleya major i Caenis macrura* (Pešić et al. 2018). Stoneflies are more numerous and represented with 49 species (Pešić et al. 2018), and midges with 48 species (Marinković-Gospodnetić, 1981; Pešić et al. 2018).

The bird fauna of this region includes 130 registered species. The upper streams, rich in forest cover and open spaces, are inhabited by birds associated with such types of habitats, such as: finch (*Fringila coelebs*), several species of tit (*Parus major, P. caeruleus, P. palustris*), common blackbird (*Turdus merula*), Eurasian nuthatch (*Sitta europea*), pigeons (*Columba oenas, C. palumbus*), Eurasian robin (*Erithacus rubecula*) and others.

The rocks of the canyon are inhabited by raptors such as the common kestrel (*Falco tinnunculus*), the golden eagle (*Aquila chrysaetos*), as well as songbirds (European red-rumped swallow *Hirundo daurica*, barn swallow *Hirundo rustica*, goldfinch Carduelis carduelis, etc.), European bee-eaters (*Merops apiaster*) and others. Species that inhabit aquatic habitats are found near the surface of the water and in the lower reaches, and include the ommon kingfisher (*Alcedo attis*, common whitethroat (*Sylvia communis*), cormorants (*Phalacrocorax pygmaeus and P. carbo*), little egret (*Egretta garzetta*), gray heron (*Ardea cinerea*) and others (Saveljić, 2009).

As for mammals, the following species can be found in this area: brown bear (*Ursus arctos*), wild boar (*Sus scrofa*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), European badger (*Meles meles*), wolf (*Canis lupus*) , red fox (*Vulpes vulpes*), martens (*Martes foina, Martes martes*) and other smaller species (rodents, insectivores, etc.) (Decision on establishing hunting areas and establishing special hunting areas, 2010; Hunting Development Program in Montenegro, 2014–2020).

The valley of the Zeta River has not been studied in detail in terms of fauna. It was researched in terms of birds; it was discovered that the artificial lakes (reservoirs) on the Nikšić plateau represent an important winter habitat or migration stop for a large number of birds, which is why they were given the status of Important Bird Areas. Wintering species include: *Anas platyrhynchos, Aythya fuligula, Aythya ferina, Podiceps nigricollis Podiceps cristatus Larus ridibundus,Fulica atra,Gavia stelatta i druge. Sledeće vrste mogu se naći u okolnim poplavnim ravnicama: Tringa totanus Charadrius dubius Actitis*

hypoleucos Gallinago gallinago Alauda arvensis, Lanius collurio, (Motacilla alba, M. cinerea,Erithacus rubecula). Near the forests there is a habitat for species like *Caprimulgus europaeus, Turdus philomelos, Sitta europaea, Accipiter nisus, Buteo buteo*, and others (Important areas for the birds of Montenegro). Rock partridge (*Alectoris graeca)* is also present in this region.

The Bojana River is a unique habitat that connects freshwater and marine environments, enabling the movement and migration of fish between ecosystems of regional importance. Althogether 13 species and subspecies of migratory fish pass through the Bojana River from Skadar Lake to the Adriatic Sea and vice versa: *Lampetra fluviatilis, Lampetra planeri, Petromyzon marinus, Acipenser sturio, Acipenser naccarii, Acipenser stellatus, Alosa fallax nilotica, Anguilla anguilla, Dicentrarchus labrax, Mugil cephalus, Lizaramada, Platichthys flesus luscus, and Citharus linguatula* (Dhora et al., 2001; Beqiraj and Dhora, 2001; Rakaj, 1996; and Schneider-Jacoby et al., 2005). Among them are sturgeons (*Acipenser naccarii and Acipenser sturio*), globally threatened species that are considered locally extinct. Another group with at least 30 species of freshwater fish inhabits Bojana. Almost all these species are also found in Skadar Lake. Almost 70% of river fish species belong to the *Cyprinidae* family. Among the most important are common carp (Cyprinus carpio), the most characteristic fish of the Skadar lake area, *Carassius auratus gibelio*, imported from Asia into the lake three decades ago, *Alburnus alburnus alborella*, *Scardinus erythrophthalmus scardafa, Leuciscus cephalus albus, and Perca fluviatilis*, which entered Bojana via Drina. *Pachychilon pictum* is particularly interesting as a locally endemic species. There are also fish species that entered Bojana via the Drin from Lakes of Ohrid and Prespa, although this migration has been stopped in the last 20 years due to the construction of dams along the Drin River. They are: *Barbus meridionalis petenyi, Alburnoides bipunctatus ohridanus, Chondrostoma nasus ohridanus, Rutilus rubilio rubilio, Rutilus prespensis vukovici, Gobitis taenia ohridana*, and so on.

Representatives of mammals include roe deer (*Capreolus capreolus*), brown bear (*Ursus arctos*), and hare (*Lepus europeus*) (Decision on Determining Hunting Areas and Establishing Special Hunting Areas, 2010).

A very high diversity in the oligochaeta community was observed in this region. Specifically, a total of 40 species from 5 families were recorded: (*Chaetogaster diaphanous, C. setosus, Dero digitata, D. obtusa, Nais barbata, N. behningi, N. bretscheri, N. communis, N. elinguis, N. pardalis, N. pseudobtusa, N. simplex, N. variabilis, Stylaria lacustris, Slavina appendiculata. Uncinais uncinata, Pristina bilobata, P. breviseta, P. jenkinae, P. aequiseta, P. longiseta, P. menoni, P. proboscidea, Embolocephalus velutinus, Ilyodrilus templetoni, Isochaetides michaelseni, Limnodrilus hoffmeisteri, L. udekemianus, Potamothrix hammoniensis, P. vejdovskyi, Psammoryctides albico)P. barbatus, Tubifex tubifex, Bothrioneurum vejdovskianum, Rhyacodrilus coccineus, Enchytraeus buchholzi, Stylodrilus heringianus, Tatriella slovenica, Criodrilus lacuum i Eiseniella tetraedra*) (Šundić and Radujković, 2012). On the Zeta River, the following water mites were found: *Feltria cornuta paucipora, Kongsbergia clypeata, Lethaxona pygmaea, Stygomomonia latipes, and Frontipodopsis reticulatifrons, Neumania imitata and Mundamela germanica* (Pešić, 2003; Pešić et al. 2010; Zawal and Pešić, 2018). The following nymphs

were found in the Zeta River: *Baetis lutheri, Baetis muticus, Baetis rhodani, Epeorus assimilis, Habrophlebia fusca, Ephemera zettana, Ephemerella ignita and Torleya major* (Pešić et al. 2018).

In the mouth of the Bojana river there are about 50 species of fish, the most common of which are *Lichia amia,* Atlantic bluefin tuna - *Thunnus thynnus, Argyrosomus regius, Engraulis encrasicholus, Aphanius fasciatus, Syngnathus tenuirostris, Sciaena umbra, Umbrina cirrosa, Diplodus sargus sargus, Lithognathus mormyrus, Symphodus cinereus, Gobius niger, Atherina hepsetus, and Solea vulgaris*. The main fish species that are caught in the delta and along the coast are mussels, eels, sea bass (*Morone labrax*), *Umbrina cirrosa, Boops boops*, and imperial scaldfish - *Arnaglosus imperialis*.

The list of amphibians of the Bojana River includes 11 species, but the actual number may be higher (Haxhiu I., 2003).

The document of Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, provides data on phytoplankton, zooplankton and benthos recorded in this area.

Detailed, additional information on important species and their conservation status can be found in the following documents:

- Skadar Lake National Park Management Plan 2021-2025[14] - 2.1. NATURAL CHARACTERISTICS, page 13, 2.1.5. Flora and vegetation, page 17, 2.1.6. Fauna, page 20
- Lovćen National Park Management Plan 2021-2025[15] – 2.1. Natural features, page 13. 2.1.5. Flora and vegetation, page 17, 2.1.6. Fauna, page 19
- Draft of the Skadar Lake Protection Study - BIOLOGICAL VALUES OF SKADAR LAKE NP, page 26, 8.1.1. Characteristics and wealth of flora in the Skadar lake area, page 27, 8.1.2. Balkan endemics and Balkan subendemics in the flora of the Skadar lake area, page 28, 8.1.3. Protected and rare species of flora of the Skadar lake area, page 32, 8.1.4. NATURA 2000 habitats in the area of the Skadar Lake National Park, page 38, 8.1.5. Distribution of significant and rare plant species in the Skadar Lake area, page 40, 8.2. VEGETATION, page 43, 8.2.1. History of botanical research with a focus on vegetation, page 44, 8.2.2. Vegetation characteristics of Skadar Lake, page 45, 8.2.3. Aquatic vegetation, page 49, 8.2.4. Vegetation in the vicinity of Skadar Lake, page 51, 8.3. ZOOPLANKTON, page 55, 8.4. FISH, page 58, 8.4.1. Economically important fish, page 62, 8.5. AMPHIBIANS AND REPTILES, page 63, 8.5.1. Fauna of reptiles, page 64, 8.5.2. Amphibian fauna, page 67, 70 8.6. BIRDS, page 74, 8.7. MAMMALS, page 78.
- Protection Study for Natural Monument of Cijevna River Canyon[16] - III. 4. Flora, page 39, III. 4.1. Flora and vegetation of the Cijevna canyon, page 40, III. 4.2. Endemism, page 40, III. 4.2.1. Endemic plant species of Cijevna canyon, page 41, III. 4.3. Plant species of Cijevna canyon protected by national and international legislation, page 42, III. 4.4. Relic plant species of Cijevna canyon, page

[14] Skadar Lake National Park Management Plan 2021-2025, 2022
[15] Lovćen National Park Management Plan 2021-2025, Montenegro NP, 2022
[16] Protection study of Natural Monument of Cijevna River Canyon, Environmental Protection Agency, 2017

44, III. 4.5. Vegetation of Cijevne canyon, page 44, III. 4.5.1. Syntaxonomic review of vegetation, page 47, III. 4.5.2. Characteristic plant communities, page 51, III. 4.5.3. Plant communities of special importance, page 66, III. 4.6. Mushrooms – Macrofungi, page 69, III. 5. Fauna, page 73, III. 5.1. Mammals, page 73, III. 5.2. Birds – Ornithofauna, page 76, III. 5.3. Amphibians and Reptiles – Herpetofauna, page 78, III. 5.3.1. Species protected by national legislation, page 79, III. 5.3.2. Spicies of international importance, page 80, III. 5.4. Ichthyology and benthic fauna, page 80, III. 5.5. Snails – Gastropoda, page 83, III. 5.5.1. Overview of registered species in Cijevna canyon, page 84, III. 5.5.2. Spicies of national and international importance page 85 III. 5.6. Insects – Entomofauna, page 86, III. 5.6.1. Beetles – Coleoptera, page 86, III. 5.6.2. Spicies of international and national importance, page 87, III. 5.6.3. Butterflies – Lepidoptera, page 88, III. 5.6.4. Species of international and national importance, page 89.

- Zeta River[17] - DIVERSITY OF PLANT SPECIES, page 20, MUSHROOMS, page 54, AQUATIC INVERTEBRATES, page 62, INSECTS, page 64, SNAILS AND SHELLS, page 93, FRESHWATER CRABS (DECAPODA ORDER) page 97, FISH page 99, AMPHIBIANS AND REPTILES page 103, BIRDS page 109, MAMMALS page 113.
- Integrated Resource Management Plan (IRMP) for the Buna/Bojana area[18] - NATURAL ENVIRONMENT AND RESOURCES page 90, 9.1 Diversity and protected areas page 90, 9.1.1. Biogeographic characteristics page 90, 9.1.2. Habitats page 91, 9.1.3. Species page 9.
- Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)[19] - Habitats of the Buna-Bojana delta page 21, Indicators of ecological importance page 49, Mammals page 49, Birds page 53, Fish page 53, Amphibians and reptiles page 54, Vegetation page 56
- Local Action Plan for Biodiversity of the Capital City of Podgorica[20] - BIOLOGICAL DIVERSITY page 16, 3.1. OVERVIEW OF THE GENERAL CONDITION page 16, 3.1.1. PLANT WORLD page 16, 3.1.2. FUNGI - MACROMYCETES page 45, 3.1.3. FISH page 76, 3.1.4. AMPHIBIANS (BATRACHOFAUNA) AND REPTILES (HERPETOFAUNA) page 78, 3.1.5. BIRDS page 84, 3.1.6. MAMMALS page 102, 3.2.2. RESULTS OF FIELD RESEARCH CONDUCTED DURING 2017 page 119-355
- Nature Protection Study for Ulcinj Salina Nature Park - Characteristics and values of biodiversity pages 36 to 89
- Lončarević N, Katnić A. & Šundić D. (2022). Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity. NGO Environmental Program - 4. Ecosystems, biodiversity objects and key ecological attributes - pages 38-61
- Vladimir Pešić, Momir Paunović, Andrey G. Kostianoy (2020) Rivers of Montenegro - Biodiversity and biogeographic characteristics of the river basins of Montenegro - pages 157-200

[17] Protection study for the Zeta River Nature Park, Environmental Protection Agency, 2019
[18] Dimitris F., Marković M., Shipman B (2015) Integrated Resource Management Plan (IRMP) for the Buna/Bojana area
[19] Sackl P., Schneider-Jacoby M., Schwarz U., Dhora D., Saveljic D., Stumberger B. (2006) "Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)"

[20] Local Action Plan for Biodiversity of the Capital City of Podgorica, Capital City of Podgorica, 2023

- Vladimir Pešić, Gordan Karaman, Andrey G. Kostianoy (2018) Environment of Skadar Lake - pages 153-445

Legal protection of species and habitats at the national level is prescribed by the Law on Nature Protection and the Decision on Placing Certain Plant and Animal Species under Protection, as well as by ratified international conventions such as the Berne Convention, CITES, CMS.

Conclusion: Comprehensive consolidated information on the value of biodiversity of the greater part of the proposed scope of the future biosphere reserve is given in the document Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin. Additionally, more detailed information for the Conservation Areas within the proposed Biosphere Reserve can be found in the individual documents listed above. However, in the individually listed sources, the key species for each area are not clearly identified, for which it is necessary to hire additional expertise. Information on species and habitats within the territories of the municipalities, which are covered by the proposed biosphere reserve area, can be found in the Biodiversity Action Plans of local governments, but it is not precisely clear where they are located geographically in relation to the proposed area. The recommendation would be that due to the large number of species important from the point of view of protection, expert consultations should be organized in the entire area in order to select the key species by expert consensus, which will then be presented in the nomination form, including their protection statuses.

Sources:

Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP, 2019
2021-2025 Management plan for Skadar Lake NP, Montenegro National Parks, 2022
2021-2025 Management Plan for Lovćen National Park, Montenegro National Parks, 2022
Draft Revision Study on Skadar Lake, Environmental Protection Agency, 2023
Protection Study for Natural Monument of Cijevna River Canyon, Environmental Protection Agency, 2017
Protection Study for Zeta River Nature Park, Environmental Protection Agency, 2019
Natura 2000 Habitat Mapping of the Skadar Lake National Park in Montenegro, GIZ, 2019
Sackl P., Schneider-Jacoby M., Schwarz U., Dhora D., Saveljić D., Stumberger B. (2006) - Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)
Dimitris F., Marković M., Shipman B (2015) Integrated resource management plan of Bojana Delta
Local Action Plan for Biodiversity of the Capital City of Podgorica, Capital City of Podgorica, 2023
Protection study for the Ulcinj Salina Nature Park, Municipality of Ulcinj, Ministry of Tourism, Ecology, Sustainable Development and Northern Development, 2017
Lončarević N, Katnić A. & Šundić D. (2022). Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity - NGO Environmental Program
Vladimir Pešić, Momir Paunović, Andrey G. Kostianoy (2020) Rivers of Montenegro - Biodiversity and biogeographic characteristics of the river basins of Montenegro - pages 157-200
Vladimir Pešić, Gordan Karaman, Andrey G. Kostianoy (2018) Environment of Skadar Lake

14.2.2 What are the pressures on key species? In other words, what are the threats (example: unsustainable forest management), their immediate causes (factors of change such as forest change or habitat change), their root causes (example: overgrazing, fires, pollution), and the main driving forces (example: economic, political, social, external, etc.) and the area(s) affected?

When it comes to the overall coverage of the proposed area of the future biosphere reserve in the document Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin[21], the following pressures and threats are identified:

Urbanization

One of the most dramatic processes taking place in this area is the change of land use in terms of urbanization. Between 2000 and 2012, artificial surfaces in the entire basin increased. This process is driven by the population investing in residential buildings and the migration of the population from rural to urban areas. Uncontrolled scattered urbanization without connection to sanitary infrastructure also has a direct impact on habitats and species that are sensitive to the eutrophication of aquatic ecosystems. Wetland habitats and associated plant species (such as *Carex elata* and *Nuphar lutea*) are most affected. Growing urbanization also increases pressure on rural resources (demand for food, timber and recreation) and on infrastructure development, such as energy production, roads and highways.

Construction of new hydropower plants

Due to the growing domestic and international demand for renewable energy, the construction or planning of hydropower plants on the rivers of the basin is current. The construction of hydropower plants represents the greatest negative pressure on aquatic biodiversity. Planned potential projects are concentrated on Morača River, or are already under construction, such as the one on the Cijevna River (in Albania). Since river canyons are the most suitable places for the construction of dams, their construction affects biodiversity to a large extent because they are usually the habitats of numerous rare (relict), endangered and/or endemic plant and animal species.

Fires

The impact of fires associated with the effects of climate change is a threat to the area's biodiversity. Such examples were the fires in the summer fire season of 2012 and 2017, which resulted in a large increase in barren land. Fires most often affect mixed grass-forest and secondary grass habitats on abandoned former pastures with increased accumulation of dry biomass. Due to the great continuity of such habitats (in the absence of meadows), fires are difficult to stop, so they spread to forests and threaten settlements.

[21] Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP-Med, 2019

Given the current trend of climate change, fires may be one of the key pressures on the basin's biodiversity in the future. So far, no effective firefighting strategy has been established.

Hunting

There is a strong tradition of hunting in the basin, but also rather poor self-regulation and enforcement of hunting legislation. The result is that populations of game species (including species of EU importance such as brown bear, wolf and lynx) are much lower than they could and should be, based on habitat potential. Hunting directly affects biodiversity through the direct taking of animals and indirectly through the reduction of natural prey for carnivores and vultures. The decrease in the availability of wild prey is further exacerbated by the decrease in livestock, which was also a food source for predators (especially the Balkan lynx and several species of eagles) and vultures. Hunting with traps and pitfalls results in regular cases of capture of brown bears, while the illegal use of poisoned baits leads to the disappearance of vultures and a drastic reduction in the population of Egyptian vultures and griffon vultures. In 2014, a two-year hunting ban came into force in Albania to protect wildlife that is declining due to uncontrolled and illegal hunting. The hunting ban was extended in 2016 (Law No. 61/2016 declaring a ban on hunting in the Republic of Albania) for the next five years (until 2021). Although some positive effects of the hunting ban have been observed in several wetlands and Skadar Lake, there is still evidence of illegal hunting across the country - in wetlands, mountain areas, and even within protected areas.

Harvesting Edible and Medicinal Plants

There is a strong tradition of harvesting wild plants, fruits, and mushrooms for both culinary and medicinal purposes. This practice serves as an important source of additional income for rural populations and is supported by a well-established procurement system that includes both domestic and international companies. However, the collection of wild plants poses a threat to certain highly valuable but slow-growing species, such as yellow gentian *(Gentiana lutea*). Additionally, in some regions, mushroom picking can lead to forest fires, as gatherers believe that the number of mushrooms increases after a fire occurs. To date, it has not been possible to implement an effective system for managing and controlling the harvesting of wild plants and mushrooms.

Unregulated Fishing

Commercial and recreational fishing have a long history on the various water bodies of the Drin River Basin. However, poor management practices, such as overfishing and the introduction of non-native species, combined with a lack of enforcement, have led to significant declines in fish populations. Since the 1990s, illegal fishing methods, including the use of explosives and electric currents, have been widely practiced, posing a serious threat to natural populations in rivers and streams. This situation has likely contributed to the local extinction of the sturgeon (*Accipiter accio*) in the Bojana River.

Water Pollution and Solid Waste

Increased urbanization and intensified agriculture have resulted in rising levels of municipal wastewater and agricultural pollution, including pesticides and eutrophication. They have also contributed to the growing accumulation of solid waste. At the same time, investments in and services for wastewater treatment and solid waste collection and disposal lag behind the pace of pollution growth. This has led to increasing pollution of rivers and groundwater, as well as widespread dispersion of solid waste. This waste accumulates in riverbeds, is carried downstream during high water levels, and eventually ends up in the sea, depositing on beaches.

Mineral Extraction

Rapid urbanization and infrastructure development are increasing the demand for stone and mineral resources. These materials are extracted from quarries or collected from riverbeds. The extraction of gravel from the Morača River is notably intensive, leading to significant changes in the entire riverine habitat.

Visitors

Urbanization and tourism development have led to an increase in the number of visitors to natural areas. These visitors engage in activities such as picnicking, harvesting medicinal plants, fishing, hunting, recreation (hiking, climbing, cycling, kayaking, etc.), or sightseeing. Regions focusing on tourism actively promote such visits and develop recreational infrastructure like visitor centers and hiking trails to provide an enjoyable experience. However, many protected areas currently lack visitor management plans and do not have sufficient capacity or resources to mitigate negative environmental and biodiversity impacts. The growing number of visitors can harm nature through littering, causing fires, and placing pressure on biodiversity through activities like species collection, illegal fishing, and hunting. This issue is particularly pronounced in coastal regions, where the rise of seaside tourism and the growing demand for nature-based tourism contribute to habitat destruction along the coast.

Based on the available data for Skadar Lake (in accordance with the Management Plan 2021–2025 for NP Skadar Lake)[22] the following conclusions can be drawn regarding specific areas within the proposed biosphere reserve:

- Anthropogenic, biological, and climatic pressures have endangered the diversity of flora through habitat devastation or occupation, particularly in the case of the lake's floodplain and wetland ecosystems and certain watercourses in the drainage basin.
- The overgrowth of wetland habitats poses a risk to the abundance and vitality of rare plant species, potentially leading to their extinction. Examples include *Caldesia parnassifolia* and *Marsilea quadrifolia*.
- The biological diversity of the river systems of Plavnica and Šegrtnica is threatened by the aggressive spread of the invasive macrophyte *Egeria densa*.

[22] The Management Plan for NP Skadar Lake 2021-2025, NP of Montenegro, 2022.

- Habitat degradation and the spread of the invasive species Amorpha fruticosa threaten potential Natura habitats in floodplain areas, such as: 92A0 *Salix alba* and *Populus alba* galleries; 3280 Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix and Populus alba*.
- Habitat degradation and illegal harvesting threaten identified Natura habitats: 5230: Arborescent matorral (*Laurus nobilis*); 5310: Laurel thickets (*Laurus nobilis*); 62A0: Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia villosae*).
- All identified forest Natura habitats are to varying degrees degraded, primarily due to uncontrolled logging in the past and, to a lesser extent, due to fires.

A clearer picture of the state of significant biological systems will emerge with the establishment and definition of the boundaries of Natura habitats, which will also help specify conservation measures for species and habitat diversity.

Currently, there is a lack of clear data regarding the intensity or quantity of wild flora harvested for commercial purposes within the park area. Illegal harvesting is known to be a problem in this national park, particularly concerning wormwood and other medicinal and aromatic plants, as well as wild pomegranate and cornelian cherry fruits. However, there is no data on the extent or specific locations where this occurs. In addition to commercial harvesting, residents and visitors to the park may individually collect smaller quantities of these species.

Forests within national parks are classified as special-purpose forests, representing unique natural values. They are considered public goods and are primarily designated for scientific research, education, leisure, and recreation. Moreover, these forests play a crucial role in addressing challenges related to climate change, increased fire risk, and other harmful impacts.

In national parks, integrated forest protection is implemented, consisting of a set of measures and actions aimed at detecting and preventing forest degradation, as well as mitigating and eliminating the consequences of damage that could threaten or completely destroy forest ecosystems. Management is exclusively carried out based on maintaining and improving the existing state, and no activities that could disrupt or endanger the natural processes of forest ecosystems are permitted. The primary activities conducted within the Park are based on the monitoring of species and habitats.

Adapting to and mitigating the impacts of climate change on forest ecosystems, improving their health, enhancing their ecological value, and contributing to social benefits are achieved through the implementation of various measures:

- Monitoring key forest species characteristic of this park, as well as species with significant biodiversity value, such as laurel forests on the islands of Skadar Lake and Skadar oak forests, remnants of former woodlands in the Gostiljska River area.
- Monitoring forest habitats, which is a critical task in managing forest ecosystems. Activities for the protection and maintenance of these important habitats should be undertaken according to the guidelines provided in the NATURA 2000 Habitat Catalogue defined for this park, in accordance with the recommendations of the managing authority.

- Maintaining and improving existing roads to ensure comprehensive forest protection.
- Utilizing privately-owned forests under a defined legal and spatial planning framework. Approving the use of privately owned forests based on the Private Forest Management Plan.

Forest fires are categorized as significant abiotic factors due to the extensive damage they cause. They pose a persistent threat, especially to the forest stands on the mainland portion of Skadar Lake, which are situated on poor and dry soils. Given the frequent occurrence of fires in and around the park, it is crucial to enhance rehabilitation efforts in areas that have suffered fire damage.
Global changes in climatic parameters have a particularly negative impact on forest ecosystems. Climate changes, including rising average annual air temperatures, frequent and unpredictable climatic extremes, short and intense rainy periods, render existing forest habitats less suitable for sustaining forest ecosystems. Moreover, climate change causes a "shift" in forest habitats along latitudinal and altitudinal gradients. The effects of climate change vary depending on the forest species. Some species can adapt over time and establish themselves in areas with more favorable climatic conditions during their reproductive cycles. However, other species are less capable of adaptation, and certain species may take longer to colonize these more suitable habitats.

The macrozoobenthos of the lake is characterized by a low density of insect larvae populations from the groups *Ephemeroptera, Trichoptera, Odonata, and Coleoptera*, as well as adult crustaceans (*Crustacea*). This suggests a tendency towards eutrophication and pollution from organic matter. The qualitative and quantitative structure of the lake's benthic fauna (zoobenthos) serves as an indicator of its ecological condition and the degree of pollution.

A low level of biodiversity, combined with a predominance of species from the groups *Oligochaeta (Tubificidae*) and *Diptera larvae (Chironomidae, Ceratopogonidae, and Tipulidae*) suggests poorer water quality. This is observed at the Plavnica site. In contrast, at the Starčevo and Virpazar sites, the presence of Ephemeroptera and Trichoptera larvae, along with adult crustaceans from the family Gammaridae, indicates clean water.

The fish of the lake inhabit a highly dynamic ecosystem characterized by high productivity, both among organisms at the base of the food chain and those at the top, such as birds and fish. The diversity of habitats, favorable ecological conditions, and high productivity have allowed the survival of 45 fish species, some of which exhibit very high population densities. This abundance not only supports a large number of birds that can spend part or all of their life cycles in the lake but also sustains the only commercial freshwater fishery in the country.

The exact level of threat to economically significant fish species remains unknown, but the overall situation appears stable. Due to a lack of funding, over the past 30 years, a comprehensive fisheries management plan (ribarska osnova) has yet to be developed. Such a plan would provide more precise data on the state of ichthyofauna, measures for the protection and conservation of fish stocks,

methods for implementing these measures, a restocking program, capacities for the construction of aquaculture facilities, and opportunities for sustainable exploitation. The new Law on Freshwater Fisheries and the Fisheries Management Plan have partially addressed the absence of a comprehensive fisheries management framework. They define protection zones and zones for commercial activities, as well as the procedures for issuing fishing licenses, recording and monitoring fishing gear, and regulating fish catches.

Fishing during prohibited periods, the use of illegal fishing methods, and the capture of undersized fish pose the greatest threats to the ichthyofauna of the lake. In recent years, a four-year ban on the catch of bleak and a complete fishing ban in the largest fishing zones have led to an increase in this species' population and an improvement in its population structure.

Carp, the most economically significant species, faces the highest pressures due to illegal fishing and the impact of invasive species such as perch and Prussian carp.

In Montenegro, measures for the protection of eels have yet to be introduced. Eels are a globally endangered migratory species whose numbers are declining worldwide. However, intensified global conservation efforts are expected to yield positive results in improving the species' global status. The common nase fish has partially recovered its population, and commercial fishing of this species is now permitted in the coming period.

Based on literature and field research, it has been established that 24 bird species have permanently disappeared from the Skadar Lake area. The reasons for the disappearance of certain species and the decline in bird populations are complex and result from the interplay of global, regional, and local impacts on nature and the environment. However, data also indicates an opposite trend: after years of absence, some species have been observed returning to the area. Nonetheless, their numbers have never reached the levels recorded in the past.

A combination of anthropogenic influences, such as the disturbance of bird fauna on the lake, is evident, along with occasional pressures from illegal hunting. Additionally, significant pressure comes from tourism activities as well as the actions of local fishermen and sport anglers. Therefore, it is necessary to implement zoning of the park and designate areas that will mitigate such pressures.

Regarding biotic factors, eutrophication in the northern (marshy) part of the lake has mixed impacts. In some cases, it provides positive conditions for certain bird species (e.g., whiskered tern), while for others, it has negative effects by eliminating nesting habitats (e.g., Dalmatian pelican).

Among abiotic factors, water level fluctuations are particularly significant and should serve as a basis for future measures. For instance, a decade ago, springtime water level variations led to the direct loss of young birds, negatively impacting populations that nest on floating vegetation or natural peat islands. This has contributed to a declining trend in such bird populations.

Two Special Nature Reserves, Pančeva Oka and Manastirska Tapija, have been designated at Skadar Lake due to the richness and diversity of bird fauna. Over the years, Manastirska Tapija has lost its ornithological significance (such as hosting colonial nesting species), while Pančeva Oka has maintained its status. The Public Enterprise for National Parks of Montenegro (JPNPCG) has proposed, through suggestions for new spatial planning documents, the inclusion of Crni Žar as a Special Nature Reserve. This area is characterized by exceptional values in terms of ornithofauna diversity, especially during the nesting period of colonial species.

Hunting is prohibited throughout the year in Skadar Lake National Park, as well as in all other national parks. Only sanitary culling is allowed, though no such cases were recorded between 2015 and 2020. During this period, there has been no recorded presence of invasive mammal species within the park.

The urbanization along the course of the Zeta River negatively impacts biodiversity. Unresolved issues such as wastewater discharge from certain factories/plants and farms, illegal construction, and pollution from agricultural activities are evident in this area. There is an intention by the Municipality of Nikšić to redirect part of the Zeta River's water to the "Krupac" and "Slano" reservoirs. Although the implementation of this initiative remains uncertain, it undoubtedly poses a threat to the biodiversity of the region[23].
The document on the Lower Bojana River Basin and Ulcinj Ecosystem Complex identifies the following threats[24]:

Illegal landfills (solid waste)
The illegal landfills primarily consist of small to medium-sized dumps containing municipal and construction waste, though they sometimes include bulky waste. Local residents who participated in our research identified this as a pressing issue, citing its impact on physio-chemical and visual pollution, as well as its negative impression on tourists, who find these areas highly unappealing. According to the Local Management Plan for Municipal and Non-Hazardous Construction Waste (2016–2020) (Municipality of Ulcinj, 2016), there are 11 locations in the hinterland of Long Beach and Ada Bojana where illegal waste dumping has occurred. These sites vary in size, with six locations having waste volumes between 10 m^3 and 100 m^3, and five locations ranging from 100 m^3 to 1000 m^3. A more detailed overview of these waste sites has been provided by NGO Green Life (Vuković A., 2020) and NGO Ada Bojana Association (Čapunović S., 2020), which mapped the illegal landfills in the hinterland of Long Beach and parts of Bojana Island. Through discussions, it was concluded that the reason for the high number of illegal dumps in the hinterland of Velika Plaža and Ada Bojana lies in the slow pace and lack of agreement on responsibilities between Public Enterprise for Coastal Zone Management (Morsko dobro), which is responsible for managing Velika Plaža and Ada Bojana beach, and the municipal company in charge of waste management. Additional waste dumping locations beyond Velika Plaža and Ada Bojana beaches include: Gač (20m^3), Klezna (6m^3), Velike Krute (50m^3), Vladimir (5m^3), Mide – Ostros road (10m^3), and Šas (10m^3). Locations with over 1000m^3 of waste are the former waste disposal areas of Hije and Bratica (Municipality of Ulcinj, 2016c). According to the Local Management Plan for Municipal and Non-Hazardous Construction Waste (2016–2020) (Municipality

[23] Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio economic analysis of the Nature Park River Zeta, The Nature Conservancy
[24] Lončarević N, Katnić A. & Šundić D. (2022). " Lower Bojana River Basin and Ulcinj Ecosystem Complex Biodiversity". NGO Environment Program

of Ulcinj, 2016c), the amounts of waste collected were 9152 tons in 2013, 9595 tons in 2014, and 10,332 tons in 2015. In the municipality of Ulcinj, only mixed municipal waste is collected, which is disposed of at the Možura landfill. Waste is collected from 80% of the municipality's territory, according to the National Waste Management Plan 2016–2020 (MORT, 2016b). Currently, there is no information about the status of these dumpsites, as a new municipal or national waste management plan (post-2020) has not yet been published. However, local ZS reports indicate that the number of illegal landfills has increased, with no interventions by the municipality or cleaning companies to address existing ones. In addition to solid waste pollution on land, waste also flows through the Bojana River into the sea. Bojana is the third-largest contributor of marine litter in the Mediterranean, accounting for 575 tons per year (5.8%) (Liubartseva et al., 2016).

Municipal Wastewater

The municipality of Ulcinj lacks adequate wastewater infrastructure, resulting in all municipal and industrial wastewater being either untreated or only minimally treated before discharging into the Bojana River or the sea. This issue is particularly pronounced during the tourist season when temporary facility operators release significant amounts of wastewater into the Bojana River near Velika Plaža. Although regulations require all owners of temporary facilities along the river to have septic tanks and maintain them properly, local residents believe this is rarely the case. Additionally, local authorities have plans to improve municipal services in the greater Ulcinj area by expanding the sewage network and building wastewater treatment plants. Several wastewater-related projects have been identified and are part of the Unified Sectoral Plan of Projects, a national list of prioritized environmental projects. According to the National Strategy for Integrated Coastal Zone Management to 2030 (Ministry of Sustainable Development and Tourism; UNEP; PAP/RAC, 2014), the main obstacle to implementing these projects is a lack of financial resources).

Agricultural Pollution

Agricultural pollution refers to substances used in farming (e.g., pesticides, industrial fertilizers) that contaminate the environment (air, soil, or water bodies through runoff). The municipality of Ulcinj is well known for its agricultural activities, as the majority of the area consists of floodplains, with good access to water due to the nearby rivers and streams, as well as ample sunlight. However, this does not make it less prone to agricultural pollution, as modern practices involving the use of environmentally-friendly natural products are not commonly adopted in Montenegro.

Uncontrolled Urbanization (Legal and Illegal)

In the municipality of Ulcinj, as is the trend in many parts of the country, urbanization is occurring without proper planning, often illegally, and involves various interests (Figure 21). According to updated information from March of this year, periodically received by the Ministry of Ecology and Spatial Planning from municipalities overseeing the legalization process, a total of 3,851 legalization requests have been submitted since the adoption of the Law on Spatial Planning and Construction of Structures. However, only four decisions regarding legalization have been made, and the process has been suspended for 466 cases.

Fires

Fires in the area are frequent and occur almost every year. Every few years, a large-scale fire appears, having an immediate and destructive effect on the environment, often affecting agricultural fields, which disrupts the economy and the quality of life for the local population. The peak of the fire season

in Ulcinj typically begins in mid-July and lasts for about 12 weeks. There were 0 VIIRS (Visible Infrared Imaging Radiometer Suite) fire warnings between April 12, 2021, and April 4, 2022, considering only high-threat warnings. This is normal compared to previous years up until 2012. Between April 8, 2019, and April 4, 2022, Ulcinj received a total of 27 VIIRS fire warnings. The highest number of fires recorded in a single year was in 2012, with 1.6 ha burned (Global Forest Watch, n.d.).

Hydropower Plants

Existing dams and reservoirs on the Drin (Bojana's largest tributary, which comes from Albania) and small hydroelectric plants that are planned and being intensively constructed on small rivers and streams within the Skadar Lake basin in Montenegro (Figure 22) significantly impact the amount of water flowing into the Bojana River, biodiversity, sediment transport, and other physical and chemical properties. Experts believe these dams have a significant effect on sediment transport within the Bojana River and influence its overall hydrological regime. They also impact flooding (Petković & Sekulić, 2019).

Deforestation

Deforestation is often poorly planned or illegal, leading to rapid loss of tree and shrub cover and affecting the ecological attributes provided by forest and shrub ecosystems. Most of the old forests were cut down decades ago due to the need for firewood or, in coastal areas, due to urbanization, which is common in Mediterranean cities (Caković D. & Milošević D, 2013). Today, the dominant vegetation is maquis, a scrubland with pioneering trees and shrubs, and occasional remnants of representative forests. However, deforestation continues, and the local population believes there has been a degradation in the enforcement of laws regarding private forest logging and forestry in general in Ulcinj, compared to previous times. In 2010, Ulcinj had 12.2 kha of forest cover, which accounted for more than 37% of its land area. By 2020, it had lost 37.1 ha of forest cover. Between 2001 and 2020, forests in Ulcinj emitted 9.76 $ktCO_2$ per year and removed -40.6 kt CO_2 per year. This represents a net carbon flux of -30.8 $ktCO_2$ per year (Global Forest Watch, n.d.).

Sand Exploitation

Sand exploitation for construction purposes primarily occurs along the banks of the Bojana River. It often takes place in areas far from the Bojana estuary, where fewer residents can notice illegal activities, as extraction is done without permission. Specific data on illegal extraction is not available here.

Noise and Other Disturbances

Noise, and often the disruptive behavior of temporary residents in facilities (such as violating quiet zone laws, improper waste disposal, etc.), is a major social problem and a threat to the ecosystem, primarily in the eastern part of Velika Plaža, near the mouth of the Bojana River. During the tourist season, parties with loud music occur almost every weekend, and loud noise often persists on weekdays as well. This poses an obstacle to the daily life of the local population and hinders the development of slow tourism that they wish to build in this biodiversity hotspot. Noise also threatens birds (and possibly other organisms), as singing is crucial during the breeding season.

Climate Change

The phenomenon of global warming is affecting local natural and social processes, which has been noticed by the local population through warmer summer temperatures and more frequent extreme

events such as floods, fires, and droughts. Although climate change is rarely studied in Montenegro, its effects on species and habitats, changes in seasonal temperatures, and disturbances like floods and fires are becoming more common. Climate change has a very significant impact on agricultural production, causing instability through increased disturbances like fires and floods. Climate change is also visible in marine ecosystems. In the Adriatic Sea, a deep basin sensitive to changes, climate change is altering the heat and salt content of the sea, which results in thermohaline circulation that threatens to permanently change the hydrographic properties of the water. Positive trends in water temperature have already been observed (Šolić et al., 2018). The GEF Adriatic project, carried out by the Ministry of Ecology, Spatial Planning, and Urbanism, has collected data on the potential rise in sea levels, where it is evident that coastal habitats, tourist zones, and settlements are under threat due to the rise.

Oil Drilling

In the spring of 2021, an oil platform was set up on the border between the municipalities of Bar and Ulcinj for the purposes of exploring the quantity of oil and the potential for exploitation in the Montenegrin sea (CAU et al., 2014). It is believed that even the exploration itself could cause damage to the marine environment. In the case of an accident, the threat has the potential to cause significant pollution in the sea and impact its biodiversity. Additionally, an oil spill could potentially affect the region, as it would influence the marine waters of neighboring countries, thus impacting their environment, economy, and more.

Poaching and Overhunting

Illegal hunting, known as poaching, along with overhunting, pose significant threats to terrestrial and marine wildlife and the functioning of ecosystems connected to them. In marine environments, examples include poaching of prized seafood such as date mussels (*Litophaga lithophaga*), the use of illegal fishing equipment, and overfishing. On land, bird hunting has been reported in Ulcinj Salina, an area particularly vulnerable due to its rich diversity and abundance of bird species. The direct impact of hunting is evident in the number of dead birds, but an even greater issue often lies in the effects of explosive sounds on surrounding bird populations. A single gunshot can drive away entire flocks, sometimes consisting of hundreds or thousands of birds. This disruption is especially critical during breeding seasons, as it may cause birds to prematurely abandon their nests, leaving eggs or young vulnerable to predators. Such disturbances can lead to a dramatic increase in breeding failures. During migration seasons, disturbances to birds—already fatigued from long migratory flights—can drive them away from crucial resting areas, significantly increasing the likelihood of mortality due to exhaustion. Another pressing concern related to hunting, especially in wetlands, is the accumulation of lead ammunition. This contamination can lead to lead poisoning in wildlife and pose risks to humans if food production occurs in these areas. Alarmingly, Mediterranean wetlands are reported to have the highest concentrations of lead ammunition in Europe, exceeding 300 pellets per square meter (Sovinc A. et al., 2017). In 2017, the Ministry of Agriculture announced plans for the Ulcinj Salina to become a protected area and a "no-hunting zone." Consequently, the municipality of Ulcinj and the Public Company for Breeding, Protection, and Hunting of Wildlife were tasked with transforming this area into a hunting-free zone. Currently, the company also holds a concession for hunting in the Ulcinj hunting grounds, valid from April 1, 2012, to March 31, 2022. This license, issued in accordance with the law by the Ministry of Agriculture and Rural Development, was granted for a 10-year period (Sovinc A. et al., 2017).

Invasive Species

Invasive species, such as plants like false indigo (*Amorpha fruticosa*) and ragweed (*Ambrosia artemisiifolia*), as well as animal species like mongooses (*Mungos mungo*), pose a threat to local biodiversity and the survival of species, endangering some species by displacing them from their natural habitats. Invasive plant species have been identified as one of the major threats to dune ecosystems (Janssen et al., 2016). This is particularly relevant for the Velika Plaža area and is discussed in greater detail in the works of Stešević, Caković, and Šilc (e.g., Šilc et al., 2020). Invasive plants like those mentioned are not only a threat to other species by releasing substances into the soil that inhibit the germination of other plants, but some of them also produce highly allergenic pollen. A preliminary list of species compiled by the Parks Dinarides Network (Popović M. & Mijović B., 2021) identified 47 invasive species in Montenegro, most of which are found in the Ulcinj area.

Intensive Agriculture

This refers to all agricultural practices associated with conventional land cultivation methods that are considered harmful to the soil, such as mulching, monoculture farming, etc. Some consequences of intensive agriculture, along with untreated wastewater, include high trophic levels, which are evident in major marine discharge areas (Tsiafouli et al., 2015) (Figure 24).

Intensive and Commercial Tourism

This pertains to conventional tourism practices, such as the construction of large resorts in biodiversity hotspots and intensive habitat management (clearing, deforestation, mowing, beach nourishment—often with silt, etc.), which threaten the local environment. Unsustainable tourism practices are evident in this region, particularly those exerting pressure on coastal areas through road construction, heavy traffic, building of tourist facilities, and similar activities (Figure 25).

Water Management (Ulcinj Salina)

The presence or absence of water dictates the biodiversity structure of the Salina, as the most significant species and habitat types in Ulcinj Salina require standing water. Sovinc A. et al. (2017) recommend a water level regime for certain basins in the Salina (Figure 26), while the management of other parts should be decided based on whether salt production will resume or not.

Mosquito Spraying

The spraying of chemicals to control mosquitoes, which dominate the warm and humid summers in Ulcinj, has negative effects on other insects and local beekeeping activities. This stressor has been highlighted by local nature conservation organizations as highly significant, as it causes numerous negative consequences for local beekeepers.

Illegal Construction

Illegal construction refers to building activities carried out without the necessary permits, often on land designated for other purposes. This practice is widespread across the region and the country, and it is not adequately penalized. On the contrary, legalization of unauthorized structures is permitted.

In the case of the Cijevna Canyon [25] direct pressures threatening biodiversity and ecosystems can be

[25] Protection study "Natural Monument Cijevna Canyon", Environmental Protection Agency, 2017

categorized as:

- Urbanization/illegal construction
- Fires
- Gravel and sand extraction
- Legal and illegal hunting and fishing
- Pollution from wastewater and solid waste

When it comes to pressures on species, relevant information can be found in the following sources:

- For fish of the Zeta River: Iković, V., Mićanović, A. (2022): Fish species of the Zeta River. Montenegrin Ecologists Society, Danilovgrad, Montenegro.
- For the Skadar Frog in the Bojana River Delta: Ljubisavljević, K., Iković, V. (2020): Protection and Conservation of Endangered Skadar Lake Frog and Its Habitats in the Bojana River Delta. Montenegrin Ecologists Society, Podgorica.
- For bat populations in the Shkodër/Skadar area: Théou, P., & Đurović, M. (2015): Conservation action plan for bat population in Shkodër/Skadar area. Montenegrin Ecologists Society.
- For the glass eel population in the Bojana River: Milošević, D. (2022): Assessment of the state of the glass eel population in the Bojana River. Green Home, Podgorica
- Monitoring Manual for Lake-bound Species and Habitats of Lakes Prespa, Ohrid and Shkodra/Skadar (2019), published by GIZ Podgorica, provides guidance for monitoring the following species:
  - Amphibians and reptiles: Skadar Frog (*Pelophylax shqipericus*), Yellow-bellied Toad (*Bombina variegata*), Macedonian Crested Newt (*Triturus macedonicus*).
  - Birds: Ferruginous Duck (*Aythya nyroca*), Common Pochard (*Aythya ferina*), Goosander (*Mergus merganser*), Great Crested Grebe (*Podiceps cristatus*), Red-crested Pochard (*Netta rufina*), Pygmy Cormorant (*Microcarbo pygmaeus*), Great Cormorant (*Phalacrocorax carbo*), Whiskered Tern (*Chlidonias hybrida*), Grey Heron (*Ardea cinerea*), Dalmatian Pelican (*Pelecanus crispus*), Great White Pelican (*Pelecanus onocrotalus*).
- Insects: Large White-faced Darter (*Leucorrhinia pectoralis*), Downy Emerald (*Cordulia aenea*), Hairy Dragonfly (*Brachytron pratense*), Red-eyed Damselfly (*Erythromma najas*).
- Plants: Yellow Water-lily (*Nuphar lutea*), Skadar Oak (*Quercus robur scutariensis*).

Conclusion: Comprehensive consolidated information on the threats and pressures on biodiversity across most of the proposed area for the future biosphere reserve is provided in the document Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin at a general level. Pressures on significant species are outlined in various documents, including: The Management Plan for Skadar Lake National Park 2021-2025, the Management Plan for Lovćen National Park 2021-2025, the draft Nature Protection Study for Skadar Lake, the Nature Protection Study "Natural Monument of the Cijevna Canyon", the Nature Protection Study for the Zeta River Nature Park, the Socio-Economic Analysis of the Zeta River Nature Park, the Integrated Resource Management Plan (IRMP) for the Buna/Bojana Area, the Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro), the Lower Bojana River Basin and Ulcinj Ecosystem Complex, and other documents mentioned above.

However, the information is often provided descriptively rather than in a quantitative format, except for the Bojana Delta and Ulcinj area. The driving forces behind these pressures are rarely explicitly

stated in the documents. Such information is mainly found in the Nature Protection Study for the Zeta River Nature Park, the Lower Bojana River Basin and Ulcinj Ecosystem Complex, and the Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin. A more detailed description of existing pressures can be found in the Local Biodiversity Plans for the Municipality of Danilovgrad and the Old Royal Capital Cetinje. However, the pressures mentioned in these documents are not directly linked to specific species and habitats. Thus, existing gaps include the absence of quantitative data on pressures, with only descriptive information available for protected areas and the municipalities of Cetinje and Danilovgrad.
The recommendation is that an expert working on the identification of key species should also address the pressures on these specific species based on the available documentation.

References:

Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin, ZaVita d.o.o. and GWP-Med, 2019
Lončarević N, Katnić A. & Šundić D. (2022). Lower Bojana River Basin and Ulcinj Ecosystem Complex. NGO Environmental Program
Management Plan 2021-2025 for Skadar Lake National Park, National Parks of Montenegro, 2022
Management Plan for Lovćen National Park 2021-2025, National Parks of Montenegro, 2022
Draft Revised Study for Skadar Lake, Environmental Protection Agency, 2023
Nature Protection Study for the Natural Monument "Cijevna Canyon ", Environmental Protection Agency, 2017
Nature Protection Study for the Zeta River Nature Park, Environmental Protection Agency, 2019
Sackl P., Schneider-Jacoby M., Schwarz U., Dhora D., Šaveljić D., Stumberger B. (2006). Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)
Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021). Socio-Economic Analysis of the Zeta River Nature Park, The Nature Conservancy
Dimitris F., Marković M., Shipman B. (2015). Integrated Resource Management Plan for the Bojana Delta
Local Biodiversity Action Plan for the Municipality of Danilovgrad, Municipality of Danilovgrad, 2020.
Local Biodiversity Action Plan for the Old Royal Capital of Cetinje, Old Royal Capital Cetinje, 2020
Local Environmental Protection Plan for the Municipality of Danilovgrad, Municipality of Danilovgrad, 2021
Draft Local Environmental Protection Plan for the Municipality of Ulcinj, Municipality of Ulcinj, 2020
Draft Local Environmental Protection Plan for the Municipality of Tuzi, Municipality of Tuzi, 2023
Vugdelić M. (2012). Analysis of synergies, gaps and complementarities on integrated environmental management at regional level Skadar Lake - Montenegro- Study 2, Green Home
Nature Protection Study for the "Ulcinj Salina" Nature Park, Municipality of Ulcinj and Ministry of Sustainable Development and Tourism, 2017.

14.2.3 What measures and indicators are currently used, or planned to be used, to assess species groups and pressures on them? Who implements them, or how will this be done in the future?

Regarding the monitoring of species, habitats, and pressures, based on available documentation, the only activities carried out or planned are by the Public Enterprise "National Parks of Montenegro." The Hydrometeorological Institute conducts biomonitoring of ichthyofauna, but the locations vary. For

instance, in 2020, fish fauna monitoring was conducted in watercourses relevant to the proposed biosphere reserve area, but this was not done in other years. In this specific case, the Management plan for national park Skadar lake (2021–2025) [26] outlines the activities carried out:

During the planning period from 2016–2020, the work of the expert service focused on research and monitoring of the species Marsilea quadrifolia and Caldesia parnassifolia, determining the population and status of the Skadar oak (Quercus robur subsp. scutariensis) and the potential for revitalizing its habitat, identified as a Natura habitat 92A0. It also included gathering data on the distribution of certain invasive species and the threat to habitats due to their spread. Additionally, coordination was established between the protection service of the National Park and the expert service of JPNPCG (Public Enterprise National Parks of Montenegro) to analyze the status of commercial species and their habitats based on collected data. At all research sites, simultaneous inventorying of significant plant taxa was conducted, and the data were entered into an electronic database.

Control of Pressures on Ecosystems and Habitats

Invasive species, particularly those characterized by rapid spreading and habitat occupation, pose a significant threat to the diversity of native flora in the area of Skadar Lake National Park and its surroundings.

Based on field research, it can be concluded that most invasive species inhabit agricultural and ruderal habitats, especially along the northern shore of the lake. The most aggressive species are Amorpha fruticosa (false indigo-bush), Ailanthus altissima (tree of heaven), Gleditsia triacanthos (honey locust), Ambrosia artemisiifolia (common ragweed), Xanthium strumarium (common cocklebur), Datura stramonium (jimsonweed), as well as Egeria densa, whose presence has been confirmed in the waters of Plavnica and Šegrtnica.

The widespread presence of false indigo-bush (*Amorpha fruticosa*), with coverage rates of 80–100%, is concerning, particularly in the area from the Plavnica River to the Gostiljska River. As a highly invasive species, false indigo-bush has created pure monocultures on previously cultivated land. It is absent only from parcels that are mowed. However, there are indications that most of these parcels have been sown with false indigo-bush seeds. Extensive monocultures of this species can also be observed along the main road toward Vranjina. It is present in the area of Rijeka Crnojevića and occupies the largest areas along the southern shore near the mouth of the Crmnica River. It even extends into a habitat recognized as a Natura 2000 habitat (3280): "Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix and Populus alba*."

In the area of Žabljačke Livade, it occurs sporadically or in smaller groups around parcels. In this part of the national park, the honey locust (*Gleditsia triacanthos*) currently shows greater aggressiveness in its spread. Although not as invasive as false indigo-bush, it occupies large areas and shows a tendency for further expansion. It is present in all developmental stages, from numerous seedlings to mature individuals. High coverage is also exhibited by common cocklebur (Xanthium strumarium) on floodplain meadows and by common ragweed (*Ambrosia artemisiifolia*) in the rural part of Žabljak Crnojevića.

The tree of heaven (*Ailanthus altissima*) is present in settlements and along major and minor roads.

[26] Management plan for national park Skadar lake, National Parks of Montenegro, 2022.

The presence of the invasive macrophyte Egeria densa was identified in the waters of the Plavnica River, near the restaurant of the same name. This discovery in 2018 marks the first recorded introduction of Egeria densa into natural watercourses in Montenegro. With the establishment of monitoring and the expansion of research areas in 2019, its presence was also confirmed in the Šegrtnica River. It occupies significant areas from the bridge near Poseljani to Žabljak Crnojevića. In certain sections, the population forms dense clusters, covering the riverbed. Experiences from European countries suggest that when this species becomes overabundant, the risks of applying removal methods may outweigh the benefits of leaving it in its current state. Collaboration with relevant institutions is necessary to assess and harmonize further steps regarding the implementation of conservation measures.

The harvesting of medicinal plants, forest fruits, and mushrooms for commercial purposes within a protected area must adhere to established regulations, based on a permit obtained in advance from the Environmental Protection Agency.

To improve the monitoring of plant species habitats that are under pressure due to commercial harvesting, collaboration has been established with the Environmental Protection Agency to collect data on issued permits. Additionally, the work of the Park Protection Service and the Expert Service of JPNPCG (Public Enterprise for National Parks of Montenegro) has been coordinated to analyze the status of commercially exploited species and their habitats based on the obtained data. During the implementation of this activity, three key issues emerged that need to be addressed in the future, both at the level of the National Park and JPNPCG, as well as at the level of relevant institutions.

1. The Environmental Protection Agency, during this planning period and in previous years, has not received any requests nor issued any permits for the commercial harvesting of medicinal plants, forest fruits, or mushrooms within the National Park (NP).

2. There is insufficient control by the Protection Service, compounded by practical challenges that hinder their ability to perform this work.

3. It is currently impossible to map habitats under pressure from harvesting because, during official reporting, rangers record the local name or a general area name for the site where an individual was caught engaging in illegal activities. The maps used in their work, such as Google Earth and GIS, do not recognize local area names. To ensure accurate data collection, it is essential to equip rangers with devices capable of providing GPS coordinates.

Given the above, it is not possible to draw a conclusion regarding the collection of wild flora for commercial purposes within the boundaries of Skadar Lake National Park. In reality, illegal harvesting of wild flora does occur in this National Park, particularly of species such as common sage (*Salvia officinalis*) and wild pomegranate (*Punica granatum*). However, due to a lack of data on the extent and specific locations of such harvesting, the actual situation on the ground remains unknown.

Forest Ecosystem Monitoring

Forest ecosystem monitoring was conducted in 2017 and involved the collection of data based on functional types. These functional types were divided into ecological, health (protective), and dendrometric categories. For each functional type, a specific number of indicators were evaluated to assess the state of forest ecosystems.

Monitoring included assessing biotic and abiotic pressures on representative forest ecosystems located in the northern part of the Park.

The analysis represents the observers' evaluations and is not as quantitatively measurable as dendrometric data. However, it can serve as a basis for interventions and further operational planning aimed at protection and utilization. The results are presented in Table 16 of the Management Plan.

Monitoring of Ornithofauna

According to the previous Management Plan for Skadar Lake National Park (2016–2020), ornithofauna monitoring was conducted focusing on parameters such as population size, distribution, population vitality, and degree of endangerment. Based on the monitoring results, certain management activities were implemented, particularly related to the conservation of habitats and species. Special attention was given to the study of bird species within aquatic ecosystems. The selection of species for monitoring was guided by the national legislative framework as well as international standards, including the IUCN Red List, Bern Convention, Bonn Convention, CITES, European trends for specific species, Convention on Migratory Species, Global Conservation Status, European Threat Status, and other specific criteria.

Monitoring of Mammals

The monitoring activities for otters included mapping their habitats and conducting an analysis of their status and level of endangerment within the Park's territory.

To identify bat species present in underground structures and ensure their preservation, the Public JPNPCG, in collaboration with the NGO "Montenegrin Ecologists Society," implemented the cross-border project "Capacity building and action plan on bat monitoring for the area of Shkodër/Skadar lake." This project facilitated the first-ever winter and spring census of bats in the area.

Additionally, the same document provides information under sections: 2.6. Monitoring and Research in the Previous Period (p. 46), 2.6.1. Monitoring and Research of Flora and Vegetation (p. 46), 2.6.2. Monitoring and Research of Fauna (p. 54), 3.1.1. Research, Monitoring, Restoration, and Improvement of Ecosystems, Habitats, and Species (p. 66). The 3.2. Table of Goals and Activities of the Management Plan (p. 77) outlines a monitoring activity plan with indicators for the period 2021–2024.

In the Management Plan for Lovćen National Park, NP of Montenegro (2022), information on previous monitoring and research is also provided (p. 37). The 3.2. Table of Goals and Activities of the Management Plan includes a monitoring activity plan with indicators for the period 2021–2024.

The Local Action Plan for Biodiversity of the Municipality of Danilovgrad[27] proposes monitoring plans for specific groups and indicator species.

Conclusion:

Regarding the monitoring of species, habitats, and pressures, continuous activities are conducted and planned by PE "National Parks of Montenegro." The Local Biodiversity Action Plan for the Municipality of Danilovgrad includes a proposed monitoring plan for specific groups and indicator species. The Hydrometeorological Institute conducts biomonitoring, but its locations vary. For instance, in 2020,

[27] Local Biodiversity Action Plan for the Municipality of Danilovgrad, Danilovgrad, 2020.

fish fauna monitoring was carried out in watercourses relevant to the proposed biosphere reserve, while in other years, it was not. There are also individual research initiatives and project-based efforts; however, as this analysis focuses on continuous monitoring, these have not been included here. For the remainder of the planned area, continuous monitoring activities have not been planned according to the available documentation. This highlights a significant gap and the necessity to plan and implement such efforts. It is therefore essential to develop a comprehensive monitoring plan with indicators for both key species and existing pressures. Additionally, the plan should clearly identify the responsible entities for its implementation.

References:

Management Plan for NP Skadar Lake 2021-2025, NP of Montenegro, 2022.

Management Plan for NP Lovćen 2021-2025, NP of Montenegro, 2022.

Fish Fauna Monitoring for the Application of the Water Framework Directive (WFD), Institute of Hydrometeorology and Seismology of Montenegro, 2020.

14.2.4 What activities are currently being undertaken to reduce these pressures?
14.2.5 What activities are planned to reduce these pressures?

The Management Plan for Skadar Lake National Park 2021–2024 [28] outlines the following measures related to visitor management, waste management, and strengthening the protection service as a key control mechanism:

- Analyze visitor structure, opinions, needs, and expectations.
- Analyze the impact of visitors on natural and cultural values.
- Research and determine the carrying capacity of the most frequently visited sites in accordance with nature protection guidelines, monitor, and regulate the number of visitors.
- Develop mechanisms to reduce the visibility of visitors' impact in certain areas (based on “leave no trace” principles).
- Create park tour programs (focused on the park’s natural and cultural values) for different target groups.
- Increase the number of staff in the Protection Service.
- Organize internal training for the Physical Protection Service and the Service for Ambient Hygiene and Infrastructure Maintenance.
- Procure material and technical resources for the Physical Protection Service and the Service for Ambient Hygiene and Infrastructure Maintenance.
- In collaboration with relevant inspection services, control and combat illegal activities.
- Work with the security departments in Podgorica, Bar, Cetinje, and Tuzi to control and combat illegal activities.
- Propose an initiative to state administration bodies responsible for forestry, environmental

[28] Management Plan for NP Skadar Lake 2021-2025, NP of Montenegro, 2022.

protection, and cadaster management, as well as municipal authorities within the park's boundaries, to establish a working body for determining and marking the park's clear boundaries.

- Define funding sources, budget, and timeline for determining and marking the park's clear boundaries.
- Initiate meetings with municipal utilities operating within the park to define procedures for preventing and remediating unregulated waste disposal sites.
- In collaboration with municipal utilities of the municipalities surrounding the park, remediate unregulated waste disposal sites within the park's area.
- In cooperation with municipal utilities, NGOs, civil sectors, local residents, and volunteers, organize waste removal campaigns.

The Study on the Protection of the Zeta River Valley[29] proposes the following measures:

- Registration of boats to enhance protection and combat poaching effectively.
- Ban on open flames from June 15 to September 15, with defined management practices for green waste (e.g., pruning greenery, orchards, vineyards).
- Mandatory mowing of meadows in Zone II.
- Regulate or ban discharges into the Zeta River. Large enterprises must have separators and wastewater treatment systems; otherwise, they should not be issued operating permits.
- Prohibit the use of rural dumps and install containers where feasible. Strengthen and improve waste management.
- Ban river channeling of the Zeta River.
- Align spatial plans with the solutions proposed in the Protection Study.
- Review the permissible extent and expansion of fish farms on the Zeta River.
- Prohibit herbicide use within the protected area (spraying grass and weeds) or near water bodies.
- Given the importance of bees for pollination, owners should be informed in advance when fruits and vegetables are treated with pesticides so they can prevent bees from grazing on those days.
- Prohibit dumping waste into sinkholes and the disposal of dead animals in sinkholes.
- Spring sources may only be captured with the approval of the relevant management authority.
- Establish a fire prevention and protection system for significant sites.
- Strengthen the capacities of gamekeepers and fishery guards and establish fish spawning grounds along the rivers under strict protection.
- Educate the local population on the use of chemical preparations, proper waste disposal, and sustainable water use.
- Promote "eco-tourism" and support rural households in improving the production of natural and organic food, its placement on the market, and the provision of tourism services.
- Revise the Danilovgrad Hunting Ground plan: Prohibit hunting throughout the Zeta River Valley and designate the Gostilja, Garča, and Kurilo slopes as hunting zones.
- Strictly monitor the use of quail lures during the autumn migration and prevent poaching in the Zeta Valley during the spring migration. The Zeta River Valley is crucial for migration, and

[29] Nature Protection Study for the Zeta River Nature Park, Environmental Protection Agency, 2019

any disturbance of birds could impede or slow their movement (prohibited under the EU Birds Directive).

- Install nesting boxes at locations such as Šabov Krug, Moromiš, Dobro Polje, and Kujava, targeting cavity-nesting species like the European roller (an ideal habitat here) and owls (natural allies in agriculture, preying primarily on rodents).
- Prohibit the burning of meadows and fences during winter property cleaning.
- Polluters must pay.

Considering that Elektroprivreda Crne Gore, specifically the HPP Perućica, has been utilizing the water resources of the Zeta River for years and significantly impacting its ecosystem, it should take responsibility for financing activities (particularly funding the managing body) aimed at restoring the Zeta River.

It is well known that the environmental impacts of hydropower plants can occur at any stage of their lifecycle—construction, renovation, decommissioning, or daily operation and management. These impacts can lead to loss, degradation, and fragmentation of natural habitats and the populations of species that depend on them.

The most important negative consequences of hydroelectric plants on rivers include changes in hydromorphology and river habitats, prevention of migration for protected species, disruption of sediment dynamics, alterations in the hydrological regime and ecological flow of water, changes in seasonal flooding cycles, changes in the chemical composition of water and temperature, as well as injuries and deaths of animal species.

Additionally, any physical modification of water bodies affects normal hydrological processes and disrupts the ecological continuity of freshwater systems. The Perućica Hydroelectric Plant undoubtedly causes disturbances in natural hydromorphological processes, which in turn disrupt or change the biotic and abiotic conditions that are vital for the structure and functioning of habitats.

The following relevant measures are listed in the Local Biodiversity Action Plan for the Municipality of Danilovgrad[30]:

- Establish strict control of fishing on the Zeta River to restore the fish population. Implement a fishing ban on endangered species for a period of three years (2021–2024).
- Strengthen local inspection services and apply penal policies (2020–2022).
- Conduct a baseline study that provides a foundation for spatial planning of urban and rural settlements in the Zeta River Nature Park area. Detailed analysis of applying protection zones in the current urban zone of the municipality of Danilovgrad.
- Align the Municipal Development Plan (PUP) of the Municipality of Danilovgrad with the designated first and second zones of the Zeta River Nature Park in cooperation with the Environmental Protection Agency (EPA) and the Ministry of Spatial Planning (MORT).

[30] Local Biodiversity Action Plan for the Municipality of Danilovgrad, Danilovgrad, 2020.

- Introduce a wastewater treatment system (2020–2024).
- Design appropriate mechanisms for waste collection and disposal. Establish a waste segregation system.
- Implement improvements in the solid waste management system (enhance human capacity, equipment, public awareness, and action).
- Design adequate waste collection and disposal mechanisms. Establish a waste segregation system.
- Increase the capacity of the municipal enterprise (staffing and equipment).
- Clean all locations with illegal waste disposal sites.
- Establish a rapid monitoring system (early warning system) for quick action, prevention, and remediation of burned areas.
- Improve equipment and capacity of key actors for rapid and adequate response.
- Engage seasonal workers for fire prevention.
- Strengthen the system of involving all stakeholders and collaborative responses: protection and rescue services, schools, local communities, farmers, the Directorate for Emergency Situations, the military through training protocols and tests.
- Remove ragweed and false indigo-bush.

The following documents contain additional measures:

- Integrated Resources Management Plan (IRMP) for the Buna/Bojana area - 6.1 Measures
- Management Plan 2021–2025 for NP Lovćen, NP of Montenegro (2022).
- Management Plan for Municipal and Non-Hazardous Construction Waste in the Old Royal Capital Cetinje for the period 2016–2020 - Waste Management in Protected Areas (p. 24).
- Management Plan for Municipal and Non-Hazardous Construction Waste in the Municipality of Bar for the Period 2016–2020 - Section 4.6: Method of Organized Waste Collection and Transport in Protected Areas and Coastal Zone (p. 42).
- Sustainable Energy and Climate Action Plan for the Municipality of Tuzi - Measures for Mitigating Climate Change (p. 47) and Measures for Adapting to Climate Change (p. 58).
- Local Environmental Protection Plan for the Capital City of Podgorica - Section 8.4: Plan of Activities (p. 71).
- Local Biodiversity Action Plan for the Capital City of Podgorica:
- Section 4.1: Activities and Measures for Biodiversity Protection and Enhancement (p. 357).
- Section 4.2: Priority Activities for the Conservation of Particularly Endangered Locations (p. 367).
- Draft Local Environmental Protection Plan for the Municipality of Tuzi - Plan of Activities (p. 94).
- Local Environmental Protection Plan for the Municipality of Danilovgrad - Plan of Activities (p. 70).
- Local Biodiversity Action Plan for the Municipality of Danilovgrad - Plan of Activities (p. 68).
- Local Biodiversity Action Plan for the Old Royal Capital Cetinje - Plan of Activities (p. 56).
- Draft Local Environmental Protection Plan for the Old Royal Capital Cetinje - Plan of Activities (p. 61).
- Draft Local Biodiversity Action Plan for the Municipality of Ulcinj - Plan of Activities (p. 68).
- Draft Local Environmental Protection Plan for the Municipality of Ulcinj - Plan of Activities (p.

55)

Conclusion: Measures aimed at reducing pressures are generally outlined across all the referenced documents. However, the level of implementation of these measures is unclear and appears to be weak. A significant lack of information regarding the extent of implementation has been identified.

References:

Dimitris F., Marković M., Shipman B. (2015). Integrated Resources Management Plan for the Bojana Delta.
Management Plan for Municipal and Non-Hazardous Construction Waste in the Old Royal Capital Cetinje 2016–2020, Cetinje, 2016.
Management Plan for Municipal and Non-Hazardous Construction Waste in the Municipality of Bar 2016–2020, Municipality of Bar, 2016.
Sustainable Energy and Climate Action Plan for the Municipality of Tuzi, Municipality of Tuzi, 2021.
Local Environmental Protection Plan for the Capital City of Podgorica, Podgorica, 2019.
Local Biodiversity Action Plan for the Capital City of Podgorica, Podgorica, 2023.
Draft Local Environmental Protection Plan for the Municipality of Tuzi, Municipality of Tuzi, 2023.
Local Environmental Protection Plan for the Municipality of Danilovgrad, Municipality of Danilovgrad, 2021.
Local Biodiversity Action Plan for the Municipality of Danilovgrad, Municipality of Danilovgrad, 2020.
Local Biodiversity Action Plan for the Old Royal Capital Cetinje, Cetinje, 2020.
Draft Local Environmental Protection Plan for the Old Royal Capital Cetinje, Cetinje, 2021.
Draft Local Biodiversity Action Plan for the Municipality of Ulcinj, Municipality of Ulcinj, 2020.
Draft Local Environmental Protection Plan for the Municipality of Ulcinj, Municipality of Ulcinj, 2020.

14.3. At the level of genetic diversity:

14.3.1 Identify species or varieties that are important (e.g., for conservation, medicine, food production, agrobiodiversity, cultural practices, etc.). 14.3.2 What ecological, economic, or social pressures or changes may threaten these species or varieties? 14.3.3 What indicators, at the species level, are being used, or will be used, to assess the evolution of population status and associated uses? 14.3.4 What measures will be used to conserve genetic diversity and practices associated with their preservation?

Regarding the question of genetic diversity, the documents do not provide a clear analysis that would allow for the identification of significant species for the proposed area. An exception is the Zeta River Valley, where the Socioeconomic Analysis[31] states: "In terms of genetic diversity in this area, it is reflected in the diversity of taxa (a large number of species, genera, families...), the presence of subspecies, and endemic species. Notably, the presence of the Zeta softmouth trout, whose populations are found only in the Neretva River basin, and the Skadar oak, endemic to the Skadar Lake basin, is particularly significant. Among the indigenous breeds of domestic animals, one can find

[31] Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio economic analysis of the Nature Park River Zeta, The Nature Conservancy

populations of the Buša cattle, Pramenka sheep, Zeta Žuja, Balkan goat, and Balkan donkey, which preserve their unique genotypes. Traditional varieties of corn, wheat, potatoes, tomatoes, peppers, beans, green beans, fruits, and grapevines were once cultivated in this area, but the presence of these indigenous genotypes is currently uncertain. If preserved seed material exists (maintained by the Biotechnical Faculty or local households), it could serve as the basis for indigenous production, aligned with the Park's objectives."

Conclusion: Except for the Socioeconomic Analysis of the Zeta River Nature Park[32], other documents do not provide clearly delineated information on the importance of species in terms of preserving genetic diversity. They also lack specifically identified pressures on these species, indicators for monitoring, and protection measures. The protection studies provide data on present species, habitats, and agricultural activities, which could potentially be further analyzed to identify species important for genetic biodiversity preservation by experts in specific fields. It is recommended to engage in professional consultations to identify species significant for genetic diversity conservation within the area.

Reference: Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio economic analysis of the Nature Park River Zeta, The Nature Conservancy

DEVELOPMENT FUNCTIONS

The questions in the Nomination Form related to the theme of development functions are formulated as follows:

15.1. Potential for promoting socio-culturally and ecologically sustainable economic and human development:
15.1.1. Describe how and why the area has the potential to serve as a center of excellence/model region for promoting sustainable development.

(The following text does not reference documents from the database but represents a consultant's proposal and reflections from the discussions during the consultative workshop held April 15–17 in Podgorica. The text requires further elaboration.)

The potential of the Skadar Lake basin to become a biosphere reserve and serve as a center of excellence/model region for promoting sustainable development is rooted in several key aspects:

Biological Diversity: Skadar Lake and its surrounding areas are home to numerous endemic plant and animal species found nowhere else in the world. Preserving this biodiversity is essential for maintaining ecological balance, ecosystem stability, and the ecosystem services that support human well-being.

Water Resources: Skadar Lake is the largest freshwater lake in the Balkans, rich in plant and animal life. This lake provides an important source of drinking water for the local population, irrigation for agricultural areas, and supports biodiversity.

[32] Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio economic analysis of the Nature Park River Zeta, The Nature Conservancy

Cultural Heritage: The Skadar Lake basin area is rich in cultural and historical heritage, with numerous settlements, churches, monasteries, and archaeological sites. Preserving this cultural wealth can contribute to promoting sustainable tourism and the economic development of the region.

Sustainable Agriculture: Traditional agricultural practices, such as the cultivation of olives, grapevines, and vegetables, are prevalent in the Skadar Lake region. Promoting sustainable agriculture can contribute to preserving rural communities and supporting local economic development.

Ecotourism: The Skadar Lake basin attracts many visitors due to its natural beauty, rich flora and fauna, and opportunities for activities like boat rides, birdwatching, and hiking. Developing ecotourism can create new jobs and enhance the local economy.

By integrating nature conservation, sustainable resource use, and economic development, the Skadar Lake basin has the potential to become a model for promoting sustainable development at both regional and global levels. This approach would balance nature protection with the needs of the local population and foster a harmonious relationship between humans and nature.

15.1.2. How do you evaluate changes and successes (what are the goals and which indicators are used)?

(The following text does not reference documents from the database but represents a consultant's proposal.)

Evaluation of changes and successes in the Skadar Lake Basin Biosphere Reserve can be conducted by monitoring progress toward established goals and analyzing specific sustainable development indicators. Potential goals and indicators for assessing changes and successes include:

Biodiversity Conservation

Goal: Preserve populations of endemic species and increase the number of species and their habitats.

Indicators: Number of endemic species, habitat conditions, number of newly recorded species, trends in populations of endangered species.

Sustainable Use of Natural Resources

Goal: Ensure sustainable management of water resources, forests, and agricultural land.

Indicators: Lake water levels, forest ecosystem health, area under organic farming, soil and water quality.

Economic Development

Goal: Diversify the local economy and reduce economic dependence on tourism.

Indicators: Unemployment rate, revenue from agriculture and rural tourism, number of new jobs in sectors supporting sustainable development.

Socio-Cultural Aspects

Goal: Preserve cultural heritage and traditional communities.

Indicators: Preservation of cultural monuments, number of visitors participating in local events and traditional activities, level of satisfaction among local residents.

Education and Awareness

Goal: Increase awareness of the importance of nature conservation and sustainable development.

Indicators: Number of educational programs on nature protection, participation of local residents in environmental initiatives, level of knowledge and awareness about ecological issues.

15.2. If tourism is a primary activity

15.2.1. Describe the types of tourism and available facilities. Summarize the main tourist attractions in the proposed biosphere reserve and their locations.

Tourism is a highly developed activity in the Skadar Lake Basin area. Unique landscapes, natural and biodiversity values, and the area's protection as a National Park (IUCN Category II) attract an increasing number of tourists each year.

The Capital City of Podgorica – Cultural Heritage – includes Stara Varoš and the Clock Tower, the archaeological sites of Duklja and Medun, as well as natural attractions such as the canyons of the Morača and Cijevna rivers. Activities like camping, recreation, and hiking in the Kučka Mountains, touring the panoramic route "Circle Around Korita," and visiting scenic viewpoints are key elements of the city's tourism offering. In addition, cruising on Skadar Lake, birdwatching, enjoying lake landscapes, visiting numerous authentic villages in the area, and exploring the diverse eno-gastronomic offerings—which combine Mediterranean and continental national cuisine with an extensive selection of high-quality, indigenous wines—form part of the high-quality tourism experience. https://podgorica.travel/wp-content/uploads/2021/06/STRATEGIJA.pdf, pp. 16-20

Within a 10- to 15-year period, Podgorica aims to become a recognized urban tourist destination, offering its cultural, historical, and traditional values through high-quality and professionally designed products, experiences, and activities. By innovatively enhancing the city center, creating green urban islands, and developing areas along the Morača River (and other rivers), it will establish experiential zones that attract both residents and visitors. https://podgorica.travel/wp-content/uploads/2021/06/STRATEGIJA.pdf, p. 36

In the Strategiji razvoja turizma Crne Gore sa Akcionim planom 2022-2025 (Montenegro Tourism Development Strategy 2022-2025 with the Action Plan) Podgorica is grouped with Danilovgrad in Cluster 6 – The Capital City and Central Region (p. 136).

In the Bojana River Basin area, tourism is the most significant economic sector, sustaining the entire region. Tourists primarily visit this area for summer recreation on the beaches.

Ulcinj, with its beaches, the Bojana River, Ulcinj Salina (salt pans), Lake Šas, Old Town, and other attractions, holds exceptional potential for the development of high-quality tourism. Long Beach is one of the most attractive surfing destinations in the Mediterranean, while Ulcinj Salina, a protected area encompassing 14.5 km² of salt pans, serves as a habitat for over 241 bird species—representing 50% of all recorded bird species in Europe.

The Valdanos Bay and its olive groves are the largest living monument to olive cultivation in Montenegro, with outstanding economic and ecological value.

In addition to its natural assets, Ulcinj, with its 2,500 years of history, three religions, and rich cultural heritage, has the potential to enhance cultural tourism. Other forms of tourism in Ulcinj include sports, health, rural, and hunting tourism. Bird hunting attracts a small group of tourists with specialized interests. https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816 p. 124.

"Approximately 32 kilometers of the Adriatic coast represent the most important economic and commercial resource of this municipality. Tourism is the most significant economic sector, sustaining the entire region. Tourists primarily visit this area for summer recreation on the beaches. In addition to beach tourism, Ulcinj also offers sports, health, rural, and hunting tourism. Bird hunting attracts a small group of tourists with specialized interests... The main attraction for tourists is the more than 15-kilometer-long sandy part of Long Beach, the Ada, and Small Beach, which is located in the town itself. The sandy and long beach at Ada Bojana (2880m) is the main center for nudism on the Adriatic coast.

Valdanos Bay (380m) is located to the west of Ulcinj. The area behind the beach still does not benefit from the development of beach tourism but has interesting cultural and natural attractions. Ulcinj Salina and Lake Šas are exceptionally attractive areas for birdwatching. Moreover, near Lake Šas, the ruins of the city of Svač can be found. However, aside from restaurants and a small hotel, there is almost no tourist infrastructure around the lake. Besides the primary activity of the Salina (salt production, processing, and distribution), this area is suitable for the development of ecotourism, particularly the rare type of tourism – birdwatching – which, according to experts, is more profitable than nautical tourism." http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf p. 42.

Municipality of Bar: "Coastal (beach) tourism is the main reason for the arrival of most domestic and foreign tourists, particularly those with lower purchasing power who are tolerant of certain deficiencies in the offerings. For these tourists, the offer of sun, sea, and beach with simple amenities, complemented by cultural and historical values, is sufficient. In addition to stationary guests, there is great interest in the Bar Riviera from daily visitors, especially from Podgorica, and on weekends, also from the northern municipalities of the country. These visitors come for day trips, most often to Sutomore, by train or private car. https://bar.me/wp-content/uploads/2020/02/STRATESKI-PLAN-RAZVOJA-OPSTINE-BAR-2020-2025-nacrt.pdf p. 33. In addition to beach tourism, the Municipality of Bar seeks to enhance its offerings in the hinterland, focusing on the resources of Skadar Lake and the cultural heritage of Stari Bar (Old Bar). "Part of Skadar Lake National Park is located within the municipality of Bar, featuring beautiful beaches such as Murići, Pješačac, and others." https://bar.me/wp-content/uploads/2020/02/STRATESKI-PLAN-RAZVOJA-OPSTINE-BAR-2020-2025-nacrt.pdf p. 6. The same document provides a description of other forms of tourism in the Municipality of Bar. A hallmark of the Bar Riviera is its olive groves, and the local population is recognized as a producer of olive oil.

The Old Royal Capital of Cetinje is the cultural and historical heart of Montenegro. It holds significant potential for the development of active tourism connected with nature, such as hiking, cycling, mountain trekking, water sports, and more. This potential is enhanced by the presence of a national park within its territory, numerous caves, including the famous Lipa Cave, and some of Montenegro's most picturesque sites, such as Rijeka Crnojevića, Žabljak Crnojevića, and Njeguši. Cetinje is also home to numerous cultural landmarks, including the Mausoleum on Lovćen, the Mausoleum on Orlov Krš, King Nikola's Palace, and many other historical sites. https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816 p. 134- 136.

Danilovgrad is recognized as a destination for religious tourism, thanks to the monasteries of Ostrog and Ždrebaonik. It is also known for its relatively well-preserved architecture in the town center, featuring distinctive old balconies. The natural and scenic values of the Zeta River, designated as a nature park, make Danilovgrad an increasingly popular destination for one-day excursion tourism. https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816
(p. 136).

The territory of Danilovgrad can be conditionally divided into three altitude-based zones, which correspond to three tourism zones:

- Zone up to 1,000 meters above sea level (masl): Suitable for the development of rural tourism, recreation, hunting and fishing, agriculture, and eco-food production (Vukotica and settlements below Vukotica and Studeno).
- Zone up to 1,300 masl: Suitable for recreation, hunting, nature stays with ambient natural and landscape features, and sports-recreational tourism (Studeno and Vukotica).
- Zone up to 1,600 masl (Katuns): Offers opportunities for sports-recreational, hunting, health

tourism, and leisure activities with eco-food offerings and enjoyment of natural beauty. https://www.auzp.me/wp-content/uploads/2021/09/studija-zeta-zavrseno.pdf (p. 150)

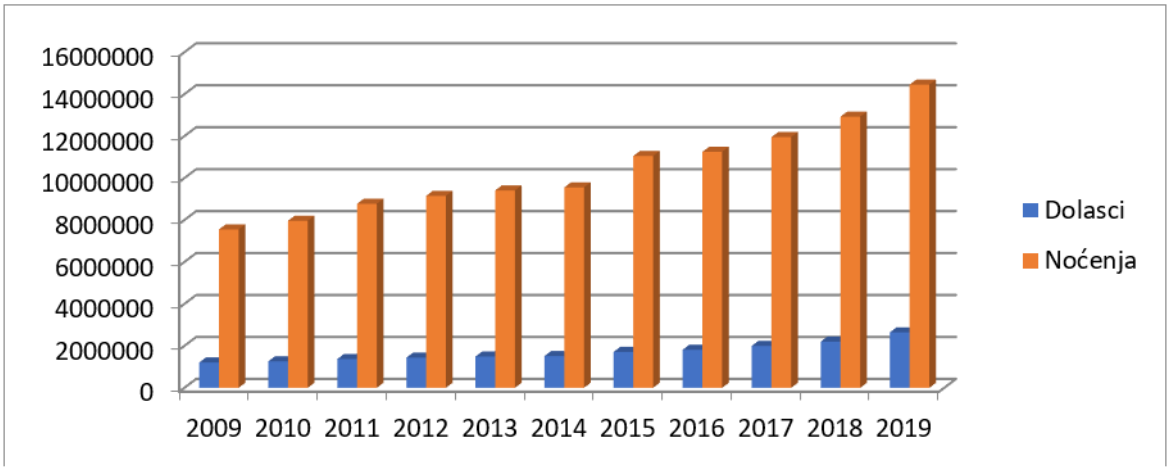
Tourism activities in the Skadar Lake Basin, based on the analysis of documents collected in the database pertaining to tourism, development, and planning documents of municipalities within the biosphere reserve, can be grouped as follows:
Ecotourism: Skadar Lake is ideal for nature and bird enthusiasts. Visitors can enjoy boat rides on the lake, bird watching, hiking, and exploring pristine nature.
Cultural Tourism: The Skadar Lake Basin area is rich in cultural monuments, such as monasteries, churches, ancient towns, and traditional villages. Visitors can delve into Montenegro's rich history and cultural heritage.
Active Tourism: The Skadar Lake Basin offers opportunities for activities such as hiking, cycling, fishing, sailing, diving, and kayaking.
Rural Tourism: Visitors can experience authentic rural life by visiting village households, participating in traditional activities, tasting local food and beverages, and staying in rural homes.
Gastronomic Tourism: Although still underdeveloped, this type of tourism is based on a network of wine routes and honey routes mapped in the Skadar Lake area.
Coastal (Beach) Tourism: This is the primary motive for most domestic and international tourists visiting the coastal areas of the Bar and Ulcinj municipalities.

The Montenegro Tourism Development Strategy with an Action Plan for 2022-2025 defines and describes specific forms of tourism, such as: rural tourism, cultural and religious tourism, health tourism, sports and recreational tourism, ski tourism, adventure tourism, MICE tourism (meetings, incentives, conferences, and exhibitions), nature-based tourism (hiking, biking, mountaineering), camping and glamping, golf tourism, casino tourism, etc. https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816, p. 102- 115.
Conclusion: The types of tourism, tourist activities, and facilities identified and described across various documents have been summarized in the text above.

15.2.2. How many visitors come to the proposed biosphere reserve each year? (Differentiate between day visitors and overnight guests, those who visit only the proposed biosphere reserve, and those passing through to another destination). Is there a trend of growth or decline, or a specific goal?
Statistical research on tourist arrivals and overnight stays is conducted by the Statistical Office (MONSTAT) based on the Law on Official Statistics and the System of Official Statistics ("Official Gazette of Montenegro," No. 18/12 and No. 47/19) and the Annual Plan of Statistical Research.
Data sources include administrative databases (Local Tourist Organizations, Ministry of Internal Affairs, Ministry of Tourism, Ecology, Sustainable Development, and Regional Development, National Tourism Organization, Secretariats of Local Governments), as well as guestbook records, which all entities providing accommodation services to tourists in collective accommodation are required to maintain. Data specific to the Skadar Lake Basin are not processed or available; instead, they are recorded individually for each of the eight municipalities within the reserve area and collectively at the national level.

The trend of tourist growth is evident (with the exception of 2020 and 2021 due to the situation caused by the COVID-19 pandemic). "During the period from 2009 to 2019, Montenegro recorded a constant

increase in tourist arrivals and overnight stays. In 2019, Montenegro's tourism sector experienced the second-highest growth in international tourist arrivals in Europe, with a 20.84% increase compared to 2018. Specifically, Montenegro, with a population of just 0.6 million, was visited by over 2.6 million international tourists." – Montenegro Tourism Development Strategy with Action Plan for 2022-2025, https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816



Izvor: Uprava za statistiku (MONSTAT), obrada Ministarstvo ekonomskog razvoja

The growth trend of visitors at the national level in Montenegro for the period 2009–2019

Based on visitor data for individual municipalities within the scope of the proposed Biosphere Reserve (BR), it is possible to make a rough and quick estimate of the total number of visitors per year.

Municipalities within the scope of BR	Number of visitors in 2019
Bar	210789
Cetinje	25970
Danilovgrad	3979
Podgorica with Golubovci	186207
Kolašin	52818
Nikšić	16606
Tuzi	2266
Ulcinj	425808
TOTAL	924443

Data source Research on tourist arrivals and overnight stays, total, 2019, Monstat https://www.monstat.org/userfiles/file/turizam/din2019uk/Istra%C5%BEivanje%20o%20dolascima%20i%20no%C4%87enjima%20turista%20ukupno%20-%202019.pdf

Given that a certain number of tourists remain unregistered each year, the actual number of visitors is likely higher. However, these figures should be taken with caution as they pertain to the entire territories of the municipalities within the scope of the proposed Biosphere Reserve (BR). Only parts of these municipalities fall within the BR area.

Conclusion: Data on the number of visitors is not available at the basin level and needs to be consolidated based on MONSTAT's statistical data for individual municipalities. Records of tourist visits to Skadar Lake National Park are available, and growth trends are regularly monitored on an annual basis.

15.2.3. How Are Tourism Activities Currently Managed?

For the proposed Biosphere Reserve (BR) area, there is no unified, centralized approach to managing tourism activities. Most tourism activities are led by the private sector, including travel agencies, tour operators, and the local community, with support from municipal tourism bodies (local tourism organizations). At the local level, the municipalities of Podgorica, Danilovgrad, and Bar have developed their own tourism strategies to define priorities for growth and sustainable sector development. The Public Enterprise for National Parks of Montenegro, which manages Skadar Lake National Park, has recognized tourism as a key area for the development of this protected area. Accordingly, a set of tourism-related activities has been included in the park's Management Plan.

The Ministry of Economic Development initiated the development of a new Tourism Development Strategy of Montenegro for 2022–2025 in 2020, along with an action plan (Strategije razvoja turizma Crne Gore 2022-2025. godine s Akcionim planom) This strategy, spanning a four-year period, aims to ensure more effective strategic tourism planning, particularly considering the altered realities brought about by the COVID-19 pandemic and other potential challenges. The strategy represents an overarching strategic document that identifies opportunities for further tourism development, taking into account the principles of sustainability, alignment, potentials, development needs, and the demands of the economy, as well as domestic and international markets. The preparation of the document involved a wide range of stakeholders at both the national and local levels, including partners from the public and private sectors.

The main guidelines for future activities identified in the strategy are:

- Enhancing the quality of tourism products on the coast relative to their quantity.
- Diversifying the tourism product by blending urban and rural offerings, with an emphasis on year-round availability and the Northern region of Montenegro.
- Encouraging "green" accommodation facilities, such as hotels and similar establishments with eco-characteristics (e.g., wild beauty, eco-lodges, eco-villages).

This document defines the strategic goal for tourism development as follows:
"Through investment and formalization of tourism flows, Montenegro affirms itself as a globally recognized tourism destination with reduced seasonality, moderated regional imbalance, and prioritization of tourism in development policies." The realization of this goal involves seven (7) key operational goals in tourism. From the perspective of managing tourism activities, Operational goal 7, Montenegro - A Globally Recognized Tourism Destination, is particularly significant as it is based on destination management.

"Destination Management (DMO – Destination Management Organization) entails the process of managing all elements that constitute a destination, i.e., coordinated actions aimed at improving the

economic, socio-cultural, and ecological dimensions of a tourism destination. This new concept involves comprehensive management, not just destination marketing. Therefore, destination management adopts a strategic approach to connect all stakeholders, who often act in a disjointed manner, to improve destination governance." https://www.gov.me/dokumenta/db71ea87-f50f-4aca-98ae-91d8af502816 (str 118)
This objective also incorporates the concepts of destination marketing, promotion, and branding.

The Tourism Development Strategy divides Montenegro as a tourist destination into eight tourism clusters. These clusters differ based on socio-cultural, historical, traditional, natural, and economic characteristics and form the foundation for Montenegro's unique and specific tourism products:

1. Ulcinj with Ada Bojana
2. Bar Riviera with Skadar Lake
3. Budva Riviera
4. Bay of Kotor
5. Cetinje (the Old Royal Capital)
6. The Capital City (Podgorica) and the Central Region
7. Bjelasica, Komovi, and Prokletije Mountains
8. Durmitor and Sinjajevina Mountains with the Tara and Piva Rivers

TURISTIČKI KLASTERI

Clusters 1, 2, 5, and 6 belong to the Skadar Lake basin. For each of these clusters, development visions have been defined based on their specific characteristics.

TOURISM CLUSTER 1 - Ulcinj with Ada Bojana

VISION OF CLUSTER DEVELOPMENT:

Ulcinj with Ada Bojana is becoming a high-quality, year-round destination, offering high-standard

accommodation and a diversified tourism experience focused on nature (beach tourism, birdwatching, hiking, walking tours within the Ulcinj Salina, with tourist valorization of "salt", horseback riding, and more), sports and recreational activities (kitesurfing, paragliding, windsurfing, and others), cultural and historical tourism, drawing attention to numerous legends, historical events (e.g., Ulcinj as a slave market and a renowned pirate center in the 17th century), submerged ships and galleys from various eras, and its rich cultural heritage.

TOURISM CLUSTER 2 - Bar Riviera with Skadar Lake
VISION OF CLUSTER DEVELOPMENT
The Bar Riviera with Skadar Lake - a unique destination featuring high-quality hotels with developed MICE (Meetings, Incentives, Conferences, and Exhibitions) and spa & wellness offer, attracting tourists year-round. The destination boasts a typical Mediterranean gastronomic experience, annual events, and concerts, along with a well-organized cultural tourism offering.
The Skadar Lake area - a destination for active holidays, offering activities such as fishing, water sports, hiking, and cycling trails. It is also recognized as a region known for cultivating and producing wine from indigenous Crmnica grape varieties.

TOURISM CLUSTER 5 – The Old Royal Capital Cetinje
SCENARIO/VISION
The Royal Capital Cetinje - a destination with a year-round offer, developed based on recognized cultural and natural landmarks, with a focus on active, cultural, and event-based tourism.

TOURISM CLUSTER 6 – The Capital City with the Central region
VISION OF CLUSTER DEVELOPMENT
The Capital City with the Central Region, which includes the Capital City of Podgorica, the municipalities of Danilovgrad and Tuzi, represents destinations for excursion, eno-gastronomic, MICE, religious, and family tourism.

Conclusion: Although the Skadar Lake Basin is unique in terms of its natural and cultural heritage, as recognized by local government units in their strategic documents, tourism plans and offers are still limited by the administrative boundaries of the municipalities. On the other hand, the private sector integrates resources from the entire area into its offers, which is a good approach for promoting the region and managing tourism activities. However, the tourism product offer is largely left to individuals, accommodation providers, and tour operators, which contributes to an uneven overall tourism offer. To overcome this issue, it is necessary to further engage local stakeholders who will work on creating and managing the tourism offer, as well as proposing changes to policymakers (bottom-up approach). Additionally, a unified tourist brand for the biosphere reserve needs to be developed. The new strategic framework for tourism development up to 2025 is based on clusters, but one of the operational goals recognizes destination management, which is a good concept for a nature reserve that could be branded as a special destination.

15.2.4. Possible positive and/or negative impacts of tourism now or in the future and how they will be assessed (related to section 14)?

In recent years, tourism has been expanding and is definitely bringing benefits to the local population.

However, it also represents a latent pressure on ecosystems. "In the area of the Park (NP Skadar Lake) and its contact zone, there has been more intensive development of economic activities in recent years, primarily oriented towards excursion tourism. Thus, in the areas of Vranjina, Murići, Gavrilovac, Pješačac, Plavnica, and Virpazar, there is tourist infrastructure in the form of accommodation and catering facilities, most of which are privately owned."
"Of course, one of the imperatives for managers, as well as other decision-makers in the system, is to increase the number of tourist activities, which undoubtedly brings benefits to the area and the local economy. However, such activities must not negate the primary mission, which is the protection of sensitive natural ecosystems, habitats, and species. Careful management of economic development processes based on sustainable and ecological tourism must be compatible with the protection of natural resources as a whole, considering the complexity of social and other flows, which have very direct repercussions on the implementation of the protection and sustainable development goals of the area." **Draft Protection Study for NP Skadar Lake** p. 111

Negative Effects of Tourism
Conversion of Natural and Semi-Natural Areas into Tourist Infrastructure
"The effects of tourism are reflected in the conversion of natural and semi-natural areas into tourist infrastructure (construction of accommodation units, catering facilities, and an increase in the number of vessels used for transporting tourists), thereby increasing various pressures on the area, primarily on Skadar Lake." **Draft Protection Study for NP Skadar Lake**, p. 111.

Abandonment of Traditional Lifestyles
The impact of the increase in visitors on the local population in this area is reflected in the abandonment of traditional ways of life (fishing and agriculture) and the shift towards the construction of tourist facilities (often unplanned and incompatible with the surroundings and traditional architecture) in order to engage in tourism activities.

Pollution (Wastewater and Solid Waste)
"As a growing pressure on the lake, the increasing development of settlements and tourism, along with the unresolved issue of wastewater treatment and solid waste disposal, represents a significant source of adverse effects on the ecosystem." **Draft Protection Study for NP Skadar Lake**, p. 57.

Positive Effects of Tourism
Improvement of the Local Economy
The development of tourism activities represents a significant source of financial benefits for the local population, which is involved in providing various services. Tourists create demand for local products and services, which can stimulate the growth of small businesses and the opening of new jobs.

Preservation of Cultural and Historical Heritage
The development of tourism offerings that include visits to historical sites, churches, monasteries, fortresses, and traditional villages provides opportunities for the enhancement and preservation of the history and culture of the region. Promoting traditional ways of life and customs through cultural events, festivals, and other activities contributes to the preservation of local identity and pride, while simultaneously generating income.

15.2.5. How will these impacts be managed, and by whom?

The Special Purpose Plan for the area of the NP Skadar Lake defines a series of measures and recommendations for preventing negative environmental impacts, some of which are related to the tourism sector. https://epa.org.me/wp-content/uploads/2018/09/SPU-za-PPPN-Skadarsko-jezero-avgust-2018.pdf pp. 146 - 152

When it comes to the construction of tourist facilities, the following recommendations are provided for investors:

- The construction of buildings must respect the characteristics of traditional mountain architecture. Natural materials such as stone, wood, and brick should be used for construction. Under certain conditions, larger (hotel) buildings can have reinforced concrete or steel structures.
- The buildings must blend into the landscape, which consists of low tree forests. The maximum height of the planned buildings is limited, except for hotel facilities, which can be taller. In addition, all buildings must follow the terrain's configuration in such a way that no part of them exceeds the height of the existing vegetation or the natural visual boundaries, in order to avoid threatening the exceptional natural value.
- In terms of design, the new buildings should be representative, blend with the surroundings, and be made of high-quality materials with modern architectural solutions.
- It is necessary to preserve the characteristics of authentic local architecture when developing all new buildings. In addition, the National Strategy for Sustainable Development of Montenegro until 2030, as **specific measures for the development of the tourism sector**, outlines the following:

– Greening tourism and improving resource efficiency from the following aspects:

- Energy consumption – There are significant opportunities for investment in energy-efficient forms of energy supply in hotels and hospitality facilities.
- Water consumption – Improving the efficiency of water use and introducing technological innovations for water conservation.
- Waste generation – Reducing the amount of waste from tourist activities and improving the management of existing waste.
- Biodiversity protection – Enhancing the effectiveness of protection and restoration of sensitive ecosystems.

– Preserving the attractiveness of the destination in the long term through:

- Careful planning and construction of new capacities,
- Development of types of tourism that positively impact the environment and do not endanger natural and heritage values,
- Efficient tourist facilities (especially in terms of water and energy consumption), with the application of new technologies for heating and cooling of buildings; replacing non-renewable energy sources with renewable ones (it is estimated that the potential for energy savings in tourism is 20%, and this can primarily be achieved through the use of solar energy),
- Raising service quality while reducing environmental impact (pollution control, especially wastewater treatment),
- Ensuring a higher degree of waste recycling, increasing the use of local food products in the tourist offer, etc.

– Green innovations, which involve the application of existing standards as well as the introduction of new ones, are of great importance for the greening of tourism:

- Promotion and creation of an environment for the development of green innovations, and stimulating companies' interest in recognizing the potential benefits of greening tourism.
- Creation of better price signals and market instruments that can reduce costs caused by negative ecological externalities.

- Development of types of tourism that are favorable to the environment, along with better planning of new service capacities

Conclusion: The positive and negative impacts have been partially recognized through management plans and protection studies, but they are not described at the ecosystem, habitat, and species levels, and there is no definition of how these impacts will be managed. Data for areas outside the Skadar Lake National Park is missing, and the chapter has not been completed.

15.3. Agricultural (including grazing) and other activities (including traditional and customary):
15.3.1. Describe the types of agricultural (including grazing) and other activities, the area covered, and the individuals involved (including men and women).
From the sea to the interior of Montenegro, plains appear only in the coastal areas (12,000 ha) and the Skadar Lake basin (42,000 ha). These are considered true plains. In their surroundings, on the slopes and terraces, there are segmented areas with no significant continuity, depending on the geological structure, type of rocks, and the steepness of the terrain. Terraced land in this part of Montenegro is very important for agriculture, as it reaches up to 500 meters above sea level but is still influenced by the Mediterranean climate, allowing for the cultivation of citrus fruits, early and winter vegetables, ornamental plants, and flowers. https://www.gov.me/dokumenta/1e9c16c3-8814-49ab-ba89-de4f60f796af (p. 26) The Bjelopavlići and Zeta plains, thanks to their natural resources, climate conditions, and pedological characteristics, are among the areas most suitable for agricultural activities. Despite the great potential for agricultural development, the level of agricultural production can be considered low.
Agricultural activity in the Skadar Lake basin mainly involves individual household activities, with organized and industrialized production on a smaller scale. All branches of agricultural production are present.

Animal-based food production: cattle farming, sheep farming, pig farming, poultry farming, goat breeding, beekeeping.
Agricultural land in the territory of the capital city, Podgorica, amounts to 23,555 ha (2011), representing 12% of the total agricultural land in Montenegro. "In the Podgorica area, livestock farming is concentrated in the northern part of the region, where cattle, sheep, and goats are primarily raised, or where intensive breeding and fattening of livestock is organized in closed farm environments. Data indicates a decline in livestock farming, which is primarily a result of depopulation in rural areas. It is still predominant in rural areas and remains the main occupation of the rural population." https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Finvest.podgorica.me%2Fwp-content%2Fuploads%2F2020%2F12%2F3.-Prijedlog-Strateskog-plana-razvoja-Glavnog-grada-Podgorice-za-period-2020.-2025.-godine.docx&wdOrigin=BROWSELINK
"The number of livestock overall and individually by species is unfavorable for the areas that can be used for livestock farming. In Podgorica, a trend of poultry farming development has been observed, which tripled between 2007 and 2012. A similar growth has also been noticed in pig farming, with an increase of about 10% compared to 2007."
https://www.sekretarijat-za-plurzs.podgorica.me/tekstualni-dio/ (p. 67)

Livestock farming as a branch of agriculture holds a significant position in the municipality of Danilovgrad. The situation is particularly favorable in pig farming and poultry farming, where it ranks first in Montenegro in terms of production, primarily due to the privatized companies: RJ "Svinjogojska

farma" and RJ "Koka Product" – the Martinići farm. https://s3.eu-central-1.amazonaws.com/danilovgrad-media/files/1600501772-strateski-plan-razvoja-opstine-danilovgrad-2019-2023-godina.pdf

In the municipality of Tuzi, livestock production is one of the most important sectors for the development of the municipality, given the terrain configuration and natural resources. However, this sector is not sufficiently developed, primarily due to fragmented farms and traditional, extensive production methods. Cattle farming is the most important sector in livestock production, with a dual production focus (milk and meat), with the greatest emphasis placed on milk production. https://tuzi.org.me/wp-content/uploads/2021/05/Strateski-plan-razvoja-TUZI-4.pdf

Agriculture, along with tourism, is one of the key economic activities in the **municipality of Ulcinj**: agricultural land totals 7,523 hectares, with the largest portion being arable land, covering 5,424 hectares (according to cadastral data). http://www.ul-gov.me/upload/document/stp_ulcinj_2022-2028_final_(2).pdf (p. 50). "The main form of agricultural production organization is small private farms with small plots, with an average property size of around 2 hectares. The size of the properties is decreasing due to inheritance divisions." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a (p. 91). "The most common activities are: livestock farming, with around 2,500 dairy cattle, about 6,000 sheep, 20,000 poultry, 1,200 goats, pigs, etc., and approximately 3,000 beehives. 'Ulcinj field is a valuable area for the intensive development of agriculture and can meet the needs of the local population and tourist facilities. This way, tourism development in the region is supported, and even more importantly, a pleasant rural atmosphere is created, enriching the landscape in an artistic sense." https://www.gov.me/dokumenta/8a956d99-26a1-4925-8cdb-fd92acc2676a (p. 29).

"**The municipality of Bar** has around 23,530 ha of agricultural land, with a structure dominated by orchards, meadows, arable land, gardens, and vineyards. The total forest area in the municipality of Bar is 7,020 ha, with the majority being deciduous forests (92.82%), while coniferous forests account for 7.18%. The forests in the municipality of Bar also have a protective function (soil erosion, wind protection)." https://bar.me/wp-content/uploads/2020/02/STRATESKI-PLAN-RAZVOJA-OPSTINE-BAR-2020-2025-nacrt.pdf (p. 6).

"Statistical data regarding livestock production in the municipality of Bar report around 2,217 cattle, 119 pigs, 4,119 sheep, 57 horses, and approximately 10,000 poultry, along with around 3,100 beehives."

Plant-based Food Production:

In recent years, there has been a noticeable growth trend in all areas of plant production. Agricultural production is characterized by a large number of small farms growing various crops. These farms are not specialized; most are mixed-type farms. The most common forms of production are vegetable growing, fruit farming, viticulture, olive cultivation, and citrus farming (in Bar and Ulcinj). A trend of reduced grazing is present in the area due to the decline in livestock activities, a decrease in the number of livestock, and the fragmentation of plots, which leads to the overgrowth of meadows and the succession of ecosystems.

Although agricultural production has drastically declined compared to the mid-20th century, available data shows an increase in this production and a general interest in the development of agricultural activities in the last decade. According to data from the Ministry of Economic Development and Tourism (MERT), in 2019, there were 65 registered rural households, the number increased to 119 in

2020, to 189 in 2021, and by the end of 2022, around 240 rural households were registered in Montenegro. https://www.gov.me/dokumenta/6b450bde-3120-4cb0-84de-7c851021a7fa (p. 14) The reason for this lies in the incentivizing measures and agricultural programs such as MIDAS and IPARD, as well as the fact that the local population recognizes the potential in the development of agritourism activities. It should also be noted that the total number of households providing tourist and hospitality services is higher than this number, but these are households that are not registered in accordance with all applicable legal regulations.

Changes in the demographic structure, along with pronounced urbanization, have caused sociocultural as well as economic changes. Demographic data for the agricultural and overall population in Montenegro show that the reduction in the active agricultural population is occurring at a significantly faster rate than the growth of the total population.

In rural households, the age structure is unfavorable, and individual production is neglected. In most cases, younger people engage in agriculture as a secondary activity (on weekends or after regular working hours). This demographic constellation negatively impacts the market orientation of households and slows down the modernization of agricultural production.

"The age structure of rural tourism operators in Montenegro is extremely unfavorable. Montenegro falls into the category of countries with an aging population, and in the last fifty years, the natural population growth has decreased by 60%. In terms of gender structure, according to the 2011 census, about 50.6% of the population were women. Until 2011, there was a strong trend of mass migration from the northern part of Montenegro, an area where rural tourism is rapidly developing, to central and coastal regions. According to data from the Agricultural Household Workforce Survey (2016), about 34% of household members were in the most active working age (up to 44 years), while 44% were over 55 years old. Given the strong link between rural tourism activities and agriculture, it is clear how this data also reflects on the operators of rural tourism activities. Data on the employment structure of individuals on family farms shows that about 9.5% had no education or did not finish primary school, 28% had completed primary school, while the majority, 53%, had completed secondary education of any profile."
https://www.gov.me/dokumenta/6b450bde-3120-4cb0-84de-7c851021a7fa (p. 27).

Conclusion: Consolidated data at the level of the Skadar Lake Basin does not exist. Spatial and urban planning documents of municipalities, as well as Strategic Development Plans, provide insight into the areas and percentages of agricultural and arable land at the level of local government units. They also offer detailed data on all branches of agricultural production. Data from the Register of Agricultural Producers and the Directorate for Food Safety, Veterinary, and Phytosanitary Affairs provide information on the number of farms, the number of livestock, and areas under specific crops.

Based on the published final results from Monstat, the Statistical Office of Montenegro, regarding the 2010 agricultural census, the structure of family agricultural farms by municipalities within the Skadar Lake Basin is as follows:

Municipality	Agricultural Land	Total Arable Land	Plots and Gardens	Orchards	Vineyards	Meadows	Pastures
Podgorica*	62.164 ha	20.891 ha	6.469 ha	719 ha	3.248 ha	10.454 ha	39.097 ha
Danilovgrad	11.462,9 ha	388,1 ha	284,7 ha	57,9 ha	45,5 ha	9.054,3 ha (total	

						including pastures)	
Ulcinj	11.502 ha	6.501 ha	3.481 ha	820 ha	95 ha	2.105 ha	4.729 ha
Bar	4.166,6 ha	2.442,7 ha	264.9 ha	244,8 ha	25,8 ha	615,8 ha	1.289,9 ha
Kolašin	14.243 ha	8.629 ha	157,7 ha	4.6 ha	/	8411,7 ha (total including pastures)	
Nikšić	54.441 ha	12.744 ha	3.609 ha	395 ha	28 ha	8.711 ha	41.697 ha

*Including Tuzi and Golubovci

The presented data pertains to the total territory of each municipality, not solely to the parts that belong to the Skadar Lake Basin.

15.3.2. Indicate possible positive and/or negative impacts of these activities on the objectives of the biosphere reserve (section 14).

"The greatest negative impact on the pollution of Skadar Lake comes from agriculture. The lake's waters in agricultural catchment areas are prone to the accumulation of nitrogen and phosphorus compounds, leading to the intensification of the eutrophication process. This results in a decline in water quality, a decrease in the abundance of zooplankton, and changes in the composition of species within the zooplankton community." (Draft Protection Study for Skadar Lake National Park, p. 57).

A similar situation exists with pollution in the Zeta River, which primarily originates from agricultural production in the Bjelopavlići Plain. "Large agricultural areas are a diffuse source of significant pollution. The intensification of agricultural production in the region in recent years has led to increased use of artificial fertilizers, pesticides, and biostimulants. These substances are washed from agricultural land and end up in the waters of the Zeta. Additionally, due to a lack of awareness, farmers often dispose of excess substances directly into natural habitats—most commonly in nearby gullies or canals—where their concentration increases, thereby amplifying their impact on biota and water quality. Waste and excrement from livestock farms are not adequately treated or recycled, representing a specific source of nitrogen and phosphorus. Instances of tree and vegetation die-offs have been observed in areas where organic waste is frequently dumped, contributing further to the eutrophication processes in aquatic environments. A potential solution to these issues is the adoption and implementation of good agricultural practices." https://www.auzp.me/wp-content/uploads/2021/09/Socio-ekonomska-analiza-PP-Rijeka-Zeta.pdf (str 34)

"There are several companies in this area that, through their activities, represent potential polluters of the Zeta River and its surroundings. These include: Dairy Lazine, the slaughterhouse PRIMATO P DOO Herceg Novi, A.D. Mermer, Šišković DOO, the pig farm Niksen Čavor, the chicken farm Agromont, and the urban settlements of Danilovgrad and Spuž." https://www.auzp.me/wp-content/uploads/2021/09/studija-zeta-zavrseno.pdf (pp. 152-153)

Negative impacts not mentioned in the analyzed documents but likely possible or already occurring on a smaller scale include the introduction and spread of invasive species and the loss of habitats due to the conversion of natural habitats into agricultural land.

A potential positive impact on the biosphere reserve is the development of non-invasive traditional agriculture that adheres to traditional methods and local ecological practices. This approach can contribute to the preservation of biodiversity and ecosystems within the basin. Additionally, integrating sustainable agricultural practices can support the conservation of natural resources, including soil and water, aligning with the goals of sustainable development.

There is significant potential for organic production in the Skadar Lake Basin. Since 2005, "Monteorganica," an accredited certification body for organic agriculture under the requirements of the MEST EN ISO/IEC 17065:2013 standard, has been conducting certification of organic production. A list of certified organic producers in Montenegro by municipality is available at this link: https://orgcg.org/pregled-proizvodjaca-organske-poljoprivrede/

In Montenegro, there is currently no LAG (Local Action Group) partnership, but several initiatives have been underway since 2019. According to the Rural Development Strategy, local development strategies will be prepared by recognized LAGs in the future as "lower-level" development documents. Given Montenegro's specific characteristics concerning the population size in certain municipalities, it is necessary to adopt EU rules that define LAGs. The European Commission responded positively to Montenegro's request, paving the way for the establishment of partnerships and the full implementation of the LEADER approach through IPARD III (i.e., the population of each LAG area in Montenegro must exceed 3,000 inhabitants — a derogation from the 10,000-inhabitant rule granted by the European Commission). To strengthen capacities before the full implementation of the LEADER measure, it is proposed to fund a project similar to LEADER using the national agricultural budget, aiming to develop at least one LAG with a prepared and adopted local development strategy.

Conclusion: Positive and negative impacts are only partially recognized in the analyzed documents.

15.3.3. Which indicators are or will be used to assess the state and its trends?
The analyzed documents do not provide indicators for assessing the state and trends in agricultural activities. Indicators need to be defined after establishing the goals of the biosphere reserve. Potential indicators include: changes in the percentage and area of arable land within the basin area, changes in the structure of production, increases in local agricultural production, growth in the use of traditional farming methods, pollution caused by agricultural activities.

15.3.4. What activities are currently being undertaken, and which measures will be implemented to strengthen positive impacts or reduce negative impacts on the goals of the biosphere reserve?
To minimize the negative impacts of agricultural activities on the goals of the biosphere reserve, it is crucial to: implement sustainable agricultural practices, educate local communities on the importance of protecting nature and ecosystems, enforce strict regulations and monitoring of agricultural activities within the lake basin.

15.4 Other types of activities contributing positively or negatively to sustainable local development, including impacts on the biosphere reserve and beyond its boundaries
15.4.1. Describe the type of activities, covered areas, and involved persons (including men and women).
Economic activities beyond agriculture and tourism are outlined in the strategic development plans for the municipalities of Ulcinj, Tuzi, Danilovgrad, Bar, and Podgorica. These plans provide statistical

data about activities by sector and the number of entities engaged in them.

For the municipality of Ulcinj, the following activities, not previously mentioned, are identified[33]:

- Manufacturing industry: 43
- Water supply, wastewater management, waste removal, and related activities: 1
- Construction: 30
- Wholesale and retail trade; repair of motor vehicles and motorcycles: 104
- Transportation and storage: 88
- Accommodation and food services: 192
- Information and communications: 1
- Real estate activities: 10
- Professional, scientific, and technical activities: 21
- Administrative and support service activities: 4
- Arts, entertainment, and recreation: 5
- Other service activities: 40
- Household activities as employers; household production for own use: 2

It is also noted that the most significant potential for economic development lies in the accommodation and food services sector, a hallmark of a tourist destination. This is especially relevant because Ulcinj still lacks sufficient high-category accommodation units, for which demand has been steadily increasing year after year. Additionally, the construction sector has strong potential, driven by the development of tourism. This area is poised for significant growth in the coming period, particularly considering the potential of Velika Plaža (the Long Beach).

For the Municipality of Danilovgrad, the following activities are highlighted[34]: food processing, stone processing, livestock feed production, wood processing, trade, hospitality, crafts, services, hunting, and fishing. Characteristic productions include dairy products, bread and pastries, coffee and confectionery, spices, vinegar, paper packaging, plastic packaging, polyethylene packaging, sawn timber, and wood products.

In the Municipality of Bar, the trade sector accounts for 26% of the total number of economic entities, followed by services, construction, processing services, and similar activities.[35]

The structure of activities in the Municipality of Tuzi includes[36]: retail trade, wholesale trade, manufacturing, construction, casinos, hairdressing salons/crafts, food and beverage preparation and serving services, hotels and accommodation, other services, and the processing industry.

When it comes to the Capital City of Podgorica, the structure of other economic activities mentioned

[33] Strategic Development Plan of the Municipality of Ulcinj 2022-2028, Municipality of Ulcinj, 2022.
[34] Strategic Development Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2019.
[35] Strategic Development Plan of the Municipality of Bar, Municipality of Bar, 2020.
[36] Draft Strategic Development Plan of the Municipality of Tuzi, Municipality of Tuzi, 2021.

in the Spatial-Urban Plan (PUP)[37], according to data from Monstat in 2011 and the Strategic Development Plan of the Municipality of Podgorica, consisted of: wholesale and retail trade, repair of motor vehicles and motorcycles, professional, scientific, and technical activities, construction, accommodation and food services, manufacturing industry, information and communications, transportation and storage, other service activities, administrative and support service activities, real estate business, and others. Additionally, the PUP of the Capital City provided information on the development of economic sectors.

For the territory of the Capital Cetinje, the available documentation[38] provides data mainly on tourism, agriculture, and forestry, while other activities are not mentioned.

Although for most municipalities within the planned area of the biosphere reserve, information is available regarding other economic activities in terms of representation and types of activities, the remaining information, such as the share of women and men, assessments, or analyses of positive or negative impacts on sustainable development, is not available.

15.4.2 Indicate possible positive and/or negative impacts of these activities on the goals of the biosphere reserve (section 14). Have any results already been achieved?

The available documents do not provide an analysis of the impact of the above-mentioned activities on the goals of the future biosphere reserve. Only general pressures, as stated in response to question 14.2.2, are mentioned. However, there is no clear correlation between the activities listed above and the identified pressures. Therefore, it is necessary to conduct a correlation analysis during the consultative process.

15.4.3 What indicators are used, or will be used, to assess the state and trends?

The analyzed documents do not provide indicators for assessing the state and trends concerning the above-mentioned activities. Indicators need to be defined after determining the goals of the biosphere reserve.

15.4.4 What activities are currently being undertaken, and what measures will be implemented to strengthen positive impacts or reduce negative impacts of activities on the goals of the biosphere reserve?

The analyzed documents do not specify activities clearly linked to the above-mentioned measures but do mention measures that can be related to them, as discussed in response to question 14.2.5.

Conclusion: Although information about other economic activities, including their prevalence and types, is available for most municipalities within the planned biosphere reserve, additional data—such as the proportion of men and women involved, as well as assessments or analyses of the positive or negative impacts on sustainable development—are not available. Furthermore, indicators to monitor the status or pressures arising from identified activities have not been defined, nor have measures or activities been outlined to promote positive or reduce negative impacts of these activities on the goals

[37] Spatial-Urban Plan of the Capital City of Podgorica, Capital City Podgorica, 2014.

[38]

of the future biosphere reserve.

It is therefore recommended to conduct an analysis of the relationship between the impacts of these activities and the future biosphere reserve. This should include defining indicators for monitoring status and trends, as well as measures to encourage activities that positively contribute to the sustainable development of the future biosphere reserve and reduce the negative impacts of other activities.

References:

Strategic Development Plan of the Municipality of Ulcinj 2022–2028, Municipality of Ulcinj, 2022.
Strategic Development Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2019.
Draft Strategic Development Plan of the Municipality of Tuzi, Municipality of Tuzi, 2021.
Strategic Development Plan of the Municipality of Bar, Municipality of Bar, 2020.
Spatial-Urban Plan of the Capital City, Capital City Podgorica, 2014.

15.5 Benefits of economic activities for the local population:

15.5.1 For the activities described above, what income or benefits do local communities (including men and women) directly derive from the proposed biosphere reserve location, and how?

15.5.2 What indicators are used to measure such income or other benefits?

The benefits of the listed activities for local communities are not provided in the available documentation, nor are data on gender representation. Additionally, indicators to measure the gains and benefits of local communities have not been defined.

Conclusion: As there is no information on this matter, it is necessary to determine, through further consultation with local communities, which activities generate benefits and how the future biosphere reserve could encourage these. Special emphasis should be placed on the participation of both women and men in these activities. Furthermore, indicators should be defined for the ongoing monitoring of the gains and benefits to local communities.

15.6 Spiritual and cultural values and customs:

15.6.1 Describe any cultural and spiritual values and customs, including languages, rituals, and traditional ways of life. Are any of these endangered or declining?

15.6.2 List activities aimed at identifying, protecting, promoting, and/or revitalizing such values and customs.

15.6.3 How should cultural values be integrated into the development process: elements of identity, traditional knowledge, social organizations, etc.?

15.6.4 Indicate whether indicators are used to assess these activities. If so, specify and provide details. (Examples of indicators: presence and number of formal and informal educational programs transmitting these values and customs, number of revitalization programs in place, number of speakers of endangered or minority languages).

When it comes to the cultural values of the area and related activities occurring within the proposed biosphere reserve (such as cultural events, customs, etc.), it is undoubtedly rich in such traditions. Data on these aspects are provided in descriptions of cultural heritage (both tangible and intangible) for the municipalities in various planning (spatial-urban plans, local environmental action plans, and, in some cases, such as Danilovgrad, the Local Biodiversity Action Plan) and strategic documents (strategic development plans). This includes information on significant cultural events traditionally held in the area to promote local culture and customs. Descriptions of cultural values are also provided in the protection studies for individual areas (e.g., Skadar Lake National Park, Zeta River Valley) and in the Management Plan for Skadar Lake National Park.

Among the most representative cultural assets within the territory of Skadar Lake National Park are the monasteries of the Balšić and Crnojević dynasties (Starčevo, Moračnik, Beška, Kom, and Obod) and fortified complexes (Žabljak Crnojevića, Lesendro, Besac, and Grmožur). Numerous examples of traditional architecture are located along the coastal belt and hinterland of Skadar Lake. Individual structures that have not undergone renovation or new construction have preserved their authenticity and originality. Old rural complexes, fishing and residential houses with vaulted cellars, "ublovi" (traditional water cisterns), wells, threshing floors (guvno), stone bridges, and mills on the lake's tributaries highlight a cultural landscape of particular architectural value. A significant legacy of movable cultural heritage pertains to various utilitarian objects associated with traditional livelihoods and handicrafts, which are preserved in museum collections in the towns surrounding the National Park. However, such items are increasingly rare in the family rural households around Skadar Lake.[39]

The cultural and historical values of Lovćen are characterized by a diverse architectural heritage, including memorial complexes, sacred and secular rural architecture, and technical structures, concentrated in the broader areas of Njeguši and Ivanova Korita. In Njeguši, specifically in the hamlet of Erakovići, are the memorial houses of the Montenegrin rulers from the Petrović dynasty. At Jezerski Vrh, one of the highest peaks of the Lovćen massif, stands the grand Mausoleum of the Montenegrin sovereign, renowned poet, and Prince-bishop Petar II Petrović Njegoš.
The sacred architecture of the Njeguši area is represented by modest village churches with simple designs, of which there were 17 by the mid-19th century. Built in the vernacular architectural tradition, they have single-nave layouts with single-section or three-section bell gables. These churches were constructed between the 15th and 19th centuries.
Across the expansive territory of Njeguši, the secular architecture preserves numerous elements of traditional building styles: stone houses with cellars, barns, threshing floors, water cisterns, and dry

[39] MP NP "Skadar Lake", National Parks of Montenegro, 2022.

stone walls. Of particular architectural and environmental significance are the old caravan route and the famous Lovćen switchbacks, which stretch along the mountain massif from Njeguši to Kotor. The Austro-Hungarian period left valuable infrastructural legacies, including the water collector in Koritnik, the Njeguši water supply system, and an extensive network of roads with stone retaining walls.[40]

The study on the protection of the Nature Park of the Zeta River Valley lists 12 immovable cultural assets. The chronological order is as follows: V. Nikčević, On the Name Zeta (Zenta, Genta), Cultural Heritage - Works of the Faculty of Cultural Studies in Cetinje, Cetinje 1985, 131-153; MONTENEGRIN ACADEMY OF SCIENCES AND ARTS - DEPARTMENT OF SOCIAL SCIENCES – Archaeology Commission – Recordings of reconnaissance from 1985; M. Baković, Society of Archaeologists of Montenegro, ANTIQUITIES: Archaeology in Montenegro, Cetinje 2012; RECONNAISSANCE OF THE MUNICIPALITY OF DANILOVGRAD, April 2-22, 2011, RESEARCH DIARY; S. Vučinić, Some Results of Reconnaissance of the River Zeta Riverbed and Banks, One Hundred and Twenty Years since the Liberation of Podgorica, Proceedings from the Scientific Conference, Podgorica, December 2-3, 1999, Podgorica 2000, 585-596. Chronological order of archaeological sites: Sige, Zidanice, Koljat, Crkvina Podvrh, Gradina Martinići, Spuž Fortress with Walls, Ostrog Monastery, Ždrebaonik Monastery, Adžija Bridge, Mijokusovići, Church of St. George, Gornji Martinići, Monument to Jovo Pajov Radulović, Danilovgrad Cemetery, Joint Monument to the Burnt Bjelopavlići, Gornji Martinići. In addition to the above, there are a number of highly significant sites, the future evaluation of which will substantially complete the formal legal picture of immovable cultural heritage. The most characteristic are: Illyrian hillfort Taraš, Tumular necropolis Frutak-Kujava, Hillfort Kurilo, Crkvine Ćurilac, Postup Harbor, Maljat Quarry, Early Christian basilica Šipkova Glavica, Traces of Queen's Bridge, Zeta Riverbed Kujava, Bulin Bridge, Viška Vrela, Krivi Bridge, Vranjak Creek, Kruščica, Fortresses: Pazarište and Stologlav.

The description of the historical significance of the immovable and movable cultural heritage of the area is often lacking in the mentioned documents, but such information can be found in the documents of the Institute for Cultural Heritage, which are available upon request. These include reports for determining the cultural value of elements of intangible cultural heritage, reports on the revaluation of immovable and movable cultural assets, and studies for the protection of cultural heritage for the needs of spatial urban planning (for the municipalities of Cetinje, Bar, Kolašin, and Ulcinj). There are no indicators used to monitor activities related to the promotion and valorization of cultural values.

Conclusion: The potential biosphere reserve is rich in both tangible and intangible cultural heritage and traditions, which are described in the relevant documents (see references). In the context of the biosphere reserve nomination, it is recommended to engage an expert in cultural heritage to consolidate information on this topic and define the possibilities for further development of the area that would rely on promoting cultural and traditional values in the context of the future biosphere reserve nomination.

References:

[40] Web sajt NPCG https://nparkovi.me/

Management Plan 2021-2025 of Skadar Lake National Park, NP of Montenegro, 2022.
Management Plan 2021-2025 of Lovćen National Park, NP of Montenegro, 2022.
Draft Study on the Revision of Skadar Lake, Environmental Protection Agency, 2023.
Spatial-Urban Plan of the Municipality of Bar, Municipality of Bar, 2018.
Spatial-Urban Plan of the Capital City of Podgorica, Capital City of Podgorica, 2014.
Spatial-Urban Plan of the Old Royal Capital Cetinje, Old Royal Capital Cetinje, 2014.
Protection Study "Cijevna Canyon Natural Monument", Environmental Protection Agency, 2017.
Protection Study of Nature Park "Zeta River", Environmental Protection Agency, 2019.
Sackl P., Schneider-Jacoby M., Schwarz U., Dhora D., Saveljić D., Stumberger B. (2006) "Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro)".
Vugdelić M., Martinović A., Pajović I., Drobnjak J., Milić J. (2021) – Socio-economic Analysis of the Zeta River Nature Park, The Nature Conservancy.
Dimitris F., Marković M., Shipman B. (2015) Integrated Resource Management Plan for the Bojana Delta.
Spatial-Urban Plan of the Municipality of Ulcinj, Ministry of Sustainable Development and Tourism, 2016.
Spatial-Urban Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2011.
Local Environmental Protection Plan of the Capital City of Podgorica, Capital City of Podgorica, 2019.
Local Biodiversity Action Plan for the Capital City of Podgorica, Capital City of Podgorica, 2023.
Sustainable Development Action Plan of the Capital City of Podgorica, Capital City of Podgorica, 2017.
Development Strategy of the Capital City of Podgorica, Capital City of Podgorica, 2020.
Draft Local Environmental Protection Plan of the Municipality of Tuzi, Municipality of Tuzi, 2023.
Draft Development Strategy of the Municipality of Tuzi, Municipality of Tuzi, 2021.
Development Strategy of the Municipality of Bar, Municipality of Bar, 2020.
Development Strategy of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2019.
Local Environmental Protection Plan of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2021.
Local Action Plan for Biodiversity of the Municipality of Danilovgrad, Municipality of Danilovgrad, 2020.
Local Biodiversity Action Plan for the Old Royal Capital Cetinje, Old Royal Capital Cetinje, 2020.
Draft Local Environmental Protection Plan of the Old Royal Capital Cetinje, Old Royal Capital Cetinje, 2021.
DEVELOPMENT STRATEGY OF THE MUNICIPALITY OF ULCINJ 2022-2028, Municipality of Ulcinj, 2022.
Draft Local Biodiversity Action Plan for the Municipality of Ulcinj, Municipality of Ulcinj, 2020.
Draft Local Environmental Protection Plan of the Municipality of Ulcinj, Municipality of Ulcinj, 2020.
Cultural Heritage Protection Study for the Spatial-Urban Plan of the Old Royal Capital Cetinje, Institute for the Protection of Cultural Monuments, 2012.
Cultural Heritage Protection Study for the Spatial-Urban Plan of the Municipality of Bar, Institute for the Protection of Cultural Monuments, 2018.
Cultural Heritage Protection Study for the Spatial-Urban Plan of the Municipality of Kolašin, Institute for the Protection of Cultural Monuments, 2023.
Cultural Heritage Protection Study for the Spatial-Urban Plan of the Municipality of Ulcinj, Institute for the Protection of Cultural Monuments, 2016.
Reports for Determining the Cultural Value of Elements of Intangible Cultural Heritage, Institute for the Protection of Cultural Monuments.
Reports on the Revaluation of Immovable and Movable Cultural Goods, Institute for the Protection of Cultural Monuments.

FUNCTIONS OF LOGISTICAL SUPPORT

16.1 Research and Monitoring:

16.1.1 Describe existing and planned research programs and projects, as well as monitoring activities and areas where they are conducted (or will be conducted), to address specific issues related to the management of the biosphere reserve and the implementation of the management plan (please refer to the variables in Annex I).

Regarding the monitoring of species, habitats, and pressures, according to the available documentation, the only ongoing and planned activities by institutions are conducted by the Public Enterprise "National Parks of Montenegro," the Hydrometeorological Institute (monitoring water quality under the Water Framework Directive), and the Environmental Protection Agency (monitoring air quality and noise levels).

In the Management Plan for Skadar Lake National Park[41] Chapter 3.2, TABLE OF OBJECTIVES AND ACTIVITIES OF THE MANAGEMENT PLAN (page 77), a plan for monitoring activities with indicators for the period 2021-2024 is provided as follows:

Activity 1.2.1: Monitor the condition of the habitat at the Moračica site due to potential overgrowth and habitat loss. Indicator: Report on the status of *Marsilea quadrifolia* at the Moračica site.

Activity 1.2.2: Continue research on the species *Caldesia parnassifolia* at the Pančeva oka and Crni žar sites. Indicator: Report on research regarding *Caldesia parnassifolia* at the Pančeva oka and Crni žar sites.

Activity 1.4.1: Continue research on the distribution of invasive species, focusing on *Amorpha fruticosa* and *Egeria densa*. Indicator: Report on conducted research on the distribution of *Amorpha fruticosa* and *Egeria densa.*

Activity 1.6.3: Monitor the condition of significant forest species, including laurel (*Laurus nobilis*) and Skadar oak (*Quercus robur ssp. scutariensis*). Indicator: Report on monitoring and the condition of laurel and Skadar oak.

[41] Management Plan for Skadar Lake National Park 2021-2025, National Parks of Montenegro, 2022.

Activity 1.6.4: With the establishment of the Natura 2000 network, monitor the condition of forest habitats classified under Natura 2000 habitat types. Indicator: Monitoring report on Natura 2000 habitats.

Activity 1.10.1: Conduct research and monitoring of colonial bird species in Special Nature Reserves. Indicator: Reports/completed monitoring protocols from spring and summer; reports on any new occurrences (qualitative and quantitative findings, comparative methods—changes, pressures, negative impacts, and other parameters) at the colony population level.

Activity 1.10.2: Conduct research and monitoring of colonial bird species across the entire lake area, with an emphasis on the whiskered tern (*Chlidonias hybrida*). Indicator: Graphical and written report; completed protocol; presentation of quantitative parameters and the location of active whiskered tern colonies.

Activity 1.11.2: Conduct monitoring of bird populations during the spring and summer annual phases. Indicator: Established qualitative and quantitative parameters, spatial dispersion—graphical representations; annual report prepared.

Activity 1.11.3: Conduct year-round monitoring of the Dalmatian pelican (*Pelecanus crispus*) population. Indicator: Reports on the pre-nesting condition of the colony (November–January); Reports on the colony condition during nesting (January–July), including quantitative data (number of adults, number of nests), pressures, disturbances, video surveillance, colony visits, etc.; Population trend report; Population vitality report.

Activity 1.11.5: Monitor the status of indicator bird species. Indicator: Completed protocols for indicator species based on the GIZ Monitoring Manual (2019): *Aythya nyroca, Microcarbo pygmaeus, Chlidonias hybrida, and Pelecanus crispus*.

Activity 1.13.2: Monitor the status of species from the marten family (*Mustelidae*). Indicator: Monitoring report on the status of marten species.

Activity 1.14.1: Monitor hydrological features. Indicator: Quality of Skadar Lake's water examined; Long-term protection and sustainable use ensured.

Additionally, the Management Plan 2021–2025 for NP Lovćen[42] by NP of Montenegro (2022), outlines a monitoring activity plan with indicators for the period 2021–2024 in Chapter 3.2: Table of Objectives and Activities of the Management Plan (page 77).

[42] Management Plan for NP Lovćen 2021-2025, NP of Montenegro, 2022.

The Local Biodiversity Action Plan for the Municipality of Danilovgrad[43] includes a proposed monitoring plan for specific groups and indicator species.

Regarding ongoing research projects, data available in accessible documents can be found in the Management Plan for NP "Skadar Lake", which states that the project “Strengthening Cross-Border Cooperation and Integrated Management of Water Resources in the Extended Drin River Basin” is being implemented. Within this framework, JPNPCG is carrying out the project activity “Multi-Purpose Vegetation Management on Skadar Lake through Biomass Collection and Briquette Production in Montenegro.” This project is implemented by the United Nations Development Program (UNDP) and conducted by the Global Water Partnership (GWP) through GWP Mediterranean (GWP-Med). Additionally, the project “Improving Wetlands Management for the Conservation of the Dalmatian Pelican in the Balkans” is underway. This initiative is led by the French NGO NOE Conservation in collaboration with JPNPCG/NPSJ and other partners from Montenegro.

Moreover, the GEF 7 project, titled “Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Protection of Biodiversity Hot-Spots in Montenegro,” is also in progress. This project aims to support the strengthening of the protected area system, including initiatives in tourism, agriculture, and forestry that align with nature conservation efforts.

When it comes to completed projects and research, there is no unified or systematic database of projects conducted within the proposed biosphere reserve's territory, even though a significant number exist.

In the recent past, the following projects have been implemented:

- World Bank Project - Albania and Montenegro: Skadar Lake-Shkoder Integrated Ecosystem Management Project. The objective of the Skadar Lake-Shkoder Integrated Ecosystem Management Project for Albania and Montenegro was to support the establishment and strengthening of institutional mechanisms for cross-border cooperation through joint efforts to enhance sustainable management of Skadar–Shkoder Lake. The project consisted of three components; 2008.
- Conservation and Sustainable Use of Biodiversity at Lakes Prespa, Ohrid and Shkoder/Skadar (CSBL): Implemented by GIZ, this project produced several outputs, including: Monitoring Handbook for Lake Species and Habitats, Natura 2000 Habitat Mapping for Skadar Lake National Park, Program of Measures for Skadar Lake, Shorezone Functionality Skadar/Shkodra Lake, and Fish and Fisheries Skadar/Shkodra Lake (2017–2021). By building capacity and knowledge and strengthening collaboration between ministries, the project supported ministries responsible for environmental protection, water management, and fisheries, as well as their subordinate bodies, in implementing the Water Framework Directive and EU environmental conservation legislation. The fisheries sector received support from the Potsdam-Sacrow Institute for Inland Fisheries.
- EMA Plan Project: Conducted an analysis of synergies, gaps, and complementarities related to

[43] The Local Biodiversity Action Plan for the Municipality of Danilovgrad, Danilovgrad, 2020.

integrated management at the regional level of Skadar Lake, 2012.

- GEF Project: "Enabling Transboundary Cooperation and Integrated Water Resources Management in the Extended Drin River Basin" (GEF):
- The project's objective was to promote joint management of shared water resources in the transboundary Drin River Basin, including coordination mechanisms among various joint commissions and committees of individual sub-systems. Beneficiaries of the project included Albania, the Former Yugoslav Republic of Macedonia, and Montenegro, 2022.
- With the support of the Rufford Foundation, the following research projects were conducted, primarily aimed at improving knowledge about specific species:
- Research on the critically endangered European eel in Skadar Lake, Montenegro, 2021.
- Ćemovsko Field: A biodiversity hotspot in plain sight, 2019.
- Monitoring of the Highly Endangered Eel in Montenegro Due to the Assessment of the State and Potential Changes to the Law on Fisheries in Accordance with EU, 2018.
- Research and protection of moss biodiversity along the Cijevna River, 2018.
- Conservation of psammophytic vegetation on Velika Plaža in Ulcinj, Montenegro, 2015.
- Distribution and threats to the European pond turtle (*Emys orbicularis*) in the Zeta and Bjelopavlići Plains, Montenegro, 2014.
- Protection of endangered bird species in the Ulcinj Salina, 2002.
- With the support of the Critical Ecosystem Partnership Fund (CEPF), the following research projects were implemented:
- "Enabling environment for joint bottom up protection and sustainable development planning of the Bojana River Basin": The project aimed to implement new approaches for data collection on the distribution, populations, and threats to freshwater biodiversity in the Bojana River Basin. It also included an assessment of the socio-economic values of ecosystem services, networking, knowledge exchange, and raising awareness among local stakeholders through workshops, educational activities, and their engagement in the protection and sustainable use of natural resources. A strategic direction for the protection of the Bojana Delta was developed. June 2020 - April 2022.
- Inclusion of local community in the process of protection and advancement of habitat of Skadar lake frog (*Pelophylax shqipericus*) in the delta of river Bojana: This project's goal was to raise awareness about the rare and endangered Skadar frog (Albanian water frog). The project worked with local communities, children, students, decision-makers, and other stakeholders in one of the main habitats of this amphibian species – the Bojana/Buna River Delta in Montenegro. It established a foundation for monitoring the species, created conservation guidelines, and organized the first Montenegrin "Frog Day". March 2019 - August 2021.
- "Contribution to the preservation of natural values of the Upper Zeta River in Montenegro": The goal of this project was to assess the hydromorphological and ecological status of the upper flow of the Zeta River and implement revitalization measures. It included the research of macrozoobenthos and hydromorphological pressures at selected locations to collect data for determining the ecological status of this water body. June 2021 - May 2022.
- Assessment of the European Eel Population in the Bojana River: The objective of this project was to identify threats to the population size of the European eel and establish measures to combat poaching. It provided support in creating a management plan, improving institutional and cross-border cooperation, raising awareness about the conservation of the European eel, and strengthening the capacities of young researchers. July 2020 - May 2022.
- Support for Better Management of the Bojana Delta in Montenegro: The goal of this project is

to support the sustainable management of the Bojana Delta by increasing knowledge about freshwater species in the cross-border protected landscape of the Buna River and Bojana Delta. This will be achieved through research on critically endangered and endangered fish species. It will also include preparing a situation analysis of the critically endangered Adriatic sturgeon (*Acipenser naccarii*) and implementing conservation actions to improve the freshwater ecosystem. The project will build the capacity of local authorities and civil society organizations in Albania and Montenegro. July 2023 - August 2024.

- Towards Effective Management in the Key Biodiversity Area of Cijevna Canyon Natural Monument: This project aims to improve integrated management of the Cijevna River basin by mapping threats, preparing a mitigation action plan, and organizing round tables and conferences. It will also build the capacity of protected area managers, local communities, and tourism organizations through a study visit to Slovenia to understand the benefits of conserving salmonid species. The project will increase the number of visitors and anglers through a campaign promoting the Cijevna canyon as a destination for fly fishing. July 2023 - October 2024.
- Restoration of Skadar Lake Wet Meadows for Sustainable and Traditional Land Use: This project focuses on educating local communities about invasive species and their removal through ecologically acceptable and sustainable methods. It aims to raise awareness about the importance of biodiversity conservation and provide training on how to prevent the spread of invasive plants. A series of events organized to remove invasive species and prepare the land for livestock grazing. June 2021 - May 2022.
- Building the Lower Bojana River Basin and Ulcinj Ecosystem Complex Resilience: This project aims to develop a strategy to increase the visibility of conservation values, threats, and solutions by involving stakeholders and enabling good management. It focuses on building stakeholders' knowledge on concrete, low-risk sustainable development and nature-based solutions. The project also promotes the benefits of nature, its proper use, and resilience to gain support from a broad group of stakeholders, encouraging partnerships, consensus, and collaboration. November 2022 - October 2023.
- From the Inventory of Monumental Skadar Pedunculate Oak to Restoration of its Forests and Protection of Biodiversity: The goal of this project was to assess the current state and restore the population of the endemic Skadar oak (Quercus robur ssp. scutariensis) at Skadar Lake, in the Zeta River valley, the Bojana River delta, and Buljarica. The project involved conducting an inventory of old trees and habitat modeling. It also focused on educating and raising awareness in the local community through the planting of 10,000 seeds for forest revitalization. An action plan for conservation and the proposal for declaring individual trees as natural monuments was also designed. July 2022 - May 2023.
- Empowering Local Community and Stakeholders to Sustainably Manage the Freshwater Biodiversity of Skadar Lake, Located Between Albania and Montenegro: This project aimed to empower local communities by promoting participatory biodiversity management in Skadar Lake, and developing economic benefits based on the sustainable use of natural resources. It also supported the eradication of illegal fishing practices that threaten freshwater biodiversity through sensitization and monitoring. September 2019 - June 2022.
- Fostering and Bringing Together Nature, Tourism and Civil Society at Bojana Delta Through Integrated Coastal Zone Management: The goal of this project was to mitigate the threats of unsustainable tourism development in the Bojana Delta in Montenegro by developing a comprehensive integrated coastal zone management plan for this pristine area. The project

used a community-based, participatory approach to identify alternative sustainable coastal tourism options that would preserve coastal ecosystems, improve natural resources, protect priority areas, and maintain cultural heritage by integrating sports, cultural, and recreational activities. November 2013 - December 2015.

- Morača River: The Way Forward: The goal of this project was to analyze the current situation of the Morača River in Montenegro and combine it with concrete actions to protect the riverbed from further destruction due to hydropower plant construction and the legal and illegal extraction of gravel and sand. It also aimed to raise public awareness about this issue, support citizen involvement in river protection, and provide alternative solutions for current plans and strategies. April 2015 - November 2016.
- Multimedia Communications Campaign for Dalmatian Pelicans in Skadar Lake: This campaign aimed to raise awareness about the conservation of the Dalmatian pelican (*Pelecanus crispus*) at Skadar Lake, located on the border between Albania and Montenegro. It involved documenting biodiversity, threats, and conservation activities at Skadar Lake, as well as developing communication tools to promote civil society engagement in biodiversity conservation. A social media campaign was organized, and a comprehensive photo database along with a short documentary were created to promote the location and civil society activities in the area. May 2014 - December 2015.
- Morača River: Sustainable Development Against Flooding: The goal of this project was to identify economic alternatives that would improve the quality of life and preserve the beautiful landscapes and unique biodiversity of the Morača River Valley, a key biodiversity area in Montenegro. The project worked closely with local communities to promote water-efficient agriculture, including honey production, and ecotourism activities through partnerships with mountaineering clubs and birdwatchers. It aimed to raise awareness among citizens about the economic and ecological values of their land and inform them about the risks that hydropower production could pose to their way of life. April 2015 - September 2016.
- Supporting the Long-Term Sustainable Management of Transboundary Skadar Lake: The goal of this project was to enable efficient cross-border management of Skadar Lake, which lies between Albania and Montenegro, by enhancing the capacity and practices for managing protected areas. It aimed to reduce illegal activities by strengthening law enforcement and increasing the involvement of local civil society organizations in monitoring and management. The project also sought to raise awareness and increase transparency among key stakeholders about the importance of biodiversity conservation. August 2013 - December 2016.
- SOS Skadar Lake - Keeping the Montenegrin Wilderness Wild: The goal of this project was to expand the knowledge base about the biodiversity of the Montenegrin part of the cross-border Skadar Lake, with a special focus on amphibian and fish species. It involved modeling the impact of future developments on the lake (particularly hydropower plants and tourism infrastructure) in order to support decision-making regarding land use and natural resource management. Findings were discussed and shared with Albanian stakeholders. October 2019 - February 2024.
- Mawa Foundation implemented the project "Enhancing the Conservation of Coastal Wetlands" from 2016 to 2022, with activities carried out at the Ulcinj Salina.
- LEPESH (Low-Adriatic Species and Habitat) project, realized through the IPA II CBC Interreg Italy-Albania-Montenegro program, included the development of an Action Plan for the Protection of *Pinus heldreichii* (H. Christ 1863) in Lovćen National Park. 2018 - 2020.

16.1.2 Summarize past research and monitoring activities related to the management of the biosphere reserve (please refer to the variables in Annex I).

Regarding the monitoring of species, habitats, and pressures, based on the available documentation, the only continuous institutional activities carried out in the past period have been conducted by PE "National Parks of Montenegro", the Hydrometeorological Institute (monitoring water quality under the Water Framework Directive, which includes watercourses within the proposed biosphere reserve), and the Environmental Protection Agency. However, these activities cover only parts of the area. The Hydrometeorological Institute conducts biomonitoring of ichthyofauna, but the locations vary. For instance, in 2020, monitoring of fish fauna was conducted in watercourses relevant to the proposed biosphere reserve area, while in other years, it was not. The Environmental Protection Agency monitors various environmental segments (air quality, noise, soil pollution, levels of ionizing and non-ionizing radiation, and biodiversity). However, the scope and content of this monitoring vary annually depending on available financial resources (e.g., biodiversity monitoring has not been conducted since 2016). The results of the mentioned monitoring programs are available in the annual environmental status reports published on the Agency's website.

In the Management Plan for NP "Skadar Lake"[44], which is directly linked to the Management Plan for NP Skadar Lake, the following monitoring and research results were provided:

Research and Monitoring

During the planning period from 2016 to 2020, the activities of the professional service were focused on: research and monitoring of the species Marsilea quadrifolia and Caldesia parnassifolia; determining the population size and condition of the Skadar oak (Quercus robur subsp. scutariensis) and exploring possibilities for revitalizing its habitat, identified as the Natura habitat 92A0; collecting data on the distribution of certain invasive species and assessing habitat vulnerability caused by their spread. Additionally, the coordination between the NP protection service and the professional service of JPNPCG (National Parks of Montenegro) ensured that data was used to analyze the condition of commercial species and their habitats. On all sites where research was conducted, simultaneous inventorying of significant plant taxa was carried out. The collected data was entered into an electronic database.

Control of Pressures on Ecosystems and Habitats
Invasive species, especially those characterized by rapid spread and habitat occupation, pose a serious threat to the diversity of native flora in the area of NP Skadar Lake and beyond.

Based on field research, it can be concluded that most invasive species inhabit agricultural and ruderal habitats, particularly along the northern shore of the lake. The most aggressive species include: false indigo bush (*Amorpha fruticosa*), tree of heaven (*Ailanthus altissima*), honey locust (*Gleditsia triacanthos*), common ragweed (*Ambrosia artemisiifolia*), rough cocklebur (*Xanthium strumarium*), jimsonweed (*Datura stramonium*), and Brazilian waterweed (*Egeria densa*), whose presence has been recorded in the waters of Plavnica and Šegrtnica.

[44] Management Plan for NP "Skadar Lake" 2021-2025, NP of Montenegro, 2022.

The widespread presence of false indigo bush (*Amorpha fruticosa*) is concerning, with coverage ranging from 80% to 100%, particularly in the area around the Plavnica River to the Gostiljska River. As a highly invasive species, false indigo bush has formed pure monocultures on previously cultivated land. It is absent only on plots that are mown. However, there are indications that even many of these plots are seeded with false indigo bush. Extensive monocultures of this species can also be seen along the main road to Vranjina. It is present in the Rijeka Crnojevića area. Along the southern shore, it occupies the largest areas near the mouth of the Crmnica River and invades habitats recognized as Natura habitat 3280—Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba.
In the Žabljak meadows area, it appears sporadically or in smaller clusters around plots. In this part of the national park, honey locust (*Gleditsia triacanthos*) currently exhibits greater aggressiveness in spreading. Although not as invasive as false indigo bush, it occupies large areas with a tendency for further expansion. It is present in all developmental stages, from abundant saplings to mature individuals.
The species rough cocklebur (*Xanthium strumarium*) demonstrates significant coverage in floodplain meadows, while ragweed (*Ambrosia artemisiifolia*) is prominent in the rural areas of Žabljak Crnojevića.

The tree of heaven (*Ailanthus altissima*) is present in settlements and along main and secondary roads.

The presence of the invasive macrophyte *Egeria densa* was recorded in the waters of the Plavnica River, near the restaurant of the same name. This 2018 finding marks the first documented introduction of Egeria densa into Montenegro's natural waterways. Through the establishment of monitoring and the expansion of research areas in 2019, its presence was also confirmed in the Šegrtnica River. It occupies significant areas from the bridge at Poseljani to Žabljak Crnojevića. In certain stretches, the population densely covers the riverbed. Experience in European countries suggests that when this species becomes overpopulated, the risks of applying removal methods are often greater than leaving it in its current state. Collaboration with relevant institutions is necessary to assess and coordinate further steps regarding the implementation of conservation measures.

The harvesting of medicinal herbs, forest fruits, and mushrooms for commercial purposes within the protected area must be conducted in accordance with established regulations and based on a permit previously obtained from the Environmental Protection Agency.

To improve the monitoring of plant species habitats that are under pressure due to commercial harvesting, collaboration has been established with the Environmental Protection Agency to collect data on issued permits. Additionally, the work of the Park Protection Service and the Expert Service of JPNPCG (Public Enterprise for National Parks of Montenegro) has been coordinated to analyze the status of commercially exploited species and their habitats based on the obtained data. During the implementation of this activity, three key issues emerged that need to be addressed in the future, both at the level of the National Park and JPNPCG, as well as at the level of relevant institutions.

Forest Ecosystem Monitoring

Forest ecosystem monitoring was conducted in 2017 and involved the collection of data based on functional types. These functional types were divided into ecological, health (protective), and

dendrometric categories. For each functional type, a specific number of indicators were evaluated to assess the state of forest ecosystems.
Monitoring included assessing biotic and abiotic pressures on representative forest ecosystems located in the northern part of the Park.

Monitoring of Ornithofauna
According to the previous Management Plan for Skadar Lake National Park (2016–2020), ornithofauna monitoring was conducted focusing on parameters such as population size, distribution, population vitality, and degree of endangerment. Based on the monitoring results, certain management activities were implemented, particularly related to the conservation of habitats and species. Special attention was given to the study of bird species within aquatic ecosystems. The selection of species for monitoring was guided by the national legislative framework as well as international standards, including the IUCN Red List, Bern Convention, Bonn Convention, CITES, European trends for specific species, Convention on Migratory Species, Global Conservation Status, European Threat Status, and other specific criteria.

Monitoring of Mammals

The monitoring activities for otters included mapping their habitats and conducting an analysis of their status and level of endangerment within the Park's territory.
To identify bat species present in underground structures and ensure their preservation, the Public JPNPCG, in collaboration with the NGO "Montenegrin Ecologists Society," implemented the cross-border project "Capacity building and action plan on bat monitoring for the area of Shkodër/Skadar lake." This project facilitated the first-ever winter and spring census of bats in the area.
Additionally, the same document provides information under sections: 2.6. Monitoring and Research in the Previous Period (p. 46), 2.6.1. Monitoring and Research of Flora and Vegetation (p. 46), 2.6.2. Monitoring and Research of Fauna (p. 54), 3.1.1. Research, Monitoring, Restoration, and Improvement of Ecosystems, Habitats, and Species (p. 66).

In the Management Plan for Lovćen National Park[45] information on previous monitoring and research is also provided (p. 37).
In the past period, the Agency for Environmental Protection implemented a monitoring program in the area of the proposed biosphere reserve during certain years. The data resulting from these activities are included in the environmental status reports. Due to a limited budget, this program was not carried out at the same scale consistently every year.

16.1.3 Describe the available research infrastructure in the proposed biosphere reserve and the role the biosphere reserve will play in supporting such infrastructure.

The following scientific research institutions are active in the area of the proposed biosphere reserve (BSR): Environmental Protection Agency, Faculty of Natural Sciences and Mathematics, Department of Biology Natural History Museum of Montenegro.
The Public Enterprise National Parks of Montenegro, which manages all national parks, has signed a Memorandum of Cooperation with the Faculty of Natural Sciences and Mathematics.

[45] Management Plan for Lovćen National Park, NP of Montenegro (2022).

Conclusion:

Regarding the monitoring of species, habitats, and pressures, continuous activities are being carried out and planned by the Public Enterprise National Parks of Montenegro. The Local Biodiversity Action Plan for the Municipality of Danilovgrad proposes monitoring for certain groups and indicator species. The Hydrometeorological Institute conducts biomonitoring under the Water Framework Directive, with the scope and locations varying. For instance, in 2020, fish fauna monitoring was conducted on watercourses relevant to the proposed biosphere reserve, whereas in other years, it was not. The Environmental Protection Agency monitors various environmental segments (air quality, noise, soil pollution, levels of ionizing and non-ionizing radiation, and biodiversity), but the scope and content vary annually depending on available financial resources. For example, biodiversity monitoring has not been conducted since 2016. Thus, activities in this regard have not been consistently planned, except for Skadar Lake National Park, nor have they been consistently implemented according to available documentation within the proposed biosphere reserve. This highlights a lack of planning and the necessity to address this gap. It is essential to develop a comprehensive monitoring plan with indicators for both key species and existing pressures and to clearly identify responsible entities for its continuous implementation.

When it comes to active and completed projects, there is no unified, systematized database, even though a significant number of projects have been implemented in the area of the proposed biosphere reserve. Some of these projects have been mentioned above, but it is recommended that a list of active and completed projects be compiled during the stakeholder consultation process.

References:

Management Plan 2021–2025 for Skadar Lake National Park, National Parks of Montenegro, 2022.
Management Plan for Lovćen National Park 2021–2025, National Parks of Montenegro, 2022.
Fish Fauna Monitoring for the Implementation of the Water Framework Directive (WFD), Institute of Hydrometeorology and Seismology, 2020.
Annual Reports on Water Quality in Montenegro for 2020–2023, HMZ, Podgorica.
World Bank website (https://documents.worldbank.org/en/publication/documents-reports/documentdetail/767551468302989382/albania-and-montenegro-lake-skadar-shkoder-integrated-ecosystem-management-project)
CEPF website (https://www.cepf.net/search/node/montenegro?page=10)
Rufford Foundation Website (https://www.rufford.org/projects/?q=montenegro&sort_by=-created)
Mawa Foundation Website (https://mava-foundation.org/legacy-library/)

16.2 Education for Sustainable Development and Public Awareness:

16.2.1 Describe existing and planned activities, specifying target groups, the number of people involved (e.g., "teachers" and "students"), and the area of concern.

Education is a vital tool for building community support, raising awareness, and fostering responsibility toward nature. The current level of activity in this field is relatively low. There are no consistent and well-designed education programs, and education is mostly conducted ad hoc, often in connection with the celebration of significant environmental dates or as part of project activities.

The key actors involved in educational activities within this basin are the managers of protected areas (mainly Skadar Lake National Park and the Agency for Management of Protected Areas of Podgorica), educational institutions, and the civil sector.
The most common forms of education include: workshops in schools, school visits to visitor centers, one-day excursions and guided walks in protected areas, visits to institutions focused on nature conservation.
Most of these activities are initiated by the Public Enterprise for National Parks of Montenegro (Skadar Lake National Park) and the civil sector within various environmental projects that incorporate both educational components and public awareness-raising elements.
The Public Enterprise for National Parks of Montenegro (JPNPCG) has established a Promotion, Education, and Tourism Service, which, among other responsibilities, is tasked with planning and implementing educational activities. In both the five-year management plan and the annual management program, education, interpretation of the park's natural and cultural values, and the development of nature-oriented tourism have been identified as strategic objectives for Skadar Lake National Park (NP). Key activities include: implementing educational programs, developing educational materials, and marking significant environmental dates. Additionally, extracurricular activities are conducted in cooperation with educational institutions.
From 2017 to 2019, Skadar Lake National Park, along with Lovćen National Park, participated in the Regional Program "School Network in Protected Areas", implemented by WWF Adria and Parks Dinarides. The purpose of the School Network was to establish a long-term and effective partnership between local schools and the protected area, guided by common goals. These goals aim to provide children with opportunities to learn about nature in nature while ensuring full inclusion of all groups. The program's results included training National Parks staff to implement education programs using modern methodologies, as well as establishing a School Network within Skadar Lake National Park territory, encompassing five elementary schools in the park's vicinity:
"Milan Vukotić" - Golubovci,
"Vladika Danilo" - Gornja Zeta,
"Jovan Tomašević" - Virpazar,
"Niko Maraš" - Bijelo Polje,
"Zarija Vujošević" - Mataguži.

The goal of establishing this school network was to create opportunities and a framework for long-term collaboration between the protected area and local schools, with the objective of educating both students and the local population. As part of this program, **the "School Network in Protected Areas Handbook"** was developed, serving as a resource to assist in implementing educational programs. To date, Skadar Lake National Park has conducted numerous educational activities and hosted school visits to this protected area. **This form of collaboration provides a strong foundation for developing an educational program aimed at promoting the biosphere reserve and could be expanded to the entire watershed level.**

In addition to this program, smaller initiatives were developed in earlier periods, though they are not as active. These include: the "**Junior Ranger**" educational program of Skadar Lake National Park for school-aged children, and the educational booklet "**Obradujmo prirodu**" (Make the nature happy).
Currently, Parks Dinarides is implementing the "Junior Rangers Program" in Lovćen National Park. This program will support the organization of a seven-day summer school in the park. It is modeled after the EUROPARC Junior Ranger Program, which is implemented in many European protected areas.
Under this initiative, a seven-day summer school for 30 participants is planned for July 2024. The activity is being carried out in collaboration with the Public Enterprise for National Parks of Montenegro and Lovćen National Park. https://parksdinarides.org/aktivni-mladi-za-zastitu-prirode/

Some additional programs and tools developed by the civil sector that can be effectively applied for educational purposes in the Skadar Lake watershed include:
Biomonitoring Program on the Zeta River
This program includes the development of an Android application available at www.biomonitoring.me. The app is designed to facilitate the implementation of biomonitoring programs in the Zeta River Nature Park. This online platform allows for the identification and input of data on bio indicator species sensitive to environmental changes. More information is available at https://envpro.me/aktuelnosti/biomonitoring-program
Biologer.me Online Platform
This platform is designed for collecting data on biodiversity, which is valuable for understanding species distribution and assessing the natural values of specific areas. The platform is accessible at https://biologer.me/me i https://parksdinarides.org/vijesti/odrzana-radionica-povodom-uspostavljanja-biologer-zajednice-u-crnoj-gori/

Resources:
Management Plan for Skadar Lake National Park 2021-2025

16.2.2 What facilities/spaces and financial resources are (or will be) available for these activities?
Skadar Lake National Park has two visitor interpretation centers located at Vranjina and Virpazar. Both centers are actively used for organizing educational workshops and visits by children from educational institutions.

In Lovćen National Park, there is a visitor center managed by the Public Enterprise for National Parks of Montenegro (JPNPCG). This facility is planned for adaptation and modernization through Interreg funding under the PA.CON (Pannonia–Adria Connection Project), which should soon be made available to JPNPCG.

In addition to the visitor center in Lovćen, the Ivanova Korita location features the Ivanova Korita Tourism and Hospitality Complex, which includes the Recreational and Educational Center—also

known as the "children's retreat." This center is well-suited for organizing summer schools and nature schools, as it includes sports fields and activity areas. More details are available at. https://www.ivanovakorita.com/me/rekreativno-edukativni-centar/ However, the facility is quite worn out and in need of renovation. Adaptation work has already started and will proceed in phases.

The Ulcinj Salina Nature Park is also used for educational activities. The attention of the public and the international community focused on this area has been leveraged by the Center for Protection and Research of Birds (CZIP), which developed educational activities based on birdwatching. Thanks to donations, primarily from the MAVA Foundation and Euronatur, CZIP renovated an existing facility within the Salina, which can now also be used for educational purposes.

CZIP also operates a visitor center called "Zeta Educational Station" within its offices in the Zeta River Nature Park, where educational activities are held. Additionally, at the Mareza site, CZIP maintains the "Mareza Educational Station," which serves as a base for bird banding activities.

The Natural History Museum in Podgorica has facilities used for exhibitions and displays on various topics. These facilities could potentially be utilized for educational activities related to the biosphere reserve.

Conclusion: The resources and funds used for educational purposes are modest and primarily rely on project-based donations. Individual initiatives and educational activities by different stakeholders exist, but it is necessary to evaluate how and to what extent they can be adapted to create educational programs for the biosphere reserve. Establishing the biosphere reserve in this basin could help mobilize more substantial resources for the development of education programs. Precise data on the financial resources currently available and used for education are not available. If needed for the preparation of the nomination file, a thorough assessment of these resources should be conducted.

16.3 Contribution to the World Network of Biosphere Reserves:
16.3.1 How will the proposed biosphere reserve contribute to the World Network of Biosphere Reserves, its regional, and thematic networks?
16.3.2 What benefits are expected from international cooperation for the biosphere reserve?

16.4 Internal and external communication channels and media used by the biosphere reserve:
16.4.1 Is (or will there be) a website for the biosphere reserve? If yes, what is its URL?
16.4.2 Is (or will there be) an electronic newsletter? If yes, how frequently will it be published?
16.4.3 Will the biosphere reserve have a presence on social media (Facebook, Twitter, etc.)?

Conclusions and Recommendations

- It is recommended that a GIS expert compare the boundaries of the proposed area with the available GIS boundaries of biogeographical regions. Based on this comparison, a final statement regarding the affiliation of the future biosphere reserve with biogeographical regions in Montenegro should be formulated.
- It is recommended that, once the final boundaries of the proposed biosphere reserve are determined, a GIS expert extract a list of settlements based on the boundary overlap. Following the publication of the 2023 Population Census results, these data should be presented in the nomination form.
- A comprehensive assessment of the value of ecosystem services across the entire planned area is necessary, following the TEEB and MEA methodologies. This assessment should establish a clear connection with the indicators and the three functions of the future reserve, as well as with the biodiversity that supports these ecosystem services. Therefore, it is recommended to engage experts on this matter. Data sources and bases for the analysis can include information from existing, referenced documents, but also the subject of further consultation processes, both in terms of quantification possibilities and recommendations for resource management in the future reserve.
- Information on ecosystems, land cover types, their condition, and trends for the proposed area does not exist at the basin level. These aspects are primarily described in protection studies for protected areas or in municipal spatial and urban plans. For more consolidated information on land cover changes and land use conversion, Land Corine data from 2006 and 2018 should be analyzed and compared. Additionally, to standardize GIS data, a map of the distribution of the most significant ecosystems at the basin level should be developed. Furthermore, it is necessary to develop a methodology and indicators for evaluating the success and monitoring of protection measures to ensure long-term habitat management and effective control of nature protection measures.
- There is no single document that defines the key species for the entire proposed area. Efforts should be made to consolidate information for the entire area of the future biosphere reserve, and, based on this, select key species through a consultative process. It is recommended that, given the large number of species important for conservation in the entire area, an expert be engaged and expert consultations organized. This would facilitate a professional consensus on selecting key species, which will then be presented in the nomination form.
- Pressures on key species are listed in the document "Transboundary Diagnostic Analysis - Thematic Report on Biodiversity and Ecosystems of the Extended Drin River Basin," as well as in individual documents, including the Management Plan for Skadar Lake National Park 2021-2025, the Draft Nature Protection Study for Skadar Lake, the Nature Protection Study of the "Cijevna Canyon Natural Monument," the Nature Protection Study of the "Zeta River Nature Park," the Socio-Economic Analysis of the Zeta River Nature Park, the Integrated Resource Management Plan (IRMP) for the Buna/Bojana area, the Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Albania/Montenegro), the Lower Bojana River Basin and Ulcinj Ecosystem Complex, and others. However, information is often provided in a descriptive rather than quantitative form. The driving forces behind the pressures are rarely explicitly

stated in the documents, and such information is mostly found in the Nature Protection Study of the Zeta River Nature Park and the Lower Bojana River Basin and Ulcinj Ecosystem Complex. For the rest of the area, such specific information is missing. A more detailed description of existing pressures can be found in the Local Biodiversity Plans of the Municipality of Danilovgrad and the Capital City of Cetinje. However, the pressures listed in these documents are not directly linked to species and habitats. Therefore, the existing gaps mostly involve the lack of quantitative data on pressures, and it is recommended that an expert be engaged to consolidate this data and link it to species and habitats, particularly for the determination of key species.

- Regarding the monitoring of species and habitats, as well as pressures, continuous activities are being carried out and planned by the Public Enterprise "National Parks of Montenegro." The Local Biodiversity Action Plan for the Municipality of Danilovgrad proposes monitoring for certain groups and indicator species. The Hydrometeorological Institute conducts biomonitoring, but the locations of monitoring vary; for example, in 2020, fish fauna monitoring was carried out in watercourses relevant to the proposed biosphere reserve area, while in other years it was not. There are also individual research and project initiatives, but since this issue relates to continuous monitoring, they are not listed here. Therefore, for the rest of the planned area, activities on this matter have not been continuously planned or implemented according to the available documentation, which points to a gap and the need for planning and application. Therefore, it would be essential to create a comprehensive monitoring plan with indicators for both key species and existing pressures, and clearly identify the responsible entities for its implementation. Measures for reducing pressures on biodiversity are generally planned in all the mentioned reference documents, but the implementation of these measures is unknown and weak, and they are not specifically linked to species and habitats. A gap has been identified in the information regarding the degree of implementation of these measures.
- In the other documents, except for the Socio-economic Analysis of the Zeta River Nature Park, there is no clearly outlined information regarding the importance of species in terms of preserving genetic diversity, nor are specific pressures on them identified, as well as indicators for monitoring and protection measures. The protection studies provide data on the presence of species and habitats, as well as agricultural activities, which could potentially be further analyzed to identify species significant for the conservation of genetic biodiversity by experts specializing in particular groups. It is recommended that, through expert consultations, efforts be made to identify species significant for the preservation of genetic diversity within the area.
- Although there is information available for most municipalities within the planned scope of the biosphere reserve regarding other economic activities in terms of their prevalence and types, other information, such as the share of women and men, or the assessment or analysis of the positive or negative impact on sustainable development, is not available. Additionally, there are no defined indicators to monitor the status or pressures arising from the recorded activities, nor are there measures or actions to encourage positive or mitigate negative impacts of these activities on the goals of the future biosphere reserve. Therefore, it is recommended

that an analysis be conducted on the relationship between the impact of these activities on the future biosphere reserve, and that indicators be defined to monitor the status and trends, as well as measures to encourage activities that contribute positively to the sustainable development of the future biosphere reserve, as well as measures to reduce the negative impacts of activities on the future biosphere reserve.

- Although the Skadar Lake Basin is in many ways unique in terms of its natural and cultural heritage, as recognized by local government units in strategic documents, tourism offerings are limited by municipal administrative boundaries. On the other hand, the private sector integrates resources from the entire area into its offerings, which is a good approach for promoting the region and managing tourism activities. The provision of tourism products is largely left to individuals, accommodation providers, and tour operators, resulting in an uneven overall tourism offering. To address this issue, further engagement of local stakeholders is needed to create and manage tourism offerings and propose changes to policymakers (a bottom-up approach). Additionally, it is necessary to develop a unified tourism brand for the biosphere reserve.
- The analyzed documents do not provide indicators for assessing the status and trends of agricultural activities. These indicators need to be defined after setting the goals of the biosphere reserve.
- As there is no information on the benefits local communities derive from activities in the area, it is necessary to determine, through further consultative processes with local communities, which activities provide them with benefits and how the future biosphere reserve could support these activities, with special emphasis on the participation of both women and men. Indicators for monitoring the benefits to local communities should also be defined.

  Regarding the monitoring of species and habitats, as well as pressures, continuous activities are being carried out and planned by the Public Enterprise "National Parks of Montenegro." The Local Biodiversity Action Plan for the Municipality of Danilovgrad includes a proposal for monitoring certain groups and indicator species. The Hydrometeorological Institute conducts biomonitoring within the framework of the Water Framework Directive; however, the locations vary for fish fauna monitoring. For example, in 2020, monitoring of fish fauna was conducted in watercourses relevant to the proposed biosphere reserve area, while in other years, it was not.

  The Environmental Protection Agency conducts monitoring of various environmental segments (air quality, noise, soil pollution, ionizing and non-ionizing radiation, and biodiversity), but its scope and content vary yearly depending on available financial resources (for instance, biodiversity monitoring has not been conducted since 2016). Therefore, apart from Skadar Lake National Park, monitoring activities are not systematically planned or continuously implemented, as indicated by the available documentation for the proposed biosphere reserve area. This highlights the need to plan and implement monitoring activities systematically. A comprehensive monitoring plan with indicators for key species and existing pressures should be developed, and responsible entities for its continuous implementation

should be clearly identified. Regarding active and completed projects, there is no unified systematic database, even though a significant number of projects have been implemented in the proposed biosphere reserve area. Some of these projects are listed; however, it is recommended that a comprehensive list of active and completed projects be compiled during the consultative process with stakeholders.

Annex I - Past and Planned Initiatives for Declaring Biosphere Reserve

The harmony between humans and nature is the foundation of the "Man and the Biosphere" program, which has been part of UNESCO since 1971. Biosphere reserves are essential for achieving a sustainable balance between the often conflicting goals of conserving biodiversity, promoting economic development, and preserving cultural values.

Currently, the only biosphere reserve in Montenegro is the Tara River Canyon, designated in 1979 after being nominated in 1976. It covers an area of 182,889.00 hectares.

Located in the southeastern part of the Dinaric Alps, the Tara River Basin encompasses plateaus and the deepest canyon in Europe. The Tara Canyon is 80 km long and reaches a depth of 1,300 meters at its deepest point. In this biosphere reserve, the altitude ranges from 433 to 2,522 meters, offering a rich habitat and species diversity. Habitats include mountain forests, rivers, and lakes, as well as alpine and subalpine meadows, wetlands, and rocky terrains. The biosphere reserve also includes Durmitor National Park, which was declared a World Heritage Site in 1980.

About 23,800 people (1991) live inside the biosphere reserve, primarily engaged in agriculture, livestock farming, and grazing. The area is also of cultural interest due to its numerous churches, monasteries, and monuments. https://www.unesco.org/en/mab/tara-river-basin?hub=66369

The initiative to declare the Skadar Lake Basin a transboundary biosphere reserve dates back to the end of 2020. At that time, the NGOs "Green Home" from Montenegro and INCA - Institute for Nature Conservation from Albania, with the support of the Delegation of the European Union in Montenegro and Albania under the IPA Cross-Border Program Albania-Montenegro 2007-2013, launched the project titled "Supporting the proposed Trans-Boundary Biosphere Reserve of Lake Shkodra/Skadar area through a participatory approach."

As part of the project, valued at approximately €209,000, activities were implemented to enhance cooperation between the two neighboring countries and build capacities for more effective management of shared cross-border resources. In this regard, a Working Group was established to monitor and coordinate all project activities. These activities included preparing training manuals and conducting training sessions for civil society and state institutions on establishing a biosphere reserve.

Additionally, efforts focused on consolidating and clarifying existing data and preparing an integrated report for the designation of the biosphere reserve.

Although the relevant institutions initially supported the project in principle, they did not provide the necessary assistance in completing the nomination form, which was never finalized.

An analysis of the process revealed that the scope of the proposed area was insufficient, as the area already included the protected Skadar Lake National Park. As a result, the additional designation was not perceived as beneficial.

Furthermore, the consultative process was poorly managed and failed to motivate all the necessary stakeholders

Annex II - Institutional Organization Related to Nature Protection, Sustainable Development, Including Synergies, Overlaps, and/or Conflicts Among State Institutions, Civil Sector Organizations, and Private Organizations

A significant number of ministries, state administration bodies, institutions, and local self-government units hold responsibilities relevant to managing Montenegro's protected areas. Below is an overview of the division of responsibilities among ministries, administrative bodies, institutions, and local governments pertinent to the management of protected areas.

The National Council for Sustainable Development was established in 2002 as an advisory body to the Government of Montenegro, focusing on implementing sustainable development policies, including environmental protection policies. In 2005, the Office for Sustainable Development was created within the General Secretariat of the Government of Montenegro to serve as the Secretariat of the Council. The National Council is composed of a president and 39 members representing all relevant stakeholders. The President of the National Council is the Prime Minister of Montenegro, while the Secretary of the National Council is the head of the Office for Sustainable Development. The Council meets at least twice a year, and its work program is adopted for a three-year period. Within the framework of the National Council, a Working Group for Monitoring the Implementation of Sustainable Development Policy was established. This working group provides technical and advisory support and addresses topics related to nature protection in its operations.

Ministry of Ecology, Spatial planning and Urbanism is responsible for developing policies related to nature protection, enacting legislation, and aligning legislation with EU policies and the EU acquis concerning nature protection. The MESPU oversees the administrative supervision of several public institutions, including:

- Environmental Protection Agency (EPA),
- Public Enterprise for Coastal Zone Management of Montenegro (PECZM), and
- Public Enterprise for National Parks of Montenegro (JPNP)

Additionally, Article 55 of the Law on Nature Protection stipulates that protected areas and areas within the ecological network are managed by an authorized manager who meets specific requirements regarding staffing, organizational capability, and the ability to perform tasks related to the protection, enhancement, promotion, and sustainable development of the protected area or ecological network area. The fulfillment of these conditions, as outlined in Paragraph 1 of this Article, is determined by the Ministry of Ecology, Spatial planning and Urbanism (MSPPU) or the relevant local government authority. The management plan for a nature park, natural monument, or area of exceptional qualities located in the territories of two or more local governments is adopted by MESPU. Similarly, MESPU adopts the management plan for protected areas and/or ecological network areas, excluding national parks, within the coastal zone.

The annual management program is prepared and adopted by the designated manager, with the approval of MEPPU or the relevant local government authority. This program must be submitted to MEPPU or the competent local authority by November 30 of the current year for the following year.

The report on the implementation of the annual management program must be submitted by the manager to MEPPU or the relevant local government authority by March 1 of the current year for the preceding year.

The UNESCO Office facilitates the implementation of policies, programs, and recommendations of the Montenegrin National Commission for UNESCO through the Directorate for Cultural Heritage and Development in the field of cultural heritage. It organizes meetings and proposes an activity plan to the Commission. The Office also ensures intensive communication and information exchange between the Commission, Montenegro's Permanent Delegation to UNESCO, the Directorate for Cultural Heritage and Development, relevant ministries, and other bodies and organizations. It monitors the work of governmental and non-governmental bodies in areas under UNESCO's scope and advises the Commission on ways to involve Montenegrin representatives and projects in UNESCO working bodies and programs, in collaboration with the relevant ministry. Additionally, the Office ensures cooperation with the UNESCO Secretariat and the regular exchange of information. It also performs other tasks within its jurisdiction.

The National Commission for UNESCO is tasked with coordinating and enhancing the activities and cooperation of ministries, state bodies, and institutions responsible for developing and implementing Montenegro's measures and activities within the framework of collaboration with UNESCO. The Commission facilitates direct connections between UNESCO and educational, scientific, and cultural institutions, as well as civil society organizations in Montenegro. It also determines priorities and effective methods for developing and strengthening Montenegro's cooperation with UNESCO. The Commission's responsibilities include participating in the preparation, implementation, and evaluation of UNESCO programs and projects in Montenegro, informing the Government of Montenegro about

UNESCO's objectives and activities, and continuously monitoring and analyzing the implementation of proposed measures.

The Environmental Protection Agency of Montenegro (EPA) holds a wide range of responsibilities related to nature protection and protected areas, including: monitoring the status of biodiversity (habitats and species); preparing protection studies during the process of establishing protected areas, Issuing permits for activities and operations in protected areas; conducting scientific research aimed at protecting nature and biodiversity; preparing and maintaining environmental databases (including biodiversity); implementing impact assessment and strategic impact assessment procedures; issuing permits for the collection, cultivation, possession, and trade of wild animal, plant, and fungal species; protecting and issuing permits for scientific research and educational activities in protected natural areas, including speleological activities; defining conservation measures for habitats and species; carrying out acceptability assessment procedures, determining overriding public interest, and defining compensatory measures; conducting educational activities and ensuring free access to information related to nature protection. The Agency also provides opinions during the preparation of management plans for protected areas.

The Institute of Hydrometeorology and Seismology is responsible for observing and measuring meteorological, hydrological, ecological, and agrometeorological parameters; analyzing, processing, and archiving measured and observed data; preparing studies, reports, analyses, and information on climate, soil conditions, air quality, surface and groundwater, and coastal seas; forecasting and providing data in the fields of meteorology, hydrology, ecology, and agrometeorology; forming an information system with a database of climatological, hydrological, ecological, and agrometeorological research in cooperation with the relevant government authority responsible for the information society; establishing and maintaining meteorological, hydrological, and agrometeorological stations to monitor weather, water, air, and soil conditions; creating and maintaining a register of sources, springs, and water facilities; testing sediments in watercourses; monitoring and assessing the quality of surface and groundwater, precipitation, air, and soil based on analyses of physical-chemical, biochemical, and radiological parameters; providing data, information, and studies for the needs of maritime, air, and road transport, electricity, water management, agriculture, construction, tourism, defense, property and life insurance, and other stakeholders; performing aerological and radiosonde measurements of higher atmospheric layers; conducting phenological observations; fulfilling international obligations in meteorology and hydrology; performing the duties of the National Coordinator in collecting, processing, and forwarding maritime safety information (MSI), in accordance with the recommendations of the International Hydrographic Organization (IHO) and the International Maritime Organization (IMO); and organizing a network of permanent and temporary stations at sea and along the coast for collecting hydrographic data.

Managers of Protected Areas

In the territory of the proposed biosphere reserve, the following protected area managers are present:

- Public Enterprise National Parks – NP Lovćen, NP Skadar Lake, and the Nature Park "Ulcinj Salina"
- Public Enterprise for Coastal Zone Management of Montenegro (PECZM) – Long beach near Ulcinj and the Old Ulcinj Nature Park
- Agency for the Management of Protected Areas of Podgorica – Zeta River Nature Park and part of the Nature Park Komovi
- In the case of the Zeta River Nature Park, there are two managers – the secretariats of the municipality of Danilovgrad and the Agency for the Management of Protected Areas of Podgorica, which have been appointed as temporary managers until a joint management body is established
- Municipality of Tuzi/ Secretariat for Urban Planning – Cijevna Canyon Natural Monument.

The Public Enterprise National Parks of Montenegro (JPNP) is responsible for managing national parks in accordance with the Law on Nature Protection and the Law on National Parks. The managers of these parks have the longest experience in managing protected areas in Montenegro. JPNP takes measures and actions to implement established policies related to the management, use, protection, development, and enhancement of national parks. It ensures the implementation of the management plan and adopts an annual management program; carries out protective measures in accordance with the protection regime; and performs other tasks defined by law and the founding act.

The Public Enterprise for Coastal Zone Management of Montenegro (PECZM) is responsible for managing the maritime domain for both general and special public purposes in accordance with the provisions of the national Public Good Law. The most significant activities of PECZM relate to managing protected natural resources in the maritime domain zone, as per the mentioned law. These activities include leasing beaches and locations for the installation of temporary tourist and service facilities during the summer season, constructing and maintaining coastal infrastructure such as embankments, ports, docks, and other public areas, managing local ports, monitoring water quality for swimming on beaches, international cooperation, and participation in international projects, promoting environmental protection, collaborating with local municipalities and national agencies for managing protected areas, and addressing other environmental issues. According to the Law on Nature Protection, the Public Enterprise is also responsible for managing protected areas within the maritime domain zone.

According to the Nature Protection Law (Articles 56 and 105), managers of protected areas and/or ecological network areas are required to:

- prepare an annual management program and an internal regulation act;
- establish a protection service;
- develop a financial plan for the protection and development of the area;

- prepare an annual development and staff training plan;
- implement nature protection measures in accordance with protection goals, zones, and regimes;
- preserve, enhance, and promote the protected area and/or ecological network area;
- mark the protected area and/or ecological network area;
- ensure the unobstructed continuation of natural processes and sustainable use of the protected area and/or ecological network area;
- monitor the condition of the protected area and/or ecological network area and provide data to the governing body;
- submit an annual report to the Ministry or the competent local administration authority on the implementation of the management plan (or the annual management program), measures carried out, and financial resources used for these measures;
- perform other tasks defined by law and the founding act.

Additionally, the manager is required to organize a protection service to safeguard the protected natural asset. The protection service is carried out by guards of the protected natural asset, who must meet the requirements specified by the law regulating the protection of persons and property. The guard is obliged to perform their duties in an official uniform, carry an identification badge, and may carry a weapon in accordance with the law. The identification badge is issued by the administrative authority responsible for police affairs, in accordance with the specific law governing the protection of persons and property.

When a guard, in the performance of their duties, determines that there has been a violation of internal order rules or a breach of the protection regime, they are authorized and obligated to:

- Identify individuals found within the protected natural asset;
- Issue warnings or orders in accordance with the specific law governing the protection of persons and property;
- Conduct inspections of individuals, vehicles, vessels, goods, and cargo;
- Detain individuals caught committing a criminal offense, in accordance with the law governing the protection of persons and property;
- Secure the scene of an incident in accordance with the same law;
- Temporarily seize items used to commit a violation or criminal offense, or items resulting from such acts, and hand them over to the manager of the protected natural asset for safekeeping;
- Immediately notify the administrative authority responsible for inspection oversight;
- Hand over or notify the competent police authority regarding individuals without identification documents caught committing an offense or criminal act;
- Request the restoration of the previous state or order measures to prevent and mitigate harmful consequences;
- Cooperate with owners and users of rights to real estate within the protected natural asset to ensure nature protection;
- Provide assistance to visitors of the protected natural asset and local residents.

In the performance of their duties, the guard is required to display their identification badge.

The guard must issue an appropriate receipt to any individual from whom they have collected a monetary fine or confiscated tools and other items. The guard must meet the necessary qualifications

and possess a permit to carry out protection duties in accordance with the specific law governing the protection of persons and property.

The Ministry of Agriculture, Forestry, and Water Management (MAFWM) is responsible for developing policies, enacting legislation, and harmonizing with EU policies and legal frameworks in areas concerning the management and protection of forests, fisheries, hunting, agro-biodiversity, the Cartagena Protocol, biosafety, GMOs, pesticides, and the management and protection of water resources. The Ministry also has a supervisory role over several state administration institutions, including t**he Water Administration, the Forestry Administration, and the Administration for Food Safety, Veterinary, and Phytosanitary Affairs, among others.**

The Forestry Administration is tasked with activities related to: securing and improving the condition of forests; forest management and the management of special-purpose hunting grounds; measures and actions for the care, regeneration, establishment, and improvement of forests (biological reproduction), including the designation of seed sources; health inspection and control of forest tree reproductive material production; provision of seeds and planting material; measures and actions to preserve the natural and human-created values of forests, as well as to prevent and mitigate the adverse effects of biotic and abiotic factors threatening these values, and to rehabilitate existing conditions; protection of forests and forest land from illegal appropriation and use, fires, and other threats; managing a reporting and forecasting service; planning forest management, including preparing forest management programs and plans, implementation projects, and afforestation programs for barren lands; tree marking, measurement, stamping, and issuing certificates of origin for forest assortments; leasing forests in state ownership for use through contracts, in accordance with the law; monitoring the implementation of forest management measures, conducting professional supervision, and ensuring the quality of performed work; maintaining records and a forestry database; professional development, cooperation, and coordination with relevant international organizations and institutions within defined competencies; other tasks assigned under its jurisdiction.

The Water Administration is a state administrative body responsible for implementing water management policies in Montenegro, in accordance with the principles of managing water resources, water and coastal lands, and water infrastructure. The Water Administration carries out measures and actions aimed at ensuring and utilizing water resources while ensuring the long-term protection of water quality and water sources, protection of water bodies from pollution, regulation of water resources and watercourses, and protection against the harmful effects of water.

Administration for Inspection Affairs performs tasks related to inspection oversight in the fields of: electrical energy, thermal energy, mining, geology, hydrocarbon exploration and production, energy efficiency, metrology, spatial protection, urban planning, construction, tourism, ecology, food control, healthcare, agriculture, water management, forestry, hunting, plant protection in forests, and marine fisheries.

The Police Directorate is responsible for tasks including: safeguarding the security of citizens and constitutionally guaranteed freedoms and rights; protecting property; preventing and detecting criminal acts and misdemeanors; locating and apprehending perpetrators of criminal acts and misdemeanors and bringing them to the competent authorities; monitoring and securing state borders and performing border control; as well as other duties assigned within its scope of responsibilities.

The Ministry of Culture and Media performs administrative tasks related to the implementation of national and international scientific research and innovation projects; the development of plans and programs for scientific research activities; the formulation of scientific research policies and strategies; the protection, preservation, valorization, and presentation of cultural heritage; and other tasks assigned within its competencies. This Ministry also oversees the work of the Administration for the Protection of Cultural Property.

The Administration for the Protection of Cultural Property carries out tasks related to: researching, studying, documenting, and recording cultural property; determining the cultural value of cultural assets; granting the status of cultural heritage and establishing permanent protection for cultural assets; determining reasons for and issuing decisions on the termination of cultural heritage status; recording objects, items, sites, areas, and other material assets under preliminary protection; issuing permits for archaeological and conservation research; suspending research and revoking research permits; assessing the value and status of accidental finds; preparing and adopting protection studies for cultural heritage for the purposes of drafting national and local planning documents; reviewing and providing opinions on planning documents; granting approvals for geological research near cultural assets; and other tasks assigned within its competencies.

The Ministry of Spatial Planning, Urbanism, and State Property is responsible for tasks related to: drafting and monitoring regulations in the fields of spatial planning, urbanism, construction, legalization, and inspection supervision; property-law relations, state property, land surveying, and cadastral records. One of its most significant responsibilities is drafting the Spatial Plan of Montenegro.

The Ministry of Education, Science, and Innovation manages tasks related to the creation, establishment, and development of the educational system and the organization of work in educational institutions. Additionally, the Ministry aligns domestic regulations with EU legislation in the fields of science, research, and innovation, and implements incentive measures for the development of research and innovation in collaboration with other relevant institutions.

The Ministry of Transport and Maritime Affairs oversees administrative tasks related to railway, road, maritime, and air transportation, as well as state roads. This includes planning ports and marinas, navigable routes, and establishing rules for the movement of vessels.

The Ministry of Finance is responsible for the public finance system, financial, and budgetary matters. Other ministries and institutions relevant to the management of protected areas include:

- The Ministry of Capital Investments (transport and maritime affairs)
- The Ministry of Education (educational programs)
- The Ministry of Economic Development
- The Ministry of Defense
- The Ministry of Internal Affairs.

Local self-governments are responsible for the following matters: (i) planning spatial and urban development, (ii) preparing location studies, (iii) ensuring financial and budgetary provisions, (iv) designating Category III protected areas except for marine protected areas, and (v) appointing managers for protected areas or managing the protected areas they designate.
Local tourist organizations play a significant role in promoting attractive tourist sites, some of which are legally protected or planned for protection, with **municipal inspections and police** playing a particularly important role.

The most significant results of previous activities by the NGO sector include raising awareness about the value of protected areas and the threats they face, promoting protected areas and cross-border cooperation, tangible improvements related to the protection of specific species and habitats, contributions to research and awareness of biodiversity, initiatives for the protection of new areas, and enhancing cooperation with local communities.
Among the active national non-governmental organizations, the following have stood out in the field of nature conservation over the past few years: **NGO Center for Protection and Research of Birds of Montenegro (CZIP), Podgorica; NGO Montenegrin Ecologists Society; Environmental Program (EnvPro); Dr. Martin Schneider-Jacoby Association (MSJA); NGO Green Home; and NGO Eco Team.**

Numerous international non-profit and non-governmental organizations, such as **WWF, GIZ, UNDP, UNEP, IUCN, TNC, and Parks Dinarides**, actively participate in achieving nature conservation goals and promoting protected areas.

The private sector has not played a significant role in the management or financing of protected areas so far. Therefore, there is considerable room for improvement in this regard, especially given the noticeable increase in businesses that directly depend on the benefits provided by protected areas. Economic sectors linked to these activities include tourism, agriculture, harvesting and promotion of non-timber forest products, fisheries, and others.
The implementation of the concept of social responsibility is another mechanism through which the private sector could support the protected areas system.

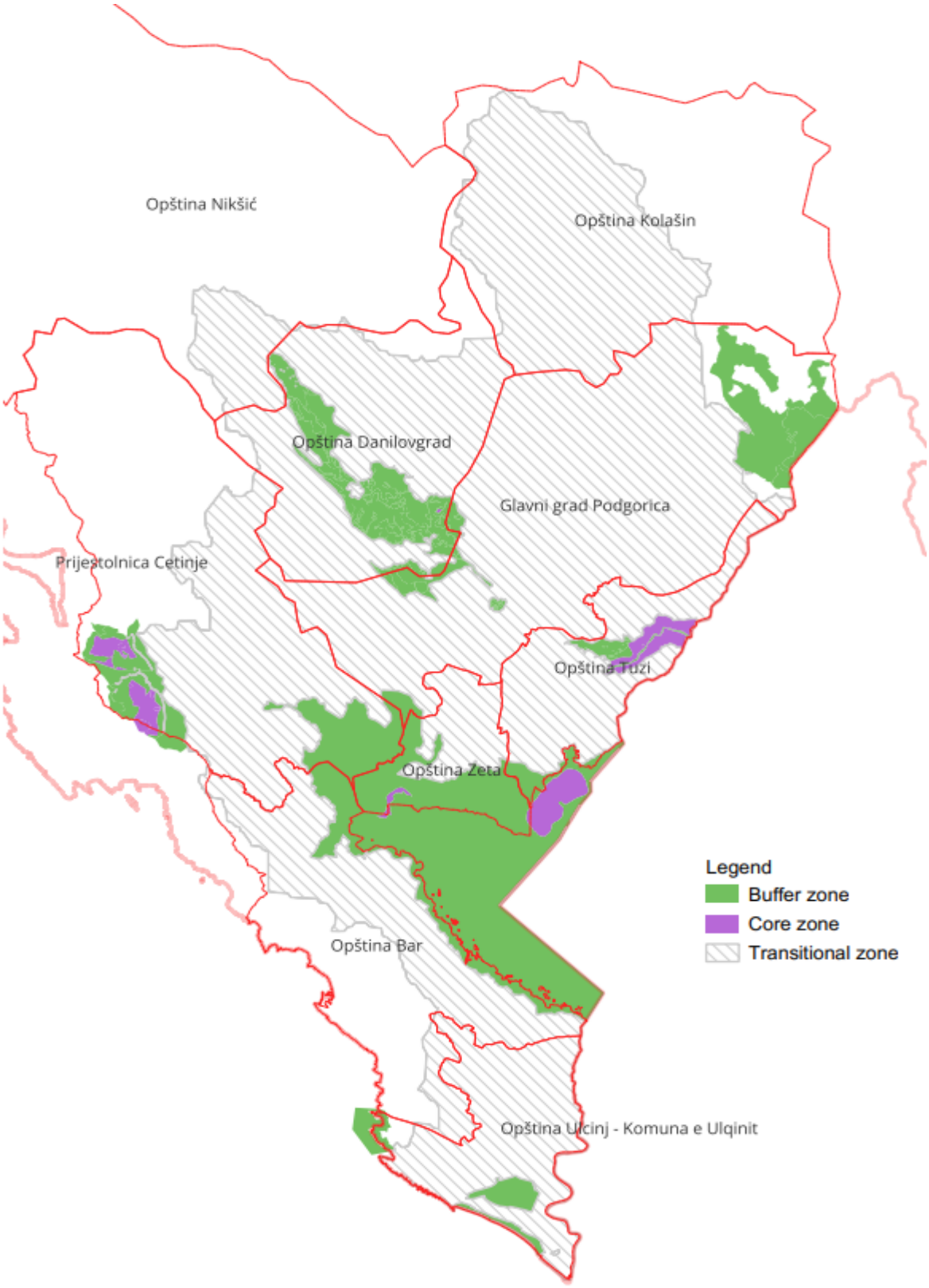
Annex III - Spatial Planning with Maps and GIS Files

In the context of GIS data availability, the following observations can be made:

Name of Relevant Document	Availability of GIS Maps	Recommendation
Spatial Plan of Montenegro	Not available on public portals	Contact the Ministry of Spatial Planning
Spatial Urban Plan of the Municipality of Bar	GIS data not available on the municipality's website	Contact the Municipality of Bar for GIS files
Spatial and Urban Plan of the Municipality of Ulcinj	GIS data not available on the municipality's website	Contact the Municipality of Ulcinj for GIS files
Spatial and Urban Plan of the Old Royal Capital Cetinje	GIS data not available on the municipality's website	Contact the Old Royal Capital Cetinje for GIS files
Spatial and Urban Plan of the Capital City	GIS data not available on the municipality's website	Contact the Capital City for GIS files
Spatial and Urban Plan of the Municipality of Danilovgrad	GIS data not available on the municipality's website	Contact the Municipality of Danilovgrad for GIS files
Boundaries and Zones of "Zeta River Valley" NP	Both boundaries and zones available on the website https://cloud.gdi.net/smartPortal/zppCG and in the folder attached to this Report	
Boundaries and Zones of "Skadar Lake" NP	Boundaries available on the website https://cloud.gdi.net/smartPortal/zppCG and in the folder attached to this Report. Zoning data is not available.	
Boundaries and Zones of "Ulcinj Salina" PP	Boundaries available on the website https://cloud.gdi.net/smartPortal/zppCG and in the folder attached to this Report. Zoning data is not available.	
Boundaries and Zones of Natural Monument of "Cijevna Canyon"	Both boundaries and zones available on the website https://cloud.gdi.net/smartPortal/zppCG and in the folder attached to this Report	
Biogeographical Region Boundaries	Available - folder attached to this Report	
Distribution of Habitats and Species from the Annexes of the Habitats Directive and Birds Directive	Available upon request to the Environmental Protection Agency	Submit a request to the Environmental Protection Agency for data on the distribution of habitats and species from the Annexes of the Habitats Directive and Birds Directive (Natura 2000), specifying the intended purpose and requesting digital boundaries of the

		proposed biosphere reserve areas.

Overview of Zoning in the Biosphere Reserve Based on Available GIS Layers


Opština Nikšić
Opština Kolašin
Opština Danilovgrad
Glavni grad Podgorica
Prijestolnica Cetinje
Opština Tuzi
Opština Zeta
Opština Bar
Opština Ulcinj - Komuna e Ulqinit
Legend
Buffer zone
Core zone
Transitional zone

Annex IV – List of Stakeholders (Excel Table)