Ministry of Spatial Planning, Urbanism and State Property

REPORT ON THE STRATEGIC ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DRAFT SPATIAL PLAN OF MONTENEGRO

Podgorica, January 2024

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Ordering Party: Ministry of Spatial Planning, Urbanism and State Property

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Table of contents

GENERAL DOCUMENTS

EXCERPT FROM THE CENTRAL REGISTRY OF BUSINESS ENTITIES OF THE REVENUE AND CUSTOMS ADMINISTRATION

Registration number: **5 – 0362891 / 006** Date of registration: 16.03.2007
TIN: **02651491** Date of modification of data: 26.05.2021

"ENTASIS" LIMITED LIABILITY COMPANY FOR SPATIAL PLANNING, DESIGNING OF CIVIL ENGINEERING AND OTHER STRUCTURES, ENGINEERING AND LEGAL AFFAIRS – PODGORICA

Number of valid registration: /006

Abbreviated name:	ENTASIS
Telephone:	+38269064780
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Web address:	
Date of contract:	15.03.2007
Date of adoption of the Statute:	15.03.2007 Date of modification of the Statute: 12.05.2021
Address of the main place of business:	370/III PIPERSKA, PODGORICA
Address for business mail:	370/III PIPERSKA, PODGORICA
Address of headquarters:	370/III PIPERSKA, PODGORICA
Core activity:	7112 engineering activities and technical advising
Foreign trade activities:	YES
Form of ownership:	Private
Origin of the capital:	Local
Subscribed capital:	EUR 1.00 (EUR 1.00 cash capital, EUR 0.00 non-cash capital)

FOUNDERS:

MIROSLAVA VUJADINOVIĆ – PIN/passport number protected by the law
Role: Founder
Share: 100% Address: personal data protected by the law

PERSONS IN THE COMPANY:

MIROSLAVA VUJADINOVIĆ – PIN/passport number protected by the law

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Role: Chief Executive Officer
Authorization in transaction: Unlimited ( )
Authorized to act: INDIVIDUALLY ( )

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Authorized to act: INDIVIDUALLY ( )

Issued: 11.05.2023 at 11:28h

Head:

Sanja Bojanić

Consolidated text of the Decision on the elaboration of the Strategic Environmental Impact Assessment for the Spatial Plan of Montenegro includes the following regulations:

1. Decision on the elaboration of the Strategic Environmental Impact Assessment for the Spatial Plan of Montenegro (Official Gazette of Montenegro 103/20 dated 19.10.2020),
2. Decision on amendments to the Decision on the elaboration of the Strategic Environmental Impact Assessment for the Spatial Plan of Montenegro (Official Gazette of Montenegro 138/21 dated 29.12.2021), which indicate the date of their entry into force.

DECISION
ON THE ELABORATION OF THE STRATEGIC ENVIRONMENTAL IMPACT ASSESSMENT FOR THE SPATIAL PLAN OF MONTENEGRO

(Official Gazette of Montenegro 103/20 dated 19.10.2020, 138/21 dated 29.12.2021)

1. Elaboration of the Strategic Environmental Impact Assessment (hereinafter referred to as the "Strategic Assessment") for the Spatial Plan of Montenegro (hereinafter referred to as the "Plan") is hereby initiated.
2. The Plan defines the need and commitment to harmonise the current plans and development strategies at the state level (National Strategy for Sustainable Development by 2030, Energy Development Strategy, Transport Development Strategy, Exploration of Oil and Gas Offshore Montenegro, Water Management Master Plan of Montenegro, Tourism Development Strategy by 2020) with plans and development documents at the international level related to the region of the Mediterranean and South East Europe, as well as the commitment to harmonise and link the national technical systems with the systems in the neighbouring countries and the wider international environment.
3. The Plan shall be prepared for the entire territory of Montenegro and forms the general basis for the organization and planning of space in Montenegro.
4. The Plan must provide a strategic framework for the overall spatial development of Montenegro until 2040 and create clearly defined corridors that will be followed by sectoral planning and more detailed spatial planning, which will be carried out through the preparation of a lower-level plan – the General Regulation Plan.
5. The Strategic Environmental Impact Assessment Report (hereinafter referred to as the "Report") shall be prepared on the conducted strategic assessment pursuant to Article 15 of the Strategic Environmental Impact Assessment Law.
6. The Report should provide a specific overview of the identification of negative impacts, the provision of protection measures and recommendations to be considered and the choice of the best variant solution, and in particular provide guidance relating on the conservation of biodiversity, water, sea, air, soil, space and the conservation of the values of other natural property.
7. The Ministry of Ecology, Spatial Planning and Urbanism, as the body responsible for the preparation of the Plan, decides on the selection of the author of the Report in a public procurement procedure.
8. The Report will be prepared within the deadline set for the preparation of the Plan.

9. The participation of the public, stakeholders and organisations will be ensured in the preparation of the Strategic Assessment and a public hearing will be organized in accordance with the Law on Strategic Environmental Impact Assessment.
10. The funds required for the preparation of the Report will be provided from the Budget of Montenegro in the amount of EUR 80.000.
11. This Decision shall enter into force on the eight day following that of its publication in the Official Gazette of Montenegro.

INTRODUCTION

The Strategic Environmental Impact Assessment (SIA) is a tool for assessing the potential negative impacts of plans and programmes on the environment and human health and for determining a set of different protective measures (prevention, minimisation, mitigation, remediation or compensation measures).

The application of SIA in the planning of various activities creates space for reviewing the changes that have occurred in the space and for recognising the environmental needs of the space, the scope of a plan or a programme. As part of the SIA, all planned activities are critically reviewed from the point of view of their impact on the environment and the elements of sustainable development, after which a decision is made as to whether and under what conditions the plan will be implemented or the planned activities will be cancelled.

Planning presupposes development, and the strategy of sustainable development requires environmental protection. In this context, strategic impact assessment is an indispensable tool for the implementation of sustainable development goals.

SIA integrates socio-economic and biophysical segments of the environment, links, analyses and evaluates activities of different interest sectors and directs the policy, plan or programme towards solutions that are primarily of interest to the environment. It is a tool that helps to integrate the objectives and principles of sustainable development into spatial planning decisions, taking into account the need to avoid or limit negative impacts on the environment, the health of the population and the social and economic status of the population. The importance of SIA is reflected in the following:

- it includes the aspect of sustainable development by tackling the root causes of environmental problems,
- it addresses issues and impacts of wider significance that cannot be compartmentalised into projects, e.g. cumulative and social impacts,
- it helps to assess the appropriateness of different options of development concepts,
- it avoids the limitations that arise when an environmental impact assessment is carried out for an already defined project,
- it ensures the site compatibility of the planned solutions from an environmental point of view,
- it defines an appropriate context for analysing the impacts of specific projects, including the prior identification of issues and impacts that merit closer examination, etc.

The Law on Strategic Impact Assessment (Official Gazette of RMNE 80/05, 59/11 and 52/16) and the Law on Environment Protection (Official Gazette of Montenegro 52/16) stipulate the obligation to carry out the strategic environmental impact assessment procedure for plans and strategies.

The environmental dimension is an important, but not the only aspect that reviews this instrument. Namely, a specific contribution of the strategic impact assessment is the contribution to the implementation of sustainable development goals.

The Spatial Plan of Montenegro is currently in the draft phase, adopted by the Government of Montenegro, and a public consultation on the Draft is pending, so we especially emphasize the fact that this SIA Report is a working version of the document, which provides further guidance for further changes to the Plan. As part of the further process of elaboration of both the planning document and the SIA Report, it is to be expected that both documents will undergo certain changes.

This SIA Report is prepared for the Draft Spatial Plan of Montenegro of October 2023.

1. A BRIEF OVERVIEW OF THE CONTENT AND MAIN OBJECTIVES OF THE STRATEGY AND HOW IT RELATES TO OTHER PLANS AND PROGRAMMES

The Spatial Plan of Montenegro (SPMNE) plays a key role in the planning of the use of space and in the coordination and integration of sectoral strategic planning. It provides a strategic framework for spatial planning and harmonisation of sectoral policies whose implementation has spatial impacts and consequences. In this respect, potential conflicts between sectoral development needs must be reconciled in accordance with the defined principles and standards of spatial development.

A necessary prerequisite for the realisation of planned projections is the definition of rules and measures for sustainable spatial development, the protection and improvement of the quality of space. This relates primarily to urban and rural development and the appropriate construction of structures and infrastructure. Controlled and managed development will also ensure higher social standards, which are also sought in the political commitment on the way to convergence with the standards of the countries of the European Union. This requires overcoming identified development constraints resulting from natural factors and created conditions, as well as institutionally addressing identified weaknesses that have emerged in the implementation of the planned objectives in the previous period.

The Spatial Plan of Montenegro until 2040 (hereinafter referred to as the "SPMNE") is prepared on the basis of the Law on Spatial Planning and Construction of Structures (Official Gazette of Montenegro 64/2017, 44/2018, 63/2018, 11/2019 – corr. and 82/2020). Pursuant to Art. 16 and 24 of the Law, the Government of Montenegro, at its session of 20 December 2018, adopted a Decision on the elaboration of the SPMNE until 2040 (Official Gazette of Montenegro 082/18 dated 21.12.2018) for the entire territory of Montenegro, which will form a general basis for the organisation and planning of the territory of Montenegro.

This part of the Report outlines the basic objectives of the planning document in order not to burden the document with a detailed presentation of the planned solutions.

1.1. Scope and boundaries of the Plan

The SPMNE is prepared for the entire territory of Montenegro with an area of 13.812 km^2 and its marine aquatorium of 2.540 km^2.

Administrative division of Montenegro

According to the Regulation of the European Commission (EC) 1059/2033, Montenegro is statistically defined as a NUTS region at all three levels (NUTS 1=NUTS 2=NUTS 3) out of a total of 272 NUTS II regions within the EU-28.

According to the national Law on Regional Development (Official Gazette of Montenegro 20/11 dated 05.04.2011), the territory of Montenegro is divided into three regions for the purpose of planning development priorities and implementing and monitoring regional development policy. These are made up of several geographically connected local self-government units as follows:

- Coastal Region – municipalities of Bar, Budva, Herceg Novi, Kotor, Tivat and Ulcinj,
- Central Region – Capital Podgorica, Old Royal Capital Cetinje and municipalities of Danilovgrad and Nikšić,
- Northern Region – municipalities of Andrijevica, Berane, Bijelo Polje, Kolašin, Mojkovac, Plav, Pljevlja, Plužine, Rožaje, Šavnik and Žabljak.

Following the adoption of this Law, the municipalities of Petnjica (2013) and Gusinje (2014), which belong to the Northern Region, and the municipalities of Tuzi (2018) and Zeta (2022), which belong to the Central Region, were established.

Table 1. Regional division, size, number of population and population density

Region	Size (km^2)	Population	Population density
Northern	7,477.47	177.837	24 citizens / km^2
Central	4,983.41	293.509	60 citizens / km^2
Coastal	1,504.57	148.683	100 citizens / km^2
Total	13,965.45	620.029	44 citizens / km^2

There are 1508 settlements in Montenegro, of which 58 of urban settlements where around 62% of the total population lives.

The Law on the Sea establishes the sovereignty of Montenegro over “inland marine waters, territorial sea, air space above it, the sea bottom and the undersea”.

The marine area is administratively divided by the law into inland marine waters, territorial sea and exclusive economic zone.

Inland marine waters with an area of 362 km^2 include ports, bays and islands; river estuaries; stretches of the sea between the coast and the main line of the territorial sea.

The territorial sea of Montenegro is a belt of sea 12 nautical miles wide, counting from the main line to the sea and covers an area of 2098 km^2.

1.2. A short overview of the content and objectives of the Plan and its relation to other plans

The grounds for the elaboration of the Spatial Plan of Montenegro include sustainable development as a commitment for the rational use of space, the vision of economic and social development, the ethical vision, the protection of nature and cultural heritage, a balance between development and protection, the reduction of poverty and unemployment, public participation in decision-making, the development of human capital and the capacity of the country.

The territory of Montenegro, its natural features and population are the most important assets and the basis for the long-term development of the country in all areas of activity. Rational consideration of all processes in the field of spatial use, economy, social activity, technical infrastructure, spatial protection and long-term commitment of the country towards the development based on the principles of sustainability imply the need to define a long-term concept of organisation, planning and use of space that will enable the achievement of the planning vision and the achievement of economic, social and environmental progress of society. Achieving the planned goals requires an improvement in the system of spatial planning and use, as well as the sustainable use of available resources in the country.

The development goals are in line with the objectives of the National Strategy for Sustainable Development, which aims to accelerate economic growth, reduce poverty, sustainably manage natural property and protect ethnic and cultural identity. The specific sectoral objectives are aligned with the overall development vision and the principles of rational use of space in accordance with the potentials, but also with the limitations and established regimes of use of space.

The planning concept of spatial planning in Montenegro for the planning period until 2040 is conditioned by the economic and social development achieved in the country, both at regional and municipal level, globalisation and European integration processes, the market economy, demographic trends and urbanisation processes, the aspiration for a society that is as human and developed as possible, using all the advantages of digital technology while preserving and protecting nature and its values.

Monitoring development through **overall strategic, specific sectoral and priority objectives** will address the structural problems in the economy and thus remove the main obstacles to improving the country's competitiveness and increasing potential economic growth in the medium and long term. In this development context, an increase in employment and productivity is expected, as well as a more efficient utilisation of all development resources in space.

1.2.1. Overall objectives

In accordance with the Rulebook[1], the overall objectives defined by the Draft Plan are based on the common interests and objectives of the strategic development documents, the policy of

[1] *Rulebook on the methodology for elaboration of a planning document and a more detailed method of organisation of prior public participation.*

rational use of space and environmental protection, the principles of sustainable development and the achievement of balanced socio-economic development.

Objective 1. Mitigate regional disparity

Balanced regional development and promotion of the development of all local communities based on their own development potentials, overcoming development thresholds and constraints; mitigation of existing regional disparities in economic and social development. This requires:

- promoting complementary development in the economic and social sectors, infrastructure and spatial protection,
- emphasizing and exploiting regional development advantages and better functional integration of the territory of Montenegro,
- more dynamic economic and social development of the Northern Region,
- coordination all levels of governance and interregional and intermunicipal institutional cooperation.

Objective 2. Ensure the quality of life in all parts of Montenegro in accordance with the adopted spatial and environmental criteria

Ensure a high quality of life through the development of economic and social activities and infrastructure development, especially in areas of with a lower level of development, in underdeveloped municipalities, especially in rural areas. Harmonising the development of areas with similar development potential and opportunities and achieving intermunicipal cooperation.

- Building the infrastructure necessary for development (transport, electricity and energy, hydrotechnical and electrocommunication infrastructure);
- Ensuring the highest level of social activity and services in all regions;
- Creating conditions for labour and business in municipalities threatened by depopulation.

Objective 3. Develop urban and rural areas in line with potentials and constraints

- Rational use of space and aligning spatial development with natural potentials and constraints, on land and the sea;
- Observance of the regime for the utilisation of space and the suitability of terrain for construction, especially in the context of seismic risk and climate change;
- Preserving the spatial identity and defining the conditions and regime for the utilisation of space;
- Steering spatial development in order to achieve as many positive effects as possible and minimize or eliminate negative effects;
- Ensuring the rational use of space and the safety of the population by controlling planning procedures and harmonising sectoral policies whose implementation has an impact on space;
- Adaptation of spatial development to the natural and spatial constraints, especially to the high risks.

Objective 4. Rational use of space and natural property

- Limiting the expansion of the building area to a reasonable level;
- Preventing the change of use of agricultural land and preserving the production potential of agricultural land;
- Control the expansion of urban areas;
- Balanced exploitation of mineral raw materials;
- Equal distribution of activities in accordance with the possibilities of water supply;
- Promotion of the use of renewable energy sources;
- Sustainable development of coastal areas through the application of the principle of integrated management of coastal areas with the resolution of numerous problems and conflicts in development, the planned management of the use of the sea and the better valorisation of natural property.

Objective 5. EU integration

- Integration of Montenegro into the EU, expansion of international economic and other exchanges on the basis of an increase in export and controlled imports;
- Integration of Montenegro into the European region. Continuation of transition reforms and inclusion of Montenegro in European integration flows, especially with regard to institutional support for the development of infrastructure, agriculture, education etc.;
- Alignment with the objectives of the European development policy aimed at “economic, social and territorial cohesion”, whereby the planning effort and sectoral development programmes should correspond to the current needs of the population, positive changes and future sustainable trends.

Objective 6. Development of cross-border cooperation

- Institutional cross-border cooperation and implementation of international conventions, protocols and standards;
- Improvement and institutionalisation of cross-border cooperation with neighbouring countries in the areas of economic and social development, infrastructure, environmental protection and the promotion of culture.

Objective 7. Implementation of legal solutions in spatial planning documents

- Harmonisation of sectoral development strategies and creation of a unified and harmonious development framework through a system of institutions and legislation;
- Adopted binding guidelines and principles for spatial development will provide a framework for detailed planning documents and sectoral development;
- Enabling democratic dialogue and social communication, participation in decision-making and the adoption of compromises as a model for resolving development conflicts;
- Institutional monitoring of the implementation of plans and reporting;
- Implementation and improvement of legal solutions of sectoral policies, as well as international conventions and protocols in the field of spatial development signed and adopted by Montenegro;
- Expanding international and other exchanges.

1.2.2. Specific sectoral objectives

Use of areas

- Definition of general categories of land use and general utilisation rules through binding guidelines for a more detailed planning level;
- Sustainable use and conservation of the coastal zone through integrated management and compliance with the spatial protection regime;
- Development and conservation of the coastal zone of Montenegro in accordance with the established instruments for managing this area, which is of special importance, particularly with regard to addressing the problems of the marine aquatorium and the identified conflicts in the narrow coastal strip.

Development of the structure of settlements

- Sustainable spatial organisation of settlements and a balanced distribution of the population;
- Achieving polycentricity in the settlement network system and establishing functional gravitational relationships between settlements;
- Developing urban areas in accordance with the acceptable building principles and parameters by controlling the expansion of building areas and urban regeneration;
- Ensuring utilities for urban and rural settlements;
- Planned establishment of guidelines for the selection of architectural forms by organising public competitions for all public areas and structures of general importance;
- Ensuring the legalisation of illegal structures and addressing spatial restrictions caused by those structures through legislation and plans;
- In the area of land policy – ensure a comprehensive approach and establish a balance between the rights of land owners and the public interest;
- Improvement of the housing sector – to improve social, economic and environmental sustainability, establish financing mechanisms to achieve the public interest in the housing sector and harmonise with EU regulations, especially with regard to environmentally sustainable solutions, energy-efficient structures and the creation of more humane housing conditions;
- Development and preservation of rural areas and improvement of urban-rural relations;
- Sustainable urban and rural development in line with spatial potentials and capacities, accepted standards and the introduction of building control;
- Population – halting negative demographic trends and strengthening the country's demographic capacity as the most important development resource.

Protection of natural and cultural heritage

- Systemic improvement of the integrated protection of the natural and cultural heritage on land and at sea and valorisation of natural and cultural values; protection and improvement of landscapes, compliance with the spatial protection regime;
- Promote the conservation of biodiversity and integrate it into the management of natural property, protect and establish new protected areas, especially valuable and sensitive zones;
- Preservation of ecosystems in accordance with national and international regulations;

- For the distribution of activities in space, analyses of natural conditions and environmental protection should be included at a detailed planning level;
- Preservation and improvement of cultural, ethnical, religious, gender and other identities.

Economic development – Improving the economic and business environment for a more dynamic economic development of the country, increasing the share of investment in GDP, strengthening private entrepreneurship, cooperation between the public and private sectors etc. Faster growth of the country's economy and application of the principle of sustainable development in all areas, especially the application of the green economy principle.

Industry and mining – Balanced, controlled exploitation of mineral raw materials in compliance with prescribed protective measures during and after exploitation; definition of the strategy and policy for the utilisation of mineral raw materials while preserving the deposits from other uses in space.

Agriculture, forestry – Development of agricultural activity and preservation of agricultural land for agricultural production and prevention of conversion into building areas.

Development of forestry and sustainable forest management for the purpose of improvement and sustainable multifunctional management (economic and protective function).

Tourism – Development of all forms of tourism by utilising the potential of all regions, focusing on a high quality of tourism offer, more intensive development of tourism in the Northern and Central Regions, especially in the rural, agricultural, environmental and health tourism.

Maritime economy (and maritime transport) – Increase the contribution of the maritime economy and capitalise on the advantages of Montenegro's location on the Mediterranean; improve port capacity and maritime transport infrastructure.

Social development – Improvement of all segments of social activity and creation of social services throughout Montenegro in accordance with national norms and the standards of European countries; support for the policy of democratisation of society and protection of human rights.

Transport – Improve accessibility of all areas throughout the country by developing all modes of transport to achieve inter-municipal, regional connectivity and ensure links to the single transport infrastructure system with neighbouring countries, Europe and the world.

Energy – Development of energy and electricity and energy infrastructure to achieve a safe energy supply, the development of a competitive energy market and sustainable energy development in the country; promotion of the use of renewable energy sources from hydro potential, solar and wind energy, biomass while avoiding conflicts with other uses of space and environmental protection; decarbonization.

Water management – Territorial distribution of activities for the purpose of balanced development and rational utilisation of water supply, protection of the quality of groundwater and underground waters and taking measures for protection from waters; ensuring the supply of high-quality water

to the entire population of urban and rural areas; and a quality system for the regulation of wastewater.

Electrocommunication infrastructure – Further development of electrocommunication infrastructure in line with the requirements of the modern digital society.

Waste management – Ensure waste management on land and at sea and address unregulated dumpsites in all municipalities. Waste reduction, recycling and appropriate disposal of all categories of waste; addressing key critical sites in areas of high conflicts and imbalance in the natural environment.

Protection from seismic risk and other disasters – Adopt the country's integrated policy to reduce earthquake risk. Identify the elements of seismic risk, determine vulnerability, control risk in all segments from planning to construction and utilisation of structures, and raise awareness of the magnitude and significance of the risk; achieve the country's resilience in terms of protection from seismic risk and protection of the country from all natural disasters to a level of acceptable resilience.

Utilities – Addressing key utility issues in urban and rural settlements and ensuring a sustainable utility system in all urban centres.

1.2.3. Development scenarios

The development scenario with which the proposed development vision can be achieved is the **"sustainable development scenario" –** ***(a scenario with more intensive development based on the "green economy" policy – spatially and environmentally acceptable).***

The proposed scenario enables the implementation of the overarching objectives and the spatial development vision. It can ensure a balanced regional development, **economically and socially developed, but above all ecologically preserved country**.

By taking into account aspects of spatial and environmental protection, it ensures the implementation of green economy and adapts it to the needs of local communities. It creates more employment and has a positive impact on demographic trends and makes protection of space, the environment, natural and cultural values in the country a development requirement and the regime of utilisation of space in all development sectors, both in the economy and in infrastructure.

This scenario is based on **1. sustainable spatial development, 2. economic development, 3. energy and transport development and 4. the protection of the fundamental values of space.**

Sustainable development encompasses economic, social and environmental objectives aimed at sustainable growth and a diversified economy capable of adapting to the challenges of the global economy. Investments are provided for various economic sectors, such as tourism, agriculture, mariculture and fisheries, forestry, food production, civil engineering, trade, maritime economy and services.

- The sustainable development scenario requires a high level of environmental awareness and a commitment to monitor the implementation of spatial development policy in order to achieve a balance between development and protection while implementing measures to mitigate negative environmental impacts.
- This development scenario is suitable for countries that need intensive economic growth and development, an increase in the employment rate, the utilisation of their own competitive advantages in all regions and sectors and the creation of added value, with strong control of all processes that have spatial impact.
- It requires technological innovation and competition on the global market. This development scenario promotes the concentration of the economic and social activities, the development of economic sectors that have development potential but are underutilised. It also implies the promotion of entrepreneurial capacity and the merger of production and service clusters. Economic growth is based on the application of European (global) standards, which means that negative spatial impacts are avoided.
- Intensive communication and cooperation between the central and local levels, cooperation between line Ministries and institutions and the professional commitment of all those involved in the implementation of the sectoral development policy and the country's general spatial development policy are required to implement and achieve the objectives of the planning vision.

In its strategic commitment, Montenegro is heading towards this development scenario, insisting on compliance with the accepted standards of the European Union in all areas of development, especially with regard to the protection of space, the environment and the health of the population. The next period will require **economic growth based on the country's own resources** and support from European development funds.

The first phase in achieving this development scenario is the period in which the most important development projects are launched and the infrastructural preconditions for development are created, and after achieving competitive development and joining the EU (probably by 2030), the sustainable development scenario with its principles would reach a high level of implementation and full connection (cohesion) with the protection scenario.

1.3. Development vision

- In the next period, Montenegro will observe the constitutional commitment and status of an ecological state in which the harmony of the traditional way of life of people and their natural environment should be achieved, in which the environment is healthy and the values of biodiversity, water, sea, air, soil, space and the values of other natural property are improved and preserved for future generations.
- It will ensure the preservation of the values of natural landscapes through responsible valuing and harmony of some functions in space with the natural environment, especially in the field of urban and rural development, construction of structures and infrastructure.
- *It will observe the principle that only healthy environment in which the values of biodiversity, inland waters, the* sea, agricultural and forest land and other natural property are preserved can ensure long-term, high-quality economic development.

- It will create preserved ecosystem values and services through sustainable and efficient management of natural and cultural values, ensure the solution of environmental problems, reduce the impacts on climate change and improve the quality of results in all economic sectors based on the principles of “green economy”.
- It will achieve the sustainable use and protection of the Montenegrin sea through the application of integrated management of the coastal zone.
- It will ensure a balanced development of the “blue economy” through a range of activities such as tourism offer, fishing and mariculture, maritime transport, controlled exploitation of mineral raw materials, regulation of navigation routes and nautical and fishing infrastructure.
- It will prevent marine pollution through an ecosystem-based approach to all activities and the preservation of cultural heritage, landscapes and archaeological sites.
- Montenegro will ensure a more balanced economic development of the regions and halt negative demographic trends in the near future through development projections in all economic sectors.
- It will achieve economic and social progress and the dynamic process of European integration by adopting and applying standards in all areas of work.
- It will develop social standards through the development of health, education, science, culture, social and child protection, physical education and sport institutions in all municipalities.
- It will control and improve urban development to create quality urban and public functions in line with human principles and recognised European standards.
- It will improve rural development and preserve the values of rural areas as a specific opportunity for the development of tourism and the overall economy and influence the reduction of negative demographic trends in rural areas, especially in the Northern Region.
- By developing energy and energy infrastructure, Montenegro will ensure a higher share of energy from renewable sources and thus ensure energy efficiency, which will have a positive impact on the economy and quality of life in urban and rural areas and will also contribute to the reduction of greenhouse gas emissions.
- More intensive development of transport will ensure greater mobility and accessibility as well as faster and better development in all three regions.
- In the area of utility infrastructure, additional efforts will be made to ensure the supply of hygienically safe water to the population and the economy, and wastewater treatment and high-quality waste management will ensure a healthy environment.
- In the field of tourism, high-quality tourism projects will be implemented in the next period, and the country will develop into a prestigious Mediterranean and mountainous country by offering mountain, rural and coastal tourism, taking advantage of healthy food, clean spring water and rich forest areas.
- In the area of agriculture, the available natural property will be used in a long-term sustainable manner, whereby arable agricultural land will be strictly protected, and incentives created for the preservation and activation of unused agricultural land in order to promote the development of rural areas.
- In the area of forestry, the improvement and preservation of forest potential will be ensured through appropriate forest management.
- In the area of waste management on land and at sea, it will ensure a system that meets modern standards, generates waste and reduces and eliminates negative environmental impacts.
- Adequate measures in the areas of defence, protection and rescue, protection against natural disasters and control of seismic risk will ensure the necessary level of resilience and

preparedness for potential natural hazards, thereby providing additional security for the lives of the country's citizens and safe investment in the economy.
- By achieving sectoral development objectives in the planning period, Montenegro will be accessible by transport, energy independent, with better regulated urban and rural settlements, an economically developed country in the Balkans, which will develop good economic and cultural relations with the countries of the region and Europe.
- By recognising weaknesses and constraints in all areas of activity, the institutions will begin to address them responsibly.
- Montenegro will comply with modern European principles in order to become a prosperous, ecologically clean, environmentally attractive country for living and new investments.
- After the adoption of the Plan, the institutions will monitor the implementation of all adopted objectives and ensure the implementation of the Plan in accordance with the legislation.

1.3.1. General structure of balanced spatial development

Regional division

The regional structure of Montenegro is determined by the geographic features and natural conditions, the existing functional connections between settlements and the established economic structure. The future structure of regional development of Montenegro should be based on the specific assets of each region and the integration of the regions into a unified business, economic and spatial system that will develop in the future according to the principles of sustainable development and integration.

The **Coastal Region** comprises the development zones of Boka Bay, the central and southern coastal areas. It is characterized by a relatively high population density, a higher proportion of tertiary economic activity and a much higher GDP per capita than the Northern Region.

The narrow coastal belt is under severe spatial pressure and requires careful spatial planning guidelines and improvement of transport through the construction of fast coastal roads and bypasses around the cities, taking into account the principle of minimising the impact on the environment and cultural heritage.

The main development objectives for this region include the targeted control and management of urban growth, raising the level of utility infrastructure in settlements, the planned management and use of non-urban and rural areas, the implementation of integrated management of the coastal zone and the determination of the purpose of the sea with its adequate protection, with special guidelines and rules for the Coastal Zone, the 1 km wide coastal belt and the narrow coastal belt 100 m from the coastline, which requires special regimes for the detailed planning, organisation and use of space.[2] In the areas where the spatial and urban structure is distorted, stricter control of construction and urban redevelopment is required through urban development and redevelopment in urban areas. The rural hinterland of the Coastal Region requires stimulation of development and recovery in accordance with established rules and planning parameters at the detailed planning level.

[2] *Regimes of use are defined in the SPSP for the coastal zone of Montenegro and in the National Integrated Coastal Zone Management Strategy.*

The narrow coastal belt is an area of special value and at the same time the most attractive zone, which is why the public interest criteria must be prioritised when planning further development. The narrow coastal belt zone requires:

- an integrated approach to the use and conservation of the coastal zone of Montenegro;
- free access to the coast as the natural property, public use and public interest in the use of the coastal zone; preservation of the natural beech and indigenous vegetation;
- the use of the coastal zone in line with the public interest and protection against devastation and construction of individual or multiple structures, with the exception of structures functionally connected to the sea or the coast, as well as structures of public interest, infrastructure facilities and structures that must be placed on the coast, such as shipyards, ports, etc.;
- planning of ports for nautical tourism in settlements and segregated building areas outside settlements, taking into account natural conditions and environmental protection;
- conservation of specific coastal ecosystems, utilisation of natural and cultural property in line with protection.

The **Central Region** comprises the zones of Zeta and Bjelopavlici valleys, the Nikšić and Cetinje fields in the lowlands of Montenegro, which are surrounded by karts areas. This region is home to the most important administrative, economic, educational and health centres.

The spatial conditions require infrastructure, economic development and the preservation of valuable agricultural land. The Central Region needs improved transport and other infrastructure to facilitate the development of industry and tourism, promote the development of agriculture while preserving agricultural areas and raising the level of administrative, health, educational and cultural functions.

The Old Royal Capital and the Capital Podgorica need better development, with the development of the city of Nikšić with the potential for a greater number of development functions, industry, education, tourism, etc. There is an urgent need to combat depopulation in the northwest part of the Central Region, to eliminate aridity in the karst area of the region and to ensure better transport and other infrastructure. There is also a great need to tackle the environmental problems identified, such as the exploitation of sand from the Morača riverbed etc.

The **Northern Region** comprises the development zones in the Lim, Tara, Ćehotina, Piva and Ibar river valleys, which come into contact with the mountainous area. In economic terms, it is centred on agriculture and forestry, is heavily depopulated and requires priority development measures.

The development of the Northern Region in the planning period should focus on faster economic development by realising the potential in tourism, agriculture and other production areas. There is a need to address the problem of depopulation and loss of agriculture of rural region, to tackle the insufficiently controlled exploitation of forests, to develop agriculture and the energy sector more intensively and to create a higher standard of social activities and services that will encourage younger population to live and invest in the development of this region. Intensive spatial protection and solving the identified environmental problems, especially in the area of the Municipality of Pljevlja.

Transport development corridors

The draft SPMNE proposes a higher degree of spatial integration of transport between development zones and regions. Transport corridors based on geographic suitability will also facilitate the concentration of economic and social activities. This process will rely on the existing and future network of the major roads and has been initiated by the construction of a section of the Bar – Boljari highway and the Risan – Žabljak main road.

Transport development routes/corridors:

- **East transport development corridor:** Bar – Podgorica – Mateševo – Andrijevica – Berane – Boljare, with branches Kolašin – Mojkovac – Bijelo Polje; secondary connections towards the areas of Plav, Gusinje, Petnjica and Rožaje.

  In Montenegro's development to date, this route has formed the eastern development axis of Montenegro in the direction Bar – Kolašin – the border with Serbia. In the next period, the construction of the first highway in Montenegro will enable more intensive development of the area of the municipalities of Andrijevica and Berane. Secondary connections to the areas of Plav, Gusinje, Petnjica and Rožaje will enable the activation of these inherently rich areas and the realisation of considerable development potential. The Kolašin zone will continue to be attractive through secondary (main) routes, and the Mojkovac zone will connect with the attractive mountainous areas of Montenegro by initiating more intense development. The need for more intensive development of the areas of Plav, Gusinje and the territories of Petnjica and Rožaje is particularly emphasised.

- **Western transport development corridor: Herceg Novi – Risan – Grahovo – Nikšić – Šavnik – Žabljak – Pljevlja; with the secondary development connection Šavnik – Nikšić – Kolašin (Mateševo-Kolašin-Boan-Šavnik); Vilusi – Petrovići – Vraćenovići – state border B&H; Nikšić – Velimlje – Crni Kuk – Crkvice – state border B&H.**

  The construction of the road from Risan via Grahovo to Žabljak has created new development opportunities in this transport corridor. In the next period, more intensive connections are expected between the development potentials of the Coastal and Northern regions in the field of tourism, but also other economic activities, which will create further possibilities for the exchange of agricultural products and other services and activities.

- **Coastal transport development corridor: Boka Kotorska – (Herceg Novi – Tivat – Kotor) – Budva – Bar – Ulcinj.**

  In addition to spatial integrity, the development route of coastal traffic from Boka Kotorska to Ulcinj depends on the activities and functions that take place at sea and on the coast, regional infrastructure systems of the Port of Bar and other ports and marinas, nautical, bathing and stationary tourism. The morphological diversity has caused the functional division of the coast into Boka – Budva Riviera and Bar – Ulcinj, which needs to be overcome in terms of development through the construction of coastal roads and bypasses around towns.

These areas strongly gravitate towards the centre of the country and, therefore, need to be better connected to Cetinje and Podgorica and the local connections with the immediate hinterland need to be improved.

- **Central transport development route – corridor: Nudo – Grahovo – Nikšić – Danilovgrad – Podgorica – state border with Albania (Božaj), with the branch Nikšić – Plužine – state border – Šćepan Polje**

  The development transport corridor of the Central Region needs to remain an important development direction in the near future, which can enable more intensive connections between economic and social activities, with further development impulses in the areas of tourism, agriculture, industry and development of the energy sector. In this transport and development corridor, complementary and high economic development and a significant improvement in transport are expected in the near future.

  The development of this region will further promote the Adriatic Ionian highway – mainland option.

  In addition to these primary development corridors, secondary development links that will establish a more intensive cooperation between certain local communities are also important.

  Northern transport development corridor: Pljevlja – Bijelo Polje – Berane – Rožaje with secondary development connections by road and rail transport between Pljevlja and Bijelo Polje.

  The Durmitor area and Žabljak were better connected in the previous period by the construction of the road from the coast via Grahovo to Žabljak with connections to Nikšić, Podgorica and further towards Bar. Better connection and transport links between the Municipality of Pljevlja and the area of Bijelo Polje and Berane are also needed, which will be achieved by the construction of road and railway transport. This will enable a more intensive economic and general cooperation between the municipalities of the Northern Region.

  In order to support intermunicipal cooperation, it is possible to establish transport connections in the Mateševo – Kolašin – Boan – Šavnik zone. The area of Kolašin is connected to the area of Berane via Bjelasica and Jelovica, which enables better integration of the area for the purpose of tourism and agricultural development.

Development zones

The draft SPMNE until 2040 retains the division into development zones as defined in the SPMNE until 2020, whereby the newly established municipalities have become parts of the respective zone.

Controlled use of development potentials, sustainable implementation of priority activities in all regions and their development zones by utilising their own potentials and protecting all segments

of the environment while strengthening capacities of local self-governments to implement the defined development policies is proposed.

Development zones of the Coastal Region

- Development zone Boka Kotorska (sub-zones Herceg Novi, Kotor, Tivat),
- Development zone Budva-Petrovac coast,
- Development zone Bar-Ulcinj coast.

Development zones of the Central Region

- Development zone with sub-zones Podgorica, Danilovgrad, Tuzi, Golubovci (Zeta-Bjelopavlići zone),
- Development zone Nikšić,
- Development zone Cetinje,
- Development zone Skadar Lake.

Development zones of the Northern Region

- Development zone Gornje and Srednje Potarje (Kolašin, Mojkovac),
- Development zone Polimlje-Plav (Plav, Gusinje, Andrijevica, Berane, Petnjica),
- Development zone Rožaje,
- Development zone Bijelo Polje,
- Development zone Piva (Šavnik, Plužine),
- Durmitor development zone – Žabljak,
- Development zone Pljevlja.

Cross-border development zones are:

1) Pljevlja, Gradac-Foča,
2) Pljevlja, Bijelo Polje – Prijepolje, Priboj,
3) Berane, Andrijevica, Rožaje, Plav – Peć, Kosovska Mitrovica,
4) Cross-bordering park Prokletije (Plav, Gusinje – Albania – Kosovo),
5) Skadar Lake basin (Podgorica, Danilovgrad, Bar, Ulcinj – Skadar, Koplik),
6) Boka Kotorska – Dubrovnik – Trebinje,
7) Nikšić, Vilusi – Trebinje, Bileća, Gacko,
8) Plužine, Maglić – Bioča – Foča, Sutjeska valley.

1.3.2. Demographic projection

The projection is prepared under the assumption that the projected targets (especially the demographic ones) until 2040 will be achieved within the planned timeframe and that migration from Montenegro will be minimised. It should be taken into account that the natural population movement is negative in most municipalities and that the Northern Region is particularly vulnerable with a high negative rate in almost all municipalities. Net migration is negative in most municipalities (with the exception of Podgorica and Danilovgrad and the municipalities of the

Coastal Region), and it is realistic to expect that the equalisation of internal migration in Montenegro will occur only after 2025 and will be reduced to a minimum after 2035, which would have an impact on reducing the decline in the population in the Northern Region and other depopulated municipalities of Montenegro.

1.3.3. Economic and market projection

The considerable economic growth of recent years has been driven by the implementation of major infrastructure projects with a positive multiplier effect, the mobilisation of local resources and an increasingly attractive tourism offer. Although there are positive trends in most sectors, the main drivers of growth over the last decade and a half have been **civil engineering, industry and tourism**. While the main advantages of Montenegro lie in its numerous and untapped natural property, the limiting factor is **the insufficient competitiveness of our economy**.

The economic model based on the free and open market with full accountability of the country for the commitments made makes Montenegro a country of social justice.

All this is compatible with the sufficiently broad concept of economic growth and development, which is reflected in the increase of competitiveness of the economy. **A developed and competitive economy is based on knowledge and assets that should be exploited through the relevant priorities of the research and innovation Strategy of Smart Specialisation (S3) for a fuller use of the considerable development potentials.** This development concept is complementary to the achieved foreign policy priority and NATO membership. The monitoring and implementation of objectives, measures and initiatives related to the Europe 2020 strategy is linked with the main mid-term priority – membership in the European Union. The S3 Strategy has been adopted by the Government of Montenegro, and we are a rare country that is not an EU Member State but has this Strategy. The development concept defined in this Strategy rerefers to a developed and competitive country based on the following three key directions:

- healthy Montenegro,
- sustainable Montenegro,
- modernised and digitalised Montenegro.

Development objectives

Overall objectives

Adoption of European economic policy and definition of common goals in line with the principles of a market economy and free competition. By entering into EU accession negotiations, Montenegro has shown its willingness to pursue common goals. These relate to:

- functional market economy,
- stability of interest rates,
- increase of competitiveness,
- stability of inflation rate,
- stability of public finance,
- or the overall macroeconomic stability.

Specific objectives

Specific long-term objectives and long-term economic policy as a whole must continue to be based **on major infrastructure projects, particularly in the areas of energy, transport, tourism and agriculture.** The current challenges need to be perceived as development opportunities. It is necessary to recognise new economic initiatives that combine **socio-economic recovery with the transition to a green economy, energy efficiency and adaptation to climate change**.

In priority sectors (energy, tourism and agriculture), we can highlight the following specific objectives[3].

Agriculture

- Ensure better and more appropriate support/assistance for agricultural producers in preparing the necessary documentation for applying for grants available under IPARD II and the future IPARD III programme.
- Promote the association of small agricultural producers in production organisations and promote the formation of vertical and horizontal clusters.
- Encourage the development of centres for the processing and distribution of agricultural products.
- Ensure higher subsidies for the use of new technologies in order to increase competitiveness of Montenegrin agricultural producers.
- Improve infrastructure for inaccessible or difficult to access arable land, which would also contribute to better regional development and reduce internal migration.

Tourism

- Work towards further improvement of the transport infrastructure.
- Develop tourism in the direction of the development model proposed in the Draft Plan, increasing the quality of the offer in order to activate the Northern Region and rural hinterland.
- Complete and implement waste management projects throughout Montenegro.
- Use the potential for the development of cultural, religious, sport and other specific forms of tourism.
- Encourage cooperation between the health and tourism sectors in order to improve the infrastructure of healthcare institutions and the development of health tourism.
- Develop sectors related to tourism in order to reduce import dependence (food industry, agriculture, business services, civil engineering, transport infrastructure) and identify potential synergies for more efficient use of assets.

Energy

- Increase the share of electricity generation from renewable energy sources.
- Promote energy efficiency and rationalise energy consumption and apply energy efficiency measures at all levels of consumption.

[3] *CBMNE*

- Ensure the technical and legal conditions for uninterrupted operation of the THP Pljevlja, especially in light of the fact that the energy crisis is prompting some EU countries to switch to coal-fired electricity generation, despite the negative impact on the climate.
- Balance carefully the share of electricity generation from renewable and non-renewable energy sources, which is a topical issue due to the ongoing energy crisis.
- Create the conditions for the full integration of wholesale electricity market of Montenegro into the EU single market.
- Implement energy efficiency measures in the civil engineering sector.

1.4. Sector projections – economic activity

1.4.1. Mining, industry and exploration of hydrocarbons

Montenegro will continue to develop and produce traditional mineral raw materials such as coal, lead and zinc ores and bauxites, depending on regional electricity prices for coal or world metal prices for metallic mineral raw materials such as lead and zinc.

The production of non-metals, building materials, ornamental and construction stone depends on the trends in the construction industry.

Development objectives

- Ensure that the bodies responsible for detailed geological survey are involved in the planning process for detailed purpose of the area.
- Detailed planning must respect the use of concession areas for which rights have been granted for geological surveys.
- Encourage projects to change the utilisation of exploitation areas where exploitation has been completed, especially in the Coastal Region. The use of exploitation areas can be converted into zones for recreation, sport grounds, artificial lakes, lookouts, malls, halls and factories or green areas.
- Prevent the illegal exploitation of solid mineral raw materials, especially stone for technical architectural purposes.

Mining and the oil and gas industry form the most important basis for the modern development of society.

The deposits of mineral raw materials are located in limited geographic areas and have been formed in certain geological periods through specific geological processes, i.e. the deposits are located in areas with specific geological characteristics. The deposits cannot be “relocated” and must be extracted where they are located.

As a candidate country for accession to the European Union, the State of Montenegro has responsibilities that include, among other things, respecting and complying with European policies, strategies and initiatives in all areas, including the economy, with regard to the rational and sustainable use of mineral raw materials, as well as mining and industry based on the utilisation of metallic, non-metallic and energy mineral raw materials.

Given the overall economic situation in Montenegro, it is realistic to expect that mining and industry based on the utilisation of mineral raw materials make a greater contribution to the development and sustainability of society and increase the share of national GDP in the future, in line with the proposed scenario of responsible, balanced development, a prosperous, economically, socially and environmentally developed Montenegro.

It is therefore very important that existing mining and industrial capacities are preserved and improved and that access to areas where mineral raw materials are discovered is maintained through the adoption of spatial planning documents at all levels, while ensuring that detailed geological surveys and the exploitation of mineral raw materials are carried out when the conditions are favourable.

The conservation of areas where deposits of mineral raw materials and prospects for further geological surveys have been proven through comprehensive spatial planning is therefore a long-term investment in the context of maintaining a sustainable supply of mineral raw materials at the national and local levels, but also in a wider regional and European context.

The total volume of mineral raw materials extracted from all mines (including quarries) in Montenegro amounts to around 4 million tonnes per year. An increase in total production by another 2 million tonnes would have a positive impact on the development of the mining industry as a whole and would not affect Montenegro's focus on sustainable development of the country. In the event of such as increase in exploitation, the mining sector would still be far from the model of intensive development.

An increase in production of traditional mineral raw materials in Montenegro such as coal, lead and zinc ores and bauxite will largely depend on the trends dictated by regional electricity prices for coal, but also on the world market prices for metals when it comes to metallic mineral raw materials such as lead and zinc. The results of recent surveys of lead and zinc deposits are encouraging when it comes to the expectation of an increase in the production of polymetallic ores and concentrates of lead, zinc and copper in Montenegro. Basically, with the existing level of production and regardless of the ore, the State of Montenegro does not belong to the group of globally important producers that can influence the market in any way. It only remains to us as a country to promote the application of the best global practices and technologies in the mining sector in order to abandon the outdated mining methods that are still widely used. The modernisation of mining would inevitably lead to a reduction in production prices per unit of product, which would have an impact on increasing competitiveness.

In terms of non-metallic raw materials, the production of technical and construction is particularly noteworthy. It will continue to depend directly on the development of the construction sector in the future. The idea that every town in Montenegro has its own production of technical and construction stone (quarry) should be fully implemented. It is to be expected that the total annual amount of extracted mineral raw materials in this mining sector will increase.

1.4.1.1. Industry

Montenegro is already recognised in the service sector, especially in tourism, as well as in the energy and transport sectors, and the focus should be on diversifying the sources of economic growth in order to reduce the impact of external factors (weather). Therefore, ***diversification of production is a key recommendation for further sustainable economic growth***. Development plans and projections should focus on the production of organic food and beverages, transport, construction, financial services and the manufacture of products with a higher degree of processing. The potential also lies in investment in renewable energy sources, the construction of green buildings, sustainable organic agriculture and support should be provided to eco-innovation, improving energy efficiency and asset utilisation efficiency in SMEs and the development of innovative joint ventures in the information technology and creative industries. Special attention has been paid to investment in infrastructure in recent years. Major capital projects in the areas of transport, tourism and energy have been completed, started or are in preparation. In addition, the development of the concept of smart specialisation will enable the development of new sectoral areas and industries through investment in research and innovation in the areas of strategic potential in our country.

The sectors that ***Industrial Policy*** recognises as having growth potential and that can drive industrial development, with a potential to increase competitiveness at the national market and a strong export potential, are ***processing industry*** *– food, timber, metal and pharmaceuticals;* ***energy and tourism***.

The sectors with growth potential that should contribute to ***modern industrial development*** are ***transport, ICT and creative industries, business services and construction.***

1.4.1.2. Sector of hydrocarbon exploration and production

Although the world is moving ever faster towards renewable energy sources, we believe that oil and gas will continue to play an irreplaceable role in the world's development in the coming decades. There is still no energy-generating product that could replace hydrocarbons. Even if all the cars currently in the world were replaced by electric cars, it would ultimately only reduce total oil and gas consumption by 20%. The remaining 80% would be used for transport by trucks and ships, air traffic and the enormous consumption in petrochemical industry. Against this background, Montenegro needs to further develop the oil and gas exploration sector in order to become an oil and gas producing country. In case of a positive outcome of the planned drilling and if the planned wells have commercial quantities of oil and gas, the concessionaires will be obliged to submit a Development and Production Plan (DPP) to the Government, which should include a development plan for the oil fields, the type and class of production facility, a production plan and a plan for demobilisation of the drilling facility after the exploitation is completed.

From a spatial planning perspective, the oil and gas production imply an installation for oil and gas exploitation that will exist on site in the next 30-40 years.

1.4.1.3. Gas supply and gas infrastructure

By joining the Energy Community, Montenegro has undertaken to apply the legal acts adopted by the competent bodies of the Community, including the legal acts on natural gas, although Montenegro does not yet have a developed infrastructure for the transmission and distribution of natural gas.

Based on the Energy Development Strategy until 2030, there are several options for supplying Montenegro with natural gas. At the time of elaboration of the Strategy, there were two projects for the construction of regional gas pipelines – the **Ionian-Adriatic Pipeline (IAP)** as part of the Trans Adriatic Pipeline (TAP) and the **Gas Ring Concept**, which was to enable the gasification of the South East Europe. Both concepts envisaged that gas from the huge Shat Denise deposit (Caspian Sea, Azerbaijan) would reach South East Europe.

In addition to the construction of regional pipelines, which Montenegro supports, knowing that it cannot influence the decision on their construction, the country is also trying to utilise its potential offshore gas reserves. In the event of a commercial discovery, the possibility of developing the local gas market and exporting gas from a neighbouring country through a potential regional pipeline (IAP) or another would be considered. The closest gas connections to Montenegro are Split (Croatia), Kraljevo (Serbia), Fieri (Albania) which should be connected through the IAP.

1.4.2. Agriculture

In addition to the economic contribution, agriculture plays an irreplaceable role in the preservation and development of rural areas, the development of rural and agrotourism, and also plays an ecological role in the protection against erosion and overgrowth, in the preservation of typical landscapes and contributes to the preservation of cultural and natural heritage.

Since the chosen scenario envisages “responsible and balanced development, a prosperous, economically, socially and ecologically developed Montenegro”, this means that agriculture will develop in a way that is fully based on the utilisation of its own competitive advantages. It is based on the application of new knowledge, technological innovations and steps towards the creation of new products and the diversification of services, both in agriculture and in the overall economic development.

The implementation of this scenario in agriculture must be accompanies by strong investment and institutional support through appropriate incentives from the Government, as well as institutional support to fulfil the requirements and use of international grants.

It is to be expected that the implementation of this scenario will lead to an increase in agricultural production, above all, to the preservation and development of rural areas, as much as possible, in terms of maintaining the population while creating fairly good conditions for the economy and life.

General objectives in further development of agriculture

The overall objectives of agriculture development must be harmonised with the main commitments set out in the national strategic documents, especially with the Strategy for the Development of Agriculture (2023-2028), which is in the final stage of elaboration, as well as with the chosen scenario for further development (responsible and balanced development).

Therefore, in the context of the general commitment of Montenegro to the EU accession policy, the generally accepted objectives are the following:

1. Long-term sustainable management of natural agricultural property while maximising environmental protection and achieving the objectives of the Green Deal in accordance with the EU Agenda;

2. Strengthening the competitiveness of agriculture while ensuring a stable supply of safe food that is acceptable in terms of quality and price;
3. Improving the standard of living of the rural population and the overall rural development while preserving traditional values;
4. Applying new technologies to increase food safety and competitiveness, and
5. Diversification of economic activities in rural areas and implementation of agricultural and rural development policy measures.

Specific objectives

The specific objectives for the development of agriculture in Montenegro over the next 20 years are derived from the general objectives mentioned above:

- Protection of the existing potential of agricultural land from further degradation or conversion into construction land;
- Activation of unused agricultural land and thus increasing the area used for agriculture;
- Increasing the proportion of arable agricultural land in the structure of total agricultural land;
- Increasing the volume of agricultural production to the level of optimal and long-term sustainable utilisation of available assets;
- Increasing the added value of agricultural products by increasing the degree of processing and finalisation of the products, etc.;
- Increasing the level of self-sufficiency and reducing dependence on imports, especially in the sector of fruit, vegetables, milk and meat production;
- Expansion of organic farming in all areas;
- Improving the overall infrastructure in rural areas in order to stop the trend of further depopulation of villages in Montenegro;
- Provision of tourism and hospitality services on the farm, especially the use and preservation of mountain huts ("*katun"*) for tourism purposes;
- Establishing close links between primary producers and processors and tourism businesses;
- Creating larger producers of commodities and the amalgamation of small producers into associations;
- Promotion and protection of traditional technologies and traditional products;
- Diversification of activities in rural areas (promotion of traditional crafts and trades) and preservation of rural cultural heritage;
- Strengthening institutional capacity to support agricultural producers, implementation of standards, etc.;
- Further development of processing capacity – agricultural industry and small-scale facilities for processing and packaging of agricultural products;
- Implementation of quality regulations and standards of safety and quality of food to a greater extent in response to the increasingly demanding criteria of retail chains;
- Strengthening horizontal and vertical links in the food production chain, etc.;
- Supporting innovation and digitalisation in agriculture and the introduction of new technologies in general;
- Establishing an information system for privately and publicly owned agricultural land.

Short-term priorities – until 2030

In the short term, i.e. over the next seven years (until 2030), agricultural development should prioritise the following points:

- Preservation and valorisation of available agricultural areas for agricultural purposes (soil cultivation, prevention of further conversion into construction land, protection against erosion, preservation of soil fertility and groundwater quality);
- Increasing irrigated areas by 50%;
- Technological modernisation of agricultural production;
- Further expansion of organic production and products with a designation of origin or geographic indication;
- Diversification of activities in rural areas;
- Institution building and greater support for investment.

Planning and spatial guidelines for agricultural development by regions

Based on an analysis of available potentials of agricultural land, the following areas are to be preserved:

In the Coastal Region: Ulcinj Field, Zoganjsko Field, Štoj region – Štoj sand, a section from Ada along the Bojana Valley to Šas and Šasko Field, the remaining part of the Bar Field, the remaining part of the Mrčevo Field, although restitution has been completed, and Grbaljsko and Sutorinsko fields. This region has considerable potential for increasing the production of citrus fruits and olives, as well as for growing vegetables in the protected areas. There is also great potential for the development of organic farming, especially in the area of harvesting of wild medicinal herbs which are abundant in this region. Livestock breeding should be developed in the marginal areas and on slopes, e.g. mini farms for cows and other animal species. Priority should be given to small ruminants, especially goats and sheep, as they clean the undergrowth well and provide potential protection against fires. The entire Coastal Region with its slopes and hills is ideal for beekeeping.

In the Central Region, where valuable agricultural land (lowlands) is most affected by construction, the dispersive expansion of private settlements in the Zeta Valley from the Karabuško Field to the Skadar Lake and in part of Sadine and Lješkopolje should be restricted. A large part of the highest quality agricultural land in the Bjelopavlići Valley is already endangered by the construction of industrial facilities (along the main roads) and by scattered private constructions. It is therefore proposed to preserve the existing agricultural land. Due to the very favourable climate conditions, it is possible to organise intensive production of all agricultural crops (vegetable growing, fruit and viticulture) in this region. Special attention should be paid to increasing of production in the protected areas, establishing and producing high-yielding fodder crops for cattle. As the main processing capacities are located in this region, intensive livestock breeding should be increased in line with the available land (dairy cow and goat farms), as well as poultry farms and pig fattening.

In the Municipality of Nikšić, special attention should be paid to the open part of the Nikšić Field (Gornje Polje, Krupačko and Slansko fields, Vir and Miločani), the Grahovsko Field and flat areas of Župa Nikšićka. The valuable plateaus of Krnovo, Lukovo and other higher areas stand out here and are used for the cultivation of potatoes, cereals, the production of fodder and seasonal grazing of livestock. There is potential for much better utilisation of these areas. The Central Region has the most and largest dairy cow farms, dairy farming is developed and fodder production with arable land needs to be improved.

In the Northern Region, high-quality agricultural areas are located in the Lim valley, and it is most affected in the Municipality of Bijelo Polje, starting from Poda and Zaton, the Municipality of Berane to Rasovo, Njegnjevo and further towards the border of Montenegro. These areas with available agricultural land need to be preserved in the near future.

In most other municipalities (Kolašin - especially Lipovo and Trebaljevo, Plužine, Žabljak, Petnjica, Berane, Andrijevica, etc.), the plateaus and plains must also be preserved for agricultural production in the near future. The expansion of settlements in the other municipalities is less intensive, with the exception of Pljevlja, where a part of the agricultural areas is continuously used for ore mining. It is expected that large infrastructure facilities will take up considerable agricultural land in the near future, such as highway, energy facilities – power transmission lines, which unexpectedly take up a lot of land, and other road infrastructure.

In the lower areas of the northern region, especially in the river valleys, there are considerable opportunities to increase the area under fruit crops (berries, stone fruit and apples), vegetables and seed potatoes, as well as cereals in the higher mountain areas. The entire northern region has enormous resources for livestock farming, especially ruminant farming (semi-intensive and semi-extensive), and the only way to utilise pastures and meadows is through livestock farming, especially sheep farming in all the municipalities in this region, which must be given special treatment in the form of additional incentives.

1.4.3. Mariculture

The results of the analysis of the suitability of the Boka Bay for mariculture have confirmed that all existing shellfish farms are in locations suitable for mariculture development, but also that a significant part of the Boka Bay is very suitable but not used for mariculture programme.

Key development objectives:

- Promotion of sustainable economic development and creation of business opportunities and new jobs in the “blue” sectors of the economy – fisheries and mariculture. This refers in particular to the identification of new sites for mariculture off the coast of Montenegro and the development of sea fish farming on land (in recirculating aquaculture systems-RAS).
- Sustainable development and improvement of mariculture as a form of supporting tourism in the Coastal Region (obtaining certification of organic shellfish farming, branding of products, protection of the geographic origin of the Mediterranean mussel (*Mytilus galloprovincialis*), creation of clusters and new tourism offers closely related to fishery and mariculture)).
- Increasing the capacity of innovative technologies in the farming process, dissemination and transfer of technological knowledge, improvement of technological processes.
- Creation of an innovative network between academic and research centres, legislative and executive authorities to form clusters of producers of traditional coastal products, including mariculture products.
- Adding value to mariculture products through organic farming and protection of geographic origin.
- Promoting the application of quality standards (application of better practices and management systems in accordance with public and private quality standards and certification programmes, especially those regulating organic food, environmental protection and preservation, food safety, animal health and wellbeing, food labelling and food information (origin), traceability of production and processing in mariculture.
- Promoting the cross-sectoral innovation capacities of the fisheries sector, mariculture and tourism in the micro-regions of coastal municipalities through the development of a knowledge network on the importance of mariculture to improve innovation,

competitiveness, internationalisation, sustainability and inclusive development of these two sectors.

1.4.4. Forestry, wood industry and hunting

Forestry Development Plan

The development of forestry in the near future needs to be based on multifunctionality, professional criteria and the principles of the forestry profession in order to emphasise the multipurpose functions of forests and the ecological balance in space or the principle of sustainable development – ensuring the continuity of production and revenues.

Sustainable forest management plays an active role in combating the negative impacts of climate change, its mitigation and adaptation measures preserve, renew and enhance biodiversity, including genetic resources; it influences the quality and quantity of water and mitigates natural disasters such as floods, droughts, avalanches, landslides and erosion and creates opportunities for numerous economic, environmental and social activities (recreation and tourism based on natural heritage).

The general development objectives in the field of forestry development include ensuring and improving the resilience and productivity of forests and other ecosystems and the conservation of plant and animal species; ensuring and sustainably fulfilling the ecological, social and economic – business functions of forests; the multipurpose exploitation of forests while ensuring sustainable forest and forestland management and continuous monitoring of forests to protect and maintain their health and contribute to the sustainable social and economic development of rural areas; the long-term development and competitiveness of the wood industry; the long-term development of the forestry profession and forestry activities. The protection and exploitation of forests should be in line with the principle of sustainable utilisation of natural property so as not to jeopardise the diversity and functioning of natural systems and processes.

Specific development objectives in the area of protection and sustainable use of forests and forestry development are as follows:

- Improve the condition of forests by improving the quality, quantity and structure of growing stock;
- Increase the proportion of coniferous species, valuable broadleaved trees and fruit trees;
- Increase the stability and resilience of stands to biotic and abiotic factors; promote natural regeneration and protect the health of forests; maintain the productive capacity of habitats; increase the proportion of high-productivity forests compared to low-productivity forests;
- Rehabilitate, reconstruct and convert devasted and coppice forests; create conditions for the production of non-timber forest products;
- Promote the increase of areas under forests compared to forestland through natural regeneration and afforestation with native species, leaving clearings – enclaves within the stands for the needs of wildlife;
- Preserve and improve biodiversity, protect habitats, species and genetic potential;
- Preservation, improvement, rational and sustainable utilisation and valorisation of the ecological, social and economic functions of forests and increasing the contribution of the forestry sector to economic and social development through the application of appropriate planning, management and monitoring measures;

- Maintaining and strengthening the capacity of forests, forest clearings and forest edges, can increase resilience;
- Adaptation to and mitigation of climate change;
- Preventing fires, protecting biodiversity, improving and protecting landscapes, landscape diversity, improving the ecosystem services of forests, rebuilding and optimising construction of forest roads, removing litter and other municipal waste from forests and forestland;
- Reduction of illegal activities in forestry, certification of the sustainability of forests and forest products according to international standards – FSC and PEFV, implementation of Natura 2000 in forests and on forestland;
- Establishing a single information system for all users in the forestry sector, which will be based on the Geographic Information System; integrated planning based on the principles of avoiding of conflicts in space and rational exploitation of forests and forestland as a natural property, protection of forestland from conversion into construction areas, etc.

Priority objectives

The implementation of the principles and objectives must be accompanied by systemic measures, such as the improvement of professional and technical capacities, the coverage of planning documents, the development of road infrastructure and the information system, and the improvement of the market.

Of the above specific objectives, the following objectives should be prioritised in continuity over the next five years and beyond:

- Preparation of planning documents at all levels (strategies, forest development plans and programmes, and forest management plans) for all forests and forestland on the territory of Montenegro in line with the given guidelines;
- Carrying out the second National Forest Inventory;
- Rehabilitation of damage caused by the effects of harmful insects – bark beetle and fires;
- Improve commitment and accountability for the protection of forests from fires, plant diseases and pests and for combating and preventing illegal activities in forestry and forestry monitoring;
- Establishment of a single Forest Information System;
- Improving and ensuring professional and technical capacities in forestry;
- Removal of litter and other waste from forests and forestland;
- Forest certification;
- Implementation of Natura 2000.

<u>Wood Industry Development Plan</u>

In view of the available timber resources and the market potential in Montenegro, the following products will be considered for the development of the timber industry in the planning period:

- Panels made of solid wood (combined with three-layer panels);
- Three-layer panels;
- Furniture made of solid wood;
- Solid structural timber (KVH, Duo/Trio) in combination with glued timber and cross-laminated timber, plywood / veneer, two-layer parquet and wooden doors and windows;
- Wooden houses, exterior and interior elements of wooden houses.

Hunting Development Plan

A general objective of the sustainable utilisation of game and the development of hunting is the versatile utilisation of hunting potential while ensuring the sustainable management of game populations and their habitats in a way and to an extent that reflects and enhances the vitality of the game population, the productive capacity of habitats and biodiversity in the long term. A specific objective is to improve the sustainable management of hunting fauna, to maintain and enhance biodiversity in hunting areas by maintaining and improving the quantity and quality of game through the application of appropriate planning, management and control measures.

1.4.5. Tourism development

The general principles for tourism development planning are based on the following:

- Orientation of the expansion of accommodation capacity towards a high-quality offer;
- Spatial protection as the basis for development;
- Rational positioning of tourism zones;
- Sensible development of complete zones and tourist centres;
- Securing the general infrastructure as the main prerequisite for the implementation of tourism projects.

According to the Tourism Development Strategy of Montenegro until 2025, in line with natural, economic and socio-cultural characteristics, key tourism zones in three regions stand out:

Coastal Region

- Ulcinj zone – subzones Velika Plaža and Ada Bojana, Old Town Ulcinj, Valdanos, Ulcinj Salina (protected area), Briska Gora, Šasko Lake, rural hinterland;
- Bar Zone – subzone Bar Riviera, Old Town Bar, rural hinterland with the Skadar Lake shore;
- Boka Kotorska zone – subzones: area of Kotor-Risan bay under UNESCO protection, Vrmac, Tivat Riviera, Luštica, Herceg Novi Riviera, Orijen.

Central Region

- Cetinje zone – subzones: NP Lovćen, Old Royal Capital Cetinje;
- Skadar Lake zone – NP Skadar Lake;
- Central zone – subzones: Podgorica, Zeta, Tuzi, Danilovgrad, Nikšić.

Northern Region

- Zone of Prokletije, Bjelasica, Komovi – subzone: NP Prokletije, NP Biogradska Gora, Nature Park Komovi,
- Zone of Durmitor and Sinjajevina with the Tara canyon – subzones: Nature Park Piva, NP Durmitor, rural area of Pljevlja, Sinjajevina (municipalities of Žabljak, Pljevlja, Plužine and Šavnik);
- Rožaje – subzones: Hajla, Štedim, Rusolija, Rožaje.

1.4.6. Marine economy

Increase the contribution of the marine economy to the overall economic development of the country in a way that enables sustainable and inclusive economic growth and contributes to reducing the country's development gap with the EU average improving the quality of life of all citizens.

Specific objectives:

- Improve the connections and operations of the Port of Bar;
- Improve business operations of the Port of Adria;
- Develop and improve further the Port of Kotor with the possibility of relocating the main port for cruise ships;
- Develop and improve business maritime shipping operations;
- Modernise and change in the use of existing capacities for ship maintenance and servicing in Bijela and Tivat;
- Develop further nautical tourism and positioning of Montenegro as an attractive nautical and cruising destination;
- Continue intensive exploration of the potentials of oil and gas reserves in the Adriatic Sea;
- Complete activities to fully harmonise legislation in this area with the relevant international regulations.

Priority objectives

- Reconstruction and modernisation of existing port capacities;
- Promote the development of the Port of Bar as a logistics centre integrated into the multimodal transport system;
- Construction of a new container terminal in the Port of Bar, which will position the Port of Bar as port of regional importance;
- Increasing the gross tonnage of the Montenegrin merchant fleet;
- Promote activities to further position Montenegro as an attractive nautical and cruising destination;
- Full adoption and application of the remaining EU legislation in this area.

1.6. Protection measures

1.6.1. Nature protection concept

Nature protection objectives

The main objectives of nature conservation relate to increasing the size of areas under some form of protection, aiming to preserve biodiversity conservation in all its forms while promoting local and regional development based on the sustainable utilisation of natural property.

In order to further increase of the quality and extent of protection, the following measures should be continued:

- establishment of new protected nature areas,
- review the status of existing protected areas,

- appoint managers and prepare management plans.

In order for Montenegro to close the negotiating chapter 27 on environmental protection as a country in the process of EU integration, it is **obliged to establish the international Natura 2000 network of protected areas**, in accordance with the implementation of the project "Establishing Natura 2000 in Montenegro". The prerequisites for the formal establishment of the ecological network should be created until 2025.

The candidate areas for the Emerald National Ecological Network (areas of special conservation interest – ASCI) must be adequately addressed in the Spatial Plan of Montenegro, in terms of guidelines for protection and avoidance of planning conflicts with the need for their conservation.

The targets for new areas and deadlines should be aligned with the EU Biodiversity Strategy for 2030 and the recently adopted Global Biodiversity Framework of the UN Convention on Biological Diversity. In line with the Biodiversity Strategy for 2030, the European Union has committed to expand the network of protected areas over the next ten years to:

- legally protect at least 30% of the land area and 30% of the marine area,
- strictly prohibit at least one third of EU protected areas or 10% of land and 10% of marine areas, including all remaining primary and old forests in the EU,
- integrate ecological corridors as part of a genuine Trans European Nature Network to prevent genetic isolation.

Projection of nature protection

The projection is based on the overview of potential protected areas dealt with in the GEF – UNEO MEPPU project "Promoting Protected Areas Management through Integrated Marine and Coastal Ecosystems Protection in Coastal Area of Montenegro".

I. Coastal area – coastal and marine protected areas

a. Coastal (land) protected areas

1. <u>Possibility to expand boundaries of existing protected areas (review procedure)</u>

- Buljarica: possibility of extension to the boundaries: (a) EMERALD areas ME0000005 (Buljarica, 302 ha), (b) IPA area of Buljarica (156 ha) or (c) IBA Buljarica (300 ha).
- Velika Plaža: possibility of extension to the boundaries: (a) EMERALD areas ME0000004 (Velika Plaža with Ulcinj Salina, 2839,46 ha), (b) IPA areas Velika Plaža and Ada Bojana (1014 ha) or (c) IBA Velika Plaža and Brijeg od Mora (12 km long and hinterland belt to 1000 m).
- Tivat Saline: possibility to extend the special nature reserve "Tivat Saline" to the boundaries of the KBA Tivat Saline (133 ha).

2. <u>New protected areas (designation procedure in accordance with the Law on Nature Protection)</u>

- "Sopot" and "Dražin Vrt": sites in the Boka Bay for which it was decided to place them under preventive protection as special nature reserves.

- Šasko Lake, Bojana River, Knete, Ada Bojana: new or newly protected areas whose spatial extent can be defined in the Protection Study within the boundaries of: (a) EMERALD areas ME000000C (7397 ha), (b) IBA Ada Bojana (494 ha), Bojana Delta (7500 ha), Šasko Lake (315-380 ha) and the Paratuk Lake (0.2 ha) or (c) KBA 1. Šasko Lake (448 ha), 2. Bojana Delta (12561 ha).
- Kotor-Risan Bay: newly protected areas whose spatial extent can be defined in the Protection Study within the boundaries of: (a) EMERALD areas ME000000Q (Kotor-Risan Bay, 2778 ha), (b) IPA area Kotor-Risan Bay (2778 ha), (c) KBA (Kotor-Risan Bay, 2781 ha) or (d) UNESCO area (Kotor-Risan Bay, 14600 ha).
- ***Marine protected areas*** (provisional designation for targeted research into marine habitats and species worthy of protection and subsequent preparation of protection studies and placing under protection).
- The zone of Mamula Bay (around 200 ha).
- Valdanos Bay to the boundaries of the "Old Ulcinj" Nature Park (around 100 ha).
- Đeran cliff (around 110 ha) and Bojana estuary to the border with Albania (around 1100 ha).

II. Continental area

In addition to the provisionally categorised areas, this overview also includes valuable sites within existing protected areas as well as uncategorised speleological, geological, hydrological and smaller botanical sites and important trees monuments.

1. ***Categorised potential protected areas***

Strict nature reserves

- Zeletin: Goveđak and other sites (around 300 ha). Mixed white-bark pine (*Pinus heldreichii)* and Macedonian pine (*Pinus peuce*) stands. Natura 2000: 95A0 White-bark and Macedonian pine stands of high oro-Mediterranean mountains. Territory of Andrijevica and Plav municipalities.
- Tuležine: Black pine, spruce and fir rainforests (around 470 ha). Natura 2000 types of habitats: *9530 (sub)Mediterranean pine forests with endemic black pines; 9410 Acidophilic mountainous spruce forests (*Vaccinio-Piceetea*). Territory of the Municipality of Pljevlja.

Nature parks

- *Rumija mountain massif:* Implementation of the proposal SPMNE 2008 – 2020. EMERALD area (12237 ha), IBA (2300 ha), IPA area (2000 ha) and KBA (9266 ha). Natura 2000 types of habitats: 95A0 White-bark pine and Macedonian pine forests of high oro-Mediterranean mountains; 9340 Holm oak (*Quercus ilex*) forests; 9250 Macedonian oak (*Quercus trojana*) forests and brushwood; 91M0 Pannonian-Balkan turkey oak-sessile oak forests; 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia villose*). Territory of the Municipality of Bar.
- *Sinjajevina*: EMERALD areas of Sinjajevina (Babji Zub and Gradište, 5709 ha), IPA area Babji Zub (4378 ha). Natura 2000 types of habitats: 6170 Alpine and sub-Alpine grasslands on carbonates; 8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*); 91KO Ilirian beech forest (*Aremonio-Fagion*); 95A0 White-bark pine and Macedonian pine forests of high oro-Mediterranean mountains. A

conservation study was prepared (2016) according to which the area of the proposed protected natural property covers 63.863,63 ha and includes the territory of four municipalities (Mojkovac 15.687,17 ha, Kolašin 18.006,24 ha, Žabljak 16.069,93 ha, Šavnik 14.100,34 ha).

- *Vrmac:* The Vrmac area is a large spatial unit characterised by a rich natural and cultural-historical heritage with great biodiversity, landscape and cultural values and features of national and international importance. Natura 2000 types of habitats: 5210 Maquis with Mediterranean juniper (*Juniperus sp.*); *5230 High bay laurel bushes (*Laurus nobilis*); 5310 Bay laurel shrubs (*Laurus nobilis*); *6110 Karstic calcareous and basophilic grasslands (*Alysso-Sedion albi*); *6220 Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*; 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia vilosae*); 8140 East Mediterranean schist; 8210 Carbonate rocks with chasmophytic vegetation; *9180 Forests of slopes and ravines (*Tilio-Acerion*); 91M0 Pannonian-Balkan turkey oak - sessile oak forests; 9260 Sweet chestnut forests (*Castanea sativa*); 9290 Cypress forests (*Acero-Cupression*); 9540 Mediterranean maritime pine forests. A Protection Study is prepared for the Vrmac Hill (2021) according to which the size of the proposed protected area covers 2361 ha (territory of the municipalities of Kotor and Tivat).
- *Ljubišnja:* Implementation of the proposal of SPMNE 2008 – 2020. EMERALD area (4332 ha), IPA area (2831 ha). Natura 2000 types of habitats: 9410 Acidophilic alpine spruce forests (*Vaccinio-Piceetea*); 91R0 Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*); 9110 Acidophilic beech forests (*Lazulo-Fagetum*); 7230 Alkaline fens; *6230 Species-rich Nardus grassland (*Nardus stricta*) on siliceous substrates in mountain areas; 6130 Juniper formations (*Juniperus communis*) on heaths or calcareous grasslands; *4070 Mugho pine shrubs (*Pinus mugo*) and hairy alpenrose (*Rhododendron hirsutum*). Territory of the Municipality of Pljevlja.
- *Ćehotina Valley:* EMERALD area, plant and animal species of national and international importance. Natura 2000 types of habitats: 3240 Alpine rivers and with banks dominated by rosemary willow; 5130 Juniper formations (*Juniperus communis*) on heaths or calcareous grasslands; 6510 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*); 8210 Carbonate rocks with chasmophytic vegetation; 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Salcion icanae, Salicion albae*); 91L0 Illirian oak-hornbeam forests (*Erythronio-Carpinion*); 91M0 Pannonian-Balkan turkey oak-sessile oak forests; 9410 Acidophilic alpine spruce forests (*Vaccinio-Piceetea*); *9530 (sub)Mediterranean pine forests with endemic black pines. A Protection Study has been prepared for the protected area “Upstream of the Ćehotina River” (2022) on the territory of the Municipality of Pljevlja with an area of 1.326,87 ha in size (integrated river, riparian and terrestrial forest area from the dam of Lake Otilovićko upstream, then the River Ćehotina to Krakalica and Vrulja, as well as the Kozička River to the central part of Mejdanica) with a protection belt (2.782,71 ha) to Vodnjanska River. The Municipality of Bijelo Polje has initiated a procedure to protect the River Ćehotina (2023) in the section that runs through its territory (from Stožer to Kovren). The downstream Ćehotina from Pljevlja to the border with Bosnia and Herzegovina must also be protected.
- *Turjak with Hajla:* Implementation of the proposal of SPMNE 2008 – 2020. EMERALD area Hajla (2266 ha), IBA (2000 ha), IPA area (1551 ha). Natura 2000 types of habitats: *4070 Mugho pine shrubs (*Pinus mugo*) and hairy alpenrose (*Rhododendron hirsutum*); 4060 Alpine and boreal heaths; 6170 Alpine and subalpine grasslands on carbonates; 6430 High hydrophilic grasslands of mountain-level to alpine plains; 7140 Transition mires; 8120 Calcareous schist of the montane to alpine levels (*Thlaspietea rotundifolii*); 9410 Acidophilic alpine spruce forests (*Vaccinio-Piceetea*); 95A0 White-bark pine and

Macedonian pine forests of high oro-Mediterranean mountains. Territory of the Municipality of Rožaje.

- *Štedim:* Plant and animal species of national and international importance, forest stands, preserved pristine nature (around 380 ha). Natura 2000 types of habitats: 4060 Alpine and boreal heaths; *4070 Mugho pine shrubs (*Pinus mugo*) and hairy alpenrose; 6170 Alpine and sub-Alpine grasslands on carbonates; 6430 High hydrophilic grasslands of mountain-level to alpine plains; 7140 Transition heaths; 95A0 White-bark and Macedonian pine stands of high oro-Mediterranean mountains. Territory of the Municipality of Rožaje.
- *Zeletin:* Plant and animal species of national and international importance, mixed forest stands of mugho pine and white-bark pine, preserved pristine nature (around 7000 ha). Natura 2000 types of habitats: 95A0 White-bark and Macedonian pine stands of high oro-Mediterranean mountains. Territory of the municipalities of Andrijevica and Plav.
- *Parts of Kučke Prokletije (1. Žijovo – Šila Velja – Treskavac; 2. Prijun – Vila – Prasica – Beškeća – Krisitor; 3. Surdup – Kariman – Torač):* It is possible to include these three mountain massifs in the Komovi Nature Park or to separate them into a larger landscape unit for the protection of plant and animal species that are mportant for the protection and preservation of the pristine nature (around 5100 ha; territory of the Capital Podgorica).
- *Lukavica:* A wider landscape unit that includes Borovnik, Mali and Veliki Žurim, Ilijin Vrh, Stožac, Trebiješ, Kapetanovo and Manito-Brnjičko Lakes (around 380 ha). Reasons for protection: plant and animal species that need to be protected. Territory of the municipalities of Nikšić and Kolašin.

Nature monuments

- *Zabran kralja Nikole in Morakovo:* A considerable complex of beech forest. Historically and biologically important site with interesting plant and animal species and habitats, it includes pristine zone of Gračanica and Jerinin Gras (430 ha). Natura 2000 types of habitats: 91 KO Ilirian beech forests (*Aremonio-Fagion*); 7230 Alkaline fens; 6540 Sub-Mediterranean grasslands of the *Molinio-Hordeion secalini.* IPA: *Scilla litardierei.* Territory of the Municipality of Nikšić.
- *Platije:* Important plant and animal species and habitats, canyon flora and vegetation (around 2200 ha). Territory of the municipalities of Podgorica and Kolašin.
- *Mala Rijeka Canyon:* Important plant and animal species and habitats, canyon flora and vegetation (around 3600 ha). Natura 2000 types of habitats: 9250 Macedonian oak forests and shrubs (*Quercus trojana*); *9180 Forests of slopes and ravines (*Tilio-Acerion*); *91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Salcion icanae, Salicion albae*); 8210 Carbonate rocks with chasmophytic vegetation; 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia villose*); 3240 Alpine rivers and with banks dominated by rosemary willow. Territory of the Municipality of Podgorica.
- *Mrtvica Canyon:* Important plant and animal species and habitats, canyon flora and vegetation, 2903 ha within the boundaries of EMERALD area of the same name. Natura 2000 types of habitats: *7220 Petrifying springs with tufa formation (*Cratoneurion*); 91K0 Ilirian beech forests (*Aremonio-Fagion*), etc. Territory of the Municipality of Kolašin.
- *Ibrištica Canyon:* Important plant and animal species and habitats, canyon flora and vegetation (around 349 ha). Territory of the Municipality of Kolašin.
- *Piperska River canyon:* Important plant and animal species and habitats, canyon flora and vegetation, chasmophytic flora (around 620 ha). Territory of the Municipality of Podgorica.
- *Bogutovski Spring* (right tributary of the Morača River, canyon section): Important plant and animal species and habitats, canyon flora and vegetation (around 21 ha).

- *Bjelopoljska Bistrica* (right tributary of Lim, outside of the boundaries of the Đalovića Gorge): Important plant and animal species and humid habitats (around 170 ha). Territory of the Municipality of Bijelo Polje.
- *Tifran Gorge:* Important plant and animal species and habitats, canyon flora and vegetation, the Šudikova Monastery – seat of the Budimlja Eparchy (around 200 ha). Territory of the Municipality of Berane.
- *Morinj Bay:* In addition to its cultural significance, this area is also ecologically important as it harbours important plant and animal species and habitats, particularly in a wider zone of the Morinj River estuary (around 300 ha). Territory of the Municipality of Kotor.
- *Plavsko Lake:* IBA (300 ha). There are important animal and plant species and habitats (around 300 ha). Natura 2000 types of habitats: 3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp (*Chara sp.*) etc. Territory of the Municipality of Plav.
- *Čakor* (with spring section of Bjeluha to the border with Kosovo): Important plant and animal species and habitats, significant forest habitats (around 1100 ha). Natura 2000 types of habitats: 9520 High Mugho pine and Macedonian pine of oro-Mediterranean mountains; 9410 Acidophilic mountainous spruce forests (*Vaccinio-Piceetea*), etc. Territory of the Municipality of Plav.
- *Torna (Bablji Zub):* High mountainous area with botanically valuable Torna site (around 345 ha). Natura 2000 types of habitats: 91K0 Ilirian beech forests (*Aremonio-Fagion*); 8210 Calcareous rocks with chasmophytic vegetation. IPA: *Daphne malyana, Eryngium alpinumm, Fritillaria montana, Geum bulgaricum, Narcissus augustifolius,* etc. Territory of the Municipality of Kolašin.
- *Jerinja Glava:* Important botanical site (around 750 ha). IPA area (295 ha). Natura 2000 types of habitats: 91K9 Ilirian beech forests (*Aremonio-Fagion*); 8210 Calcareous rocks with chasmophytic vegetation. IPA: *Achillea fraasii, Himantoglossum caprinum.* Territory of the Municipality of Andrijevica.
- *Bjeloševske Bare* (from the school in Donje Morakovo to Slap, the Gračanica Bridge): Interesting hydrogeological phenomenon with glacial traces, humid habitats and species that are important for protection (around 38 ha).
- *Budoške Bare:* Botanical site (finding of *Edraiantus dalmaticus*), humid habitats (around 370 ha). Natura 2000 types of habitats: *9180 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Salcion icanae, Salicion albae*); 6540 Sub-Mediterranean grasslands of the *Molinio-Hordeion secalini*; 6510 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*); 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia villose*); *3180 Occasional karst lakes (turloughs); 3150 Natural eutrophic lakes with *Magnopotamion* and *Hydrocharition* – type vegetation; 3260 Water courses of plain to montane levels with buttercup vegetation (*Ranunculion fluitantis, Callitricho-Batrachion*). IPA area: *Edraiantus dalmaticus, Allium guttatum subsp. Dalmaticum, Scilla litardierei, etc.* Territory of the Municipality of Nikšić.
- *Semolj:* Fens, important habitats which are significant for moss and vascular plants (around 65 ha). Territory of the Municipality of Kolašin.
- *Canyons of upstream of Popče and Radmanska River:* Important plans and animal species and habitats, canyon flora and vegetation, pristine natural value (around 1300 ha). Territory of the Municipality of Petnjica.
- *Veliko and Malo Pošćensko Lake:* Fens, aquatic and humid habitats which are particularly important for vascular plants and moss (around 13 ha). Territory of the Municipality of Šavnik.

Landscape with outstanding features

- *Visitor* (optionally also Zeletin): Important plant and animal species and habitats, forest stands, preserved pristine nature. The area of Visitor and Zeletin is recognised as an EMERALD site (13680 ha), while Visitor is recognised as an IPA area (1779 ha). Natura 2000: 9410 Acidophilic mountainous spruce forests (*Vaccinio-Piceetea*).
- *Beech forests on Obzovica:* These forests burnt several years ago, but gradually regenerate (around 115 ha). Natura 2000: 91K0 Ilirian beech forests (*Aremonio-Fagion*), etc.
- *Luštica:* Important Mediterranean plant and animal species and habitats (around 3500 ha). Natura 2000 types of habitats: 62A0 Eastern sub-Mediterranean dry grasslands (*Scorzoneretalia villose*); *6220 Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*; 5330 Thermo-Mediterranean and pre-desert scrub; 5210 Maquis with Mediterranean juniper (*Juniperus sp.*); 9340 Holm oak (*Quercus ilex*), etc.
- *River Morača catchment area:* Protection as an integrated protected area (hydrological catchment area) or (optionally) as individual canyons / canyons. Important plant and animal species and habitats of Mediterranean canyons (around 82000 ha).

2. <u>*Uncategorised potential protected areas*</u>

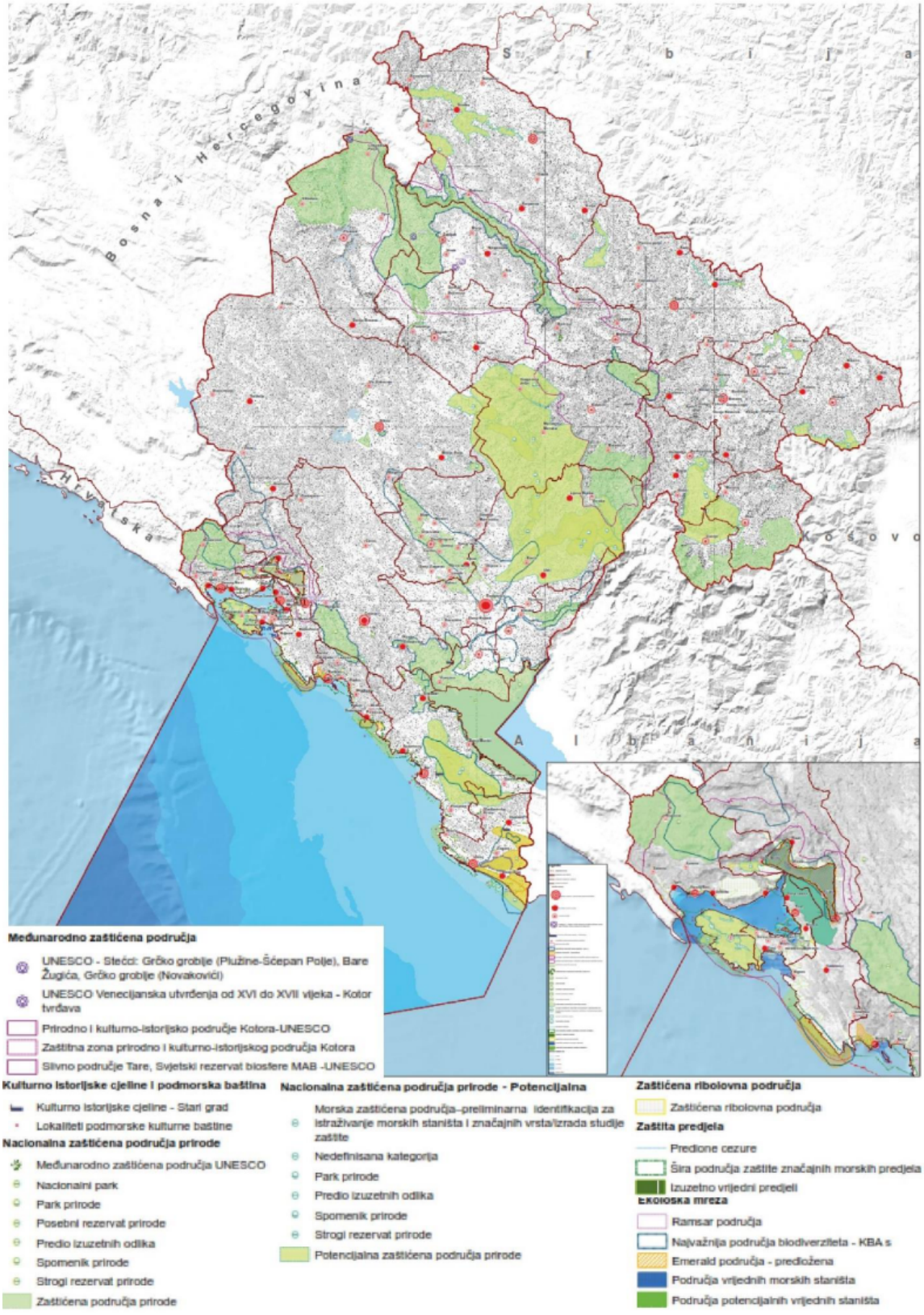
a) IPA areas (outside existing protected areas and other potential protected areas)
- Grebaje Valley (remaining part, out of the NP Prokletije),
- Kakaricka Gora.

b) IBA (outside existing protected areas and other potential protected areas)
- Ćemovsko Polje, 1200 ha,
- Nikšić reservoirs (lakes Slano 900 ha, Krupac 500 ha and Liverovićko 300 ha).

c) IFA
- A detailed analysis should be carried out for potentially important habitats for fungi to identify them and ensure appropriate protection status.

d) EMERALD areas (outside existing protected areas and other potential protected areas)
- Golija and Ledenice.

e) Marine health – ecological sites
- Topljanski Bay with the zone of Sutorina estuary or its special protection.



Cartogram 6.2.2. Protected areas and ecological networks

Regimes of protection, utilisation and restoration of marine areas

The protection regimes are implemented in accordance with the legislation for the following areas:

Protected areas in the sea

- Platamuni and Katič Nature Parks and the Old Ulcinj Island (category IV of protected area);
- Permitted and prohibited activities in parts of the protected areas that fall under protection regimes I, II, III are defined in the GEF Adriatik Project in accordance with the regulations;[4]
- Protection regime III – sustainable utilisation means selective and limited utilisation of natural property that enables the functional and environmental coherence and integrity of the protected area;
- Special nature reserves Sopot and Dražin Vrt (provisional protection);
- The area near Sopot and Dražin Vrt is provisionally protected until a protection study is completed, as stipulated in the Nature Protection Law (Official Gazette of Montenegro 54/16);
- A special nature reserve may be visited for the purpose of monitoring the status of nature, education, recreation and tourism on the basis of the manager's authorisation, provided that the populations of wild animals and their habitats are not disturbed, i.e. that the protected natural property is not threatened, and interventions can be carried out to protect the ecosystem from natural disasters and accidents.

Cartogram 6.2.3. Protection regimes at sea

[4] GEF Adriatik Project – protection regimes of marine areas.

Areas with valuable and potentially valuable habitats

Areas with valuable marine habitats:

- Trašte Bay, area off Ratac, area off Budva – Budva Tunja (although there have been sporadic surveys for these areas, no detailed surveys have been conducted yet, except for the Ratac area);
- The areas off Velika Plaža, where activities that could pose a further threat should be prohibited, especially backfilling, military use, construction of marinas, harbours and ensure regulation of outflows;
- The Tivat Salinas aquatorium, which is adjacent to an already nationally protected area, should be protected in order to plan activities involving construction, backfilling, urbanisation and the like;
- Important habitats such as sandy habitats (widespread along the coast in Montenegro, which include beaches such as Plavi Horizonti, Petrovac, Čanj, Velika Plaža, Sutomore, Slovenska Plaža, Bečići, etc.), sea caves and pits (in the area Luštica – Donji Grbalj and in the Ulcinj, the most interesting of which are Volujica, Plava Špilja, Krekavica) and wellsprings (Gurdić fountain, wellsprings under the steep shores of Lovćen between Ljuta and Perast and under the slopes of Orjen between Risan and Morinj; the most interesting is Risan wellspring, which is located directly under the Sopot fountain) require certain protective measures.

Wider areas with potentially valuable habitats:

- Mamula Bay to the Mačka Cape;
- Volujica Cape to Dobre Vode;
- Seka Đeran and south of Velika Plaža to Bojana Delta.

Further surveys are proposed for these areas in order to determine suitability for formal protection. In the areas where valuable marine habitats are located, no activities should be planned that could pose a further threat to the existing habitat types.

Underwater meadows of Posidonia and communities of marine grasses; valuable coral-like biocenoses – Due to their sensitivity, they are under the greatest pressure from outflows, tourist activities and other pressures resulting from human activities, especially marine litter. The following is therefore necessary:

- installation of wastewater treatment facilities;
- the treatment of marine litter;
- control and planning of anchorages outside the distribution area or, if this is not possible, planning the placement of environmentally friendly buoys that can be used as moorings;
- minimising, restricting and controlling construction, backfilling and tourist development activities;
- control of vessel discharges;
- control of diving activities (important for the protection of corals);
- avoidance of sites with this type of habitat for the purpose of planning and establishing mariculture (fish farming);
- prohibition of the use of fishing gear which may damage this type of habitat in the area where this habitat is widespread.

Emerald ecological network

Montenegro has drawn up a list of 32 candidate sites for the Emerald ecological network (also defined as sites of special conservation interest at European level – ASCIs), 12 of which are located in the coastal area or at sea: Skadar Lake, Velika Plaža with the Ulcinj Salina, Buljarica, Tivat Salina, Šasko Lake, Bojana River, Knete, Ada Bojana, Kotor-Risan Bay, Orjen, Pećin Beach, Spas Hill in Budva, islands of Katič, Donkova and Velja Seka, Platamuni.

Areas important for fishing and reproduction and feeding of fish

Protected fishing areas are defined by the relevant regulation and include parts of the fishing waters suitable for the natural reproduction of fish and feeding of juvenile fish and other marine organisms:

- Port Milena canal: from the mouth of the canal into the sea to the Salina, including the marginal canal of the Saline to the Brdela River, with an area of 28.5 ha;
- Tivat Salina: the area of 50 ha/139.8 ha covered by the existing basins;
- Krtolska cove with Kukuljina cove, area between Kaliman marine and the Milosrđe Island up to the outer cape at the entrance to Bjelila cove, 656.9 ha in size;
- Morinj estuary: from the estuary into the sea upstream for 700 m to the Ćatovića Mill and Milinovići;
- Estuary of the Mrčevska River: from the estuary into the sea to the bridge over the new road to the Luštica Peninsula for 700 m;
- Estuary of Gradiošnica: from the estuary into the sea to the bridge over the main road in the lenght of 450 m;
- Estuary of Veliki Potok (Široka River): from the estuary into the sea, upstream, in the lenght of 1000 m and average bed width of 13 m;
- Estuary of the Sutorina River to the estuary into the sea, upstream to the bridge over the main road Herceg Novi – Debeli Brijeg;
- Škurda estuary (Škurda 1 and Škurda 2 – Mala River): from the headwater to the estuary into the sea and a section of the sea off the estuary to the quay, in front of the Faculty of Maritime Studies and the beginning of the Muo settlement, 21.4 ha in size.

Kotor-Risan bay: area of special importance for reproduction of fish and feeding of fish and fish fry

Long-term studies of the early development stages of fish (ichthyoplankton) have shown that the Boka Bay area is the feeding and spawning zone for a considerable number of pelagic and demersal fish species.

The main spawning zones are located in:

- the central part of the Kotor and Risan bays;
- in the Tivat Bay (in front of the Solila nature reserve).

Considering the fact that the bays of Kotor and Risan are of special importance for the reproduction and feeding of fish and fish fry, that the main fish reproduction zones coincide with the zones of high productivity, but also the fact that the area of the Kotor-Risan Bay is an area of high biodiversity, valuable habitats and underwater archaeological sites and is under the protection of UNESCO as natural and cultural heritage, it is proposed to protect the aquatorium

of the Kotor-Risan Bay as a site with outstanding features as a category VI protected area in accordance with the Nature Protection Law (Official Gazette of Montenegro 054/16 and 018/19) ("category VI protected area, which includes areas designated for the conservation of ecosystems and habitats and related cultural values and traditional methods of natural property management, where natural property is managed and utilised in a sustainable manner").

Fishing area of the open sea

The analyses have shown that there are two valuable zones for anchovy spawning:

- from Bigova Cove to the Budva Bay;
- from the Black Cape to the border with Albania.

The spatial distribution of adult anchovies and sardelle shows that there are two important zones:

- between Platamuni and Budva;
- area in front of Ulcinj.

As far as demersal fish stocks are concerned, the area from Jaz Cape to Dobre Vode is considered to be the most valuable area for biomass according to studies carried out to date.

Protection of beaches

Some beaches have the status of a protected natural property, and all beaches are an important natural property. The establishment of bathing areas on protected beaches and their use is carried out in line with the general requirements for the conservation of protected natural property, taking into account the conservation of biological and landscape diversity.

On these beaches, it is forbidden to use (the protected natural property) in a way that causes permanent changes, no permanent structures may be erected, it is forbidden to concrete the beach, change the coastline and reshape the beach. Special criteria have been set for the protected dune belt on Velika Plaža, where no construction or other interventions are permitted, but restoration measures are possible.

The stability of beaches needs to be ensured as part of beach protection. It is necessary to prevent and mitigate the effects of erosion by replenishing the beached without constructing protective structures, aside for exceptional situations when jetties and submerged breakwaters must be built. Biological measures to protect the shore from erosion should be implemented by establishing a vegetation belt in the erosion-prone coastal area.

Rehabilitation regimes for threatened marine environment

- Remediation of areas affected by pollutants: Bijela Shipyard site (hazardous waste-grit, address pollution of underground waters in Bijela, grit from former Arsenal, etc.).
- In the Port of Bar, relocation of the facilities for receiving waste oil derivatives and removal of all hazardous waste.

Reduction of existing and prevention of future pollution and anthropogenic impacts on the trophicity of the marine environment

- Planning the construction of a comprehensive infrastructure for the collection and treatment of municipal wastewater.
- Strict compliance with the criterial for the coastal shift. Protection of zones that are particularly sensitive to pollution.
- Ensure that facilities which may jeopardise the quality of water for mariculture (industrial and similar facilities) are not planned in the vicinity of sites of special importance for mariculture and prevent negative impacts on the farm location, especially in the Boka Bay.
- Remediation of existing disposal sites for municipal waste in the littoral to prevent the infiltration and runoffs of toxic substances through underground waters into the marine aquatorium.
- Implementation of control and monitoring measures to prevent the discharge of wastewater from ships and yachts in the entire Boka Bay, especially in Kotor, Tivat and Herceg Novi.
- Construction of new harbour capacities and places for the overhaul of ships.

1.6.2. Cultural heritage

The planning projection of protection with the elimination of the consequences that have occurred under the conditions of the lack of (formal) systemic protection should ensure the preservation of identity and active integration of cultural heritage into the strategy of responsible, balanced and sustainable development of Montenegro, primarily the natural and cultural-historical area of Kotor, which is a specific objective of the SPMNE until 2040.

General objective:

The establishment of a fully-fledged protection system and its measurable implementation in the *institutional, normative and planning framework* for spatial management of Montenegro, which implies (the missing):

- elaboration of comprehensive documents on cultural heritage in accordance with applicable regulations;
- protection and improvement of underwater archaeological sites and cultural landscape as part of the reform and harmonisation of national legislation with European conventions;
- protection and integration of traditional (profane) architecture into development processes – in the context of social, cultural, tourism and economic potential for the development of the country;
- defining the boundaries of cultural property and their protected environment as an integral part of modern social, economic and urban development in order to respect their integrity and status and consistently implement the protection regime and measures;
- analysis and control of illegal construction by developing rehabilitation programmes and strengthening of the institutional protection system.

Conservation measure: Establish formal and legal protection, categorisation and registration of cultural heritage: establishment of an information system, marking of cultural property, entry in the Central Register, updating of the file on cultural property, definition of the boundaries of cultural property and their protected environment, entry in the Cadastre.

Specific objective:

Conservation of the outstanding universal value/OUV of the natural cultural-historical area of Kotor through the unity of attributes that contribute to the integrity and cohesion of the general structure of landscape (built and natural) as an essential quality of the natural and cultural-historical area of Kotor.

Conservation measure: Implementation of the International Convention concerning the Protection of World Natural and Cultural Heritage, Decision of the World Heritage Committee, Report (findings and recommendations) of the UNESCO missions on the status of the natural and cultural-historical area of Kotor from 2003 until 2018.

Specific objective:

Reform the system for the protection of cultural property by revising and coordinating national legislation in the areas of planning, construction and spatial protection.

Conservation measure: Improvement of the protection system by strengthening human resources and institutional reform.

Protection of cultural heritage of the sea

Although the current regimes for the protection of the natural and cultural-historical area of Kotor and its protected environment (buffer zone) are consistently observed, there is a need to define the protected environment and the contact zone of the urban centres of the cities. The area of the sea is considered part of this environment. This applies to the historic town centres and suburbs of mediaeval origin of Herceg Novi, Risan, Perast, Kotor, Budva, Sveti Stefan and Ulcinj.

Other important monuments of cultural heritage (e.g. Banja Monastery, Sveti Vavedenje Monastery, St. Nikola's Church) along the coastal strip and their surroundings (which are among the important sites of the coastal landscape) are also taken into account.

The protection of underwater archaeological sites includes the prohibition of all activities that could affect the cultural, social, economic, research, educational and other important features of the archaeological sites (construction of structures, dredging of the seabed, anchoring, fishing with deep dredges, shell/fish farming).

The activities with significant impact are shipyards, oil and gas exploitation (*implementation of maximum precautions to protect the environment, as far as possible from the coast;* large vessels and cruise ships and monitoring of their environmental impact, positioning of anchorages (*avoiding sites with valuable/vulnerable habitat types*)); in the Kotor-Risan Bay and later in the entire Boka Bay, gradual introduction of the rule that only vessels with integrated holding tanks have access; activities in port facilities and marinas, exploitation of mineral ores, fish farming (in the open sea and relocation out of the Boka Bay), deepening activities (*activity should be limited to occasional dredging to deepen navigation routes and the port aquatorium*); prohibition of waste disposal into the sea.

1.6.3. Reduction of disaster risk and protection of weather disasters

General development objectives

Building overall resilience and ensuring the safe functioning of the country in the areas of natural and other disaster risk or defence requires that general and specific objectives and priorities are set in these two areas:

- Objective 1 – development objectives and spatial planning priorities in the area of disaster risk reduction (natural, i.e. weather disasters, technical-technological and other man-made accidents),
- Objective 2 – development objectives and spatial planning priorities related to the country's defence.

1.7. Network and structures of social infrastructure – suprastructure

1.7.1. Development of social activities

Development objectives and measures to achieve the objectives:

The objectives in the area of social activities were formulated on the basis of the need for the Spatial Plan to enable general social and economic development according to a polycentric model that ensures an appropriate content of social activities in all regions and municipalities.

Education, science, culture, sport, health and social protection are very important in modern economic conditions and are often a key indicator of the development of a society.

Education

- Pre-school education should be introduced in all municipalities in Montenegro and in the centres of the network of settlements.
- Primary education should be introduced in all municipalities in Montenegro and in the areas of the network of settlements where the demographic structure requires so.
- Centres of regional importance and centres of municipal importance must have secondary education institutions that meet the need of the population.

Scientific activity

- The institutions for the development of scientific activity should be located in the centres of regional importance.

Cultural activity

- Preservation of cultural diversity and cultural heritage and development of cultural activities in all parts of Montenegro through the establishment of cultural institutions and the organisation of mobile forms of cultural activity according to the needs of the demographic structure.

Healthcare activity

- All municipalities in Montenegro must have an adequate primary healthcare system, with centres of regional importance being locations for general hospitals.

Social and child protection

- Facilities for children with development disabilities, children with behavioural disorders and children without parental care must be provided in all networks of settlements where the demographic structure requires so.
- Construction of homes for the elderly in all municipalities that are regional centres.
- Strengthen the of institutions and services of the social protection system that will meet the needs.

Physical culture and sport

- Every municipality in the network of settlements should have adequate sport infrastructure for sport and recreation activities.

Gender equality

Achieve a higher level of gender equality in Montenegro by improving the application of the existing normative framework and implementing measures to strengthen the capacity of institutional mechanisms for the enforcement of legal provisions on protection against discrimination.

1.7.2. Concept of the network of settlements, urban and rural development

The sustainability of the spatial organisation should continue to be based on the polycentric development model. This model is also accepted as optimal model in the EU countries and is applied to the territorial development of Montenegro. The development objective of this model is to achieve a balanced spatial distribution of the population and to mitigate the depopulation processes that are characteristic for the Northern Region, especially for villages.

Strategic objectives and priorities for urban development and binding guidelines:

- Harmonisation with the objectives of urban development in Europe, realisation of the European vision of a spatial organisation of cities and regions to ensure social cohesion, economic connections, cooperation, cultural exchange and diversity.
- Promoting the integral urban and rural development while improving the accessibility of rural areas and the connecting functions of cities and villages.
- Strengthening or creating new functions and services according to the status of a settlement.
- Consideration of regional diversity and local characteristics in the regulation of urban and rural settlements.
- Creating people-friendly and liveable cities and their immediate surroundings with more recognisable urban patterns.
- Utility infrastructure and the provision of utility infrastructure is important for the development of all settlements in Montenegro, which increases its value and importance

for the development and improvement of the community. A priority task is the rational and efficient management of construction as a public property. This requires an organised system of utility infrastructure and maintenance with the necessary rehabilitation of the condition of the most endangered areas.

- Promoting green infrastructure as a starting point for future sustainable - green development (open spaces, natural areas, preservation of parks, squares and public areas, ensuring an irrigation and drainage system, preservation of watercourses in settlements, creation of bike and pedestrian paths in the urban environment, etc.
- Creating amenities in cities for all generations that are safe and spatially and functionally organised in such a way as to reduce travel time for basic work and life needs while reducing energy consumption (transport, travel time, parking, etc.).
- Creating high-quality public areas in accordance with established urban standards, rules and principles.
- The settlement structure should be developed with a rational approach to the use of space for urbanisation while controlling expansion of construction areas.
- Compliance with clear rules and restrictions (Rulebook) for the expansion of construction zones in all regions, municipalities and settlements.
- Increasing the attractiveness of cities and other settlements by ensuring a high-quality and preserved environment with strict respect for cultural heritage.
- Preserving the uniqueness and identity of urban structures, especially old towns.
- Reducing pollution in cities and supporting the development of vital, clean, navigable cities and settlements that are as “green” as possible and equipped with utility infrastructure.

Specific objectives

Sustainable approaches to urban and rural development should be ensured in the preparation of planning documents, emphasising the following:

- Revise planning documents that do not comply with acceptable urban design standards and construction parameters.
- The urbanisation process should be carried out in accordance with the possibilities and limitations of local areas, individual zones and sites in such a way that the existing natural limitations and potential conflicts in land use are taken into account from the outset.
- Detailed planning should ensure safe and secure access to all planned or built structures in the event of earthquakes, fires, floods or other natural or man-made disasters.
- Maintain corridors of fresh and clean air and ensure insolation during construction, especially of residential buildings, schools, healthcare facilities and hospitals, tourist facilities for leisure and recreation.
- Improve abandoned areas through renewal and new functions and put them into to appropriate use.
- Plan urban areas in such a way as to minimise energy consumption.
- Regenerate the cultural heritage, taking into account the protection or conservation requirements established by a competent institution.
- At the detailed planning level, plan the construction of suitable sport zones and areas that meet the needs of the population.
- Rehabilitate, renew and develop abandoned urban areas.
- Old urban centres, especially in the Coastal Region, offer great potential that must be strictly protected from disturbance, damage removed and revitalised.
- Legalisation of structures in all municipalities of Montenegro with prior detailed registration of illegal structures.

- Harmonious architectural design in accordance with the local characteristics of the area.
- Landscaping of abandoned areas which are infrastructurally connected – brownfield.

The general objectives of rural development are as follows:

- In addition to planning commitments, agricultural policy support measures, support for village development through various funds, government incentives, etc. are also necessary (small business, rural tourism, transport and social infrastructure, educational opportunities, care for old people's households).
- Redevelopment is only possible by harmonising or levelling the living conditions in villages and towns.
- A part of the concept of revitalisation of the village is also the demographic policy that relieves the urban settlements and supports the development of the villages.
- Stimulate the development of important local centres in rural areas and prevent their further devastation and degradation.

Specific objectives:

- When planning the development of rural settlements, their characteristics need to be taken into account, i.e. the characteristics of the region/municipality in which the rural settlement is located.
- Accessibility and infrastructure.
- Activation of villages and planned preservation of village identity, supporting the development of agricultural production, agritourism, eco-tourism and ethno-tourism.
- Development of production and processing businesses.
- Ensuring the required level and content of social activities and services.
- Maximising the protection of agricultural and forest areas and their sustainable enhancement through food production and the development of appropriate forms of tourism.
- Supporting the development of agritourism and other forms of rural tourism in such a way that arable agricultural land is not converted into construction land.
- Appropriate protection and revitalisation of villages while preserving the specific environmental characteristics of settlements in all municipalities.
- In the land use plans, new construction for agriculture, tourism and housing in rural areas must be defined in such a way that the identity of the villages is not jeopardised and the remains of the old villages are revitalised.
- Providing rural areas with the necessary infrastructure and social services.
- Careful regulation and utilisation of rural space while preserving landscape values, especially in the construction of infrastructure systems, industrial plants and other economic facilities.
- At the level of detailed planning, establish rules for the landscape design of rural settlements depending on geomorphological characteristics, regional and traditional features (especially for settlements in the Coastal Region, the Central Region and the Northern – mountainous region in accordance with the specific urban and architectural features of each planning zone, each municipality and its settlements).

Priority objectives:

- Ensuring transport accessibility.
- Incentive measures in the area of agriculture.

- Incentive measures in the area of tourism development in rural areas.
- Opening of secondary education facilities in the Northern Region.
- Creating the prerequisites for the local population to become involved in tourism.

1.7.3. Housing

Development objectives:

- Complete the legal and institutional framework for regulating the housing sector in a way that meets the new conditions and needs of the market economy, with the aim of harmonising with EU regulations.
- Create the prerequisites for improving the housing market.
- Optimise investment, competitiveness and employment in the housing development.
- Improve the non-profit housing sector.
- Organise a more efficient management and maintenance sector for the existing housing stock.
- Improve availability and safety in the rental housing sector.
- Define the modalities for private-public partnership in the housing sector.
- Promote environmentally sustainable solutions in housing development.
- Ensure a system for adequate maintenance of residential buildings.
- Develop citizens' awareness of housing culture.
- Ensure people-friendly housing conditions in accordance with EU standards.
- Address social housing problems; improve housing conditions for specific social groups.
- Solve the issue of illegal settlements.
- Ensure energy efficient residential buildings and certification; improve infrastructure and energy consumption in the housing sector.
- Develop a strategic framework for the transparent distribution of public funds and the mobilisation of other resources, etc.

1.7.4. Land policy

General objectives

- Reform the system of planning, landscaping and utilisation of space to ensure efficient and consistent implementation of strategic commitments and development objectives.
- Redefine policy in this area with strategic commitments and objectives that meet the requirements of sustainable development – rational use of space.

Specific objectives

- Improve the regulatory framework – amend the existing law or adopt a new law (a set of laws).
- Improve practice and synchronise the preparation of spatial planning documents.
- Strengthen the administration by training staff and improving resources for efficient and responsible implementation of plans, establishing GIS for the territory of Montenegro.
- Promote the rational use of space through spatial planning and regulatory policy, through land policy measures, and prevent the construction of structures that serve the turnover of capital - "privatise profits and socialise costs", based on the principle that the public interest takes precedence in the planning of space as a public property.

- Ensuring the conditions for the preparation (endowment) of building land - urbanisation, regulations for the conversion of cadastral plots into urban development plots, funds for land infrastructure / costs of land infrastructure are borne by those who benefit from construction.
- Redefine the rules for the legalisation of illegal structures and specifying the "cases of damage" for specific situations - based on the acceptance of the state and the principle of fairness.
- Define land policy measures (tax measures and incentives) to activate the structures built ("second homes" and "weekend homes") for economic purposes – tourist accommodation capacities.
- Create funds with adequate resources for the rehabilitation of the spatial and regulatory status in accordance with plans.

1.8. Infrastructure network and facilities

1.8.1. Transport infrastructure

In addition to road transport as the most important mode of transport, rail, sea and air transport are integral components of the transport infrastructure in Montenegro.

1.8.1.1. Road transport

The primary network of roads is consisted of one transversal route (**Bar-Boljare highway**) **with two longitudinal routes (Adriatic – Ionian highway and the road for fast motor transport).** The longitudinal route that is missing in the north of the country is proposed by the Draft SPMNE. **Bijelo Polje and Pljevlja need to be connected by a road for fast motor transport which would be connected to the Bar-Boljare highway**. In this respect, technical possibilities for the alignment of this road.

The **Adriatic-Ionian highway** maintains the corridor from the previous SPMNE, connects Montenegro with Bosnia and Herzegovina and further with Croatia, Slovenia and Italy, as well as with Albania and Greece. The corridor is planned through Montenegro to the border with Bosnia and Herzegovina in the area Nudo-Grahovo-Čevo-Podgorica (bypass) to the border with Albania, in the lenght of around 1550 km. It passes through rarely populated and arid area and plays a role of transit international transport. It is connected to Pan-European corridors (corridors V, Vb, Vc, VIII).

The **Bar-Boljare highway** – several variant solutions were analysed through studies and documents at various levels of elaboration. Along with multi-criteria analysis of options, the Draft SPMNE **proposes the option of the corridor and the highway route that bypasses the Skadar Lake, and it bypasses the centre of the Berane in the Berane area.**

Given the importance of the Port of Bar, **the proposal for the section until the exit from the Sozina Tunnel to Bar to have a highway profile**, and not the profile of a fast motor road, as it was defined in the planning and technical documents.

The road for fast motor traffic (fast road) – several options were analysed both through studies and technical documents. Decades of dilemmas are present in the defining the corridor of the fast road in Montenegro. The key dilemma is related to the crossing of the fast road over the Boka Bay.

The need to build a fast road – the road for fast motor traffic in the Coastal Region is planned in the planning documents so far as a road of strategic importance and has a role of quality and safe transport solution in the Coastal Region and connections of the Coastal Region to the countries in the region. The proposal of planning and construction of the "fast road" is anchored in numerous documents prepared to date. As far the key issue of conflict of the transport solution and protection of cultural heritage is concerned, all analyses have shown that the "solution of passing by a bridge" for the road at the entrance to the Boka Bay is more optimal solution compared to the tunnel solution on the same location, which would have lower negative visual impact on the protected area.

On the other hand, the 2108 UNESCO Report on the impact of the corridor of the fast road on the area of the Boka Bay highlighted that the bridge solution should be finally abandoned.

On the one hand, there are requirements for strict protection of space, and on the other hand the position of the corridor of fast road is questioned, which is a project that is a part of the indicative extension of the Trans-European Transport Network (TEN-T) in the Western Balkans (Mediterranean corridor) and as such, it is recognised as a part of the so-called "Blue Highway". Changes in the position of this project relative to the position that is defined at the level of TEN-T would cause further problems in the communication with the European Commission and prevent allocation of grants for the implementation of the project of a bypass around Budva, on the fast road.

For the purpose of final solution and expressing positions of competent institutions of Montenegro, in order for the Draft SPMNE to adopt a proposal of optimal and technically possible solution, **competent ministries need to intensify communication with UNESCO and consider further preparation of the Heritage Impact Assessment – HIA for the passing over the Boka Bay, which was highlighted by the Administration for Protection of Cultural Property. In the process of public hearings for the Draft SPMNE, opinion of the Government and its institutions will be accepted, as well as the final position of the Administration for Protection of Cultural Property and UNESCO representatives.**

From the aspect of spatial protection, which is morphologically limited and demanding from the aspect of overall spatial protection, especially in the zone of the Boka Bay, elaboration of the Concept and Draft Plan considered other options which would cause less conflicts in space, especially from the aspect of protected universal values of Kotor. After considering all previous studies and analyses, multi-criteria analyses that reviewed spatial, ecological, cultural, social, technical and economic aspects, the Draft Plan **proposes crossing of the corridor by the bridge with mandatory consultations of competent ministries and the Administration for Protection of Cultural Property with UNESCO representatives. The objective is to reach a compromise between spatial protection and development of transport in the Coastal Region.**

For the transit of the fast road corridor in the Municipality of Budva in the zone through Paštrovići, the Draft proposes „**north Paštrovići option**" which bypasses settlements, it is further away from the existing maain road and enables connecting the fast road with the Bar-Boljare highway in the Građani zone.

Bypasses of all coastal towns (except Kotor) are parts of the fast motor road. After Bar, the fast road continues to Ulcinj and further to the border with Albania. On the opposite side, the connection with Croatia and aligned with the plans of that country.

Conceptual designs are being prepared for variants of roads of primary network in the zone between Cetinje, Budva, Podgorica and Bar in order to define more precisely the corridors proposed in the Draft SPMNE.

1.8.1.2. Rail transport

Priorities in the implementation of the plan for the development of rail network are:

- Reconstruction and modernisation of the Vrbnica – Bar railway (general overhauling, rehabilitations of signalling, rehabilitation of tunnels, preparation of concrete bridges, construction of tracks, etc.).
- Reconstruction, electrification and modernisation of the Podgorica-Tuzi railway, national border with Albania (reconstruction of tracks, electrification, etc.).
- Pljevlja-Bijelo Polje (Ravna Rijeka)-Berane-border with Kosovo (feasibility study and the conceptual design are prepared, construction of inter-modal terminal in Berane is proposed).
- Čapljina-Trebinje-Nikšić – preliminary transport study and related studies have been prepared, construction of 3 terminals is planned for combined transport within the railway stations Podgorica, Bijelo Polje and Bar. Bearing in mind the EU Transport Development Strategy in terms of creating uniform corridors and connecting the network of Montenegro with the TEN-T network, this is a priority for the next period.
- Relocation of a part of the Nikšić-Podgorica railway that goes through Duklja.
- Construction of intermodal terminals in Bijelo Polje, Podgorica and Bar.

1.8.1.3. Air transport

The network of airports of Montenegro in the planning period comprises two international and five local airports: Airport Podgorica, Airport Tivat, airports in Berane, Nikšić, Pljevlja, Žabljak, Bar and Ulcinj.

The airport Berane will develop in the 4D category and the remaining airports Nikšić, Žabljak, Pljevlja, Bar and Ulcinj will develop primarily as airports for special purposes, recreational flying, sport flying, seasonal tourism transport, business and tourism need of 3C category.

The locations of all airports must be protected from other requests and uses that are contrary or hinder the primary use for the development and potential expansion of the airport.

1.8.1.4. Water transport

The water transport development plan, which primarily refers to maritime transport, includes coordination and cooperation between all sub-systems of marine economy such as shipping, ports, shipyard, marinas, environment, research and use of the sea and underwater zone, other related activities in marine transport, marine and coastal tourism, fishery and mariculture.

Continuous growth of water transport is planned in the coming period, which will confirm that Montenegro is a maritime country through the strengthening and competitiveness of the marine economy based on general principles of sustainability. This requires a developed port infrastructure, which will be connected to the hinterland by road and rail infrastructure.

The basis and priority for the development of marine transport in line with the Marine Economy Strategy are created primarily through the development of the Port of Bar.

The Port of Kotor has been adapted, reconstructed, constructed and equipped to operate as a commercial port open to international transport, with a focus on the tourist- passenger segment. It is important for the Port of Kotor to:

- improve safety and security for large ships on berths, especially in difficult weather conditions,
- consider the security aspect for the environment and minimise emission of harmful particles from gases (CO_2, SO_2, etc.),
- enable extension of the season by safe berths,
- security of the UNESCO protected area, especially in marine environment.

The renovation and equipping the **Port of Risan** is planned for the purpose of further development of marine transport. **The Port of Zelenika** functions as a commercial port open for international marine transport and as a border crossing point.

In addition to the developments related to ports, the development of **coastal navigation in its function for tourism** is also necessary. A detailed analysis of the establishment of passenger and excursion shipping on Lake Skadar and the Bojana River is required from the point of view of spatial protection and the exclusion of conflicts with environmental protection.

Ports of nautical tourism, i.e. marinas – Budva Port, Luštica Bay, Tivat Port – Porto Montenegro, the port of nautical tourism marina Bar and the port of Kumbor – Portonovi, Lazure marina in Meljine (Bar, Portonovi and Porto Montenegro are also serviced) will continue to be important for the development of tourism in the coming planning period. The development of nautical tourism requires the modernisation of existing and planning of new berths and docks in line with the natural conditions, taking into account the limitations in terms of the protection of the sea and the marine environment.

1.8.2. Energy and power infrastructure

Sustainable energy development is a prerequisite for the development of all economic and social activities. General development objectives for the energy sector of Montenegro are the following:

- safe energy supply,
- development of competitive energy market,
- sustainable energy development.

Strategic commitments are the following:

- maintenance, revitalisation and modernisation of existing and building new infrastructure for energy generation, transmission and distribution based on the principles of meeting international technical standards, energy efficiency, minimising losses and negative environmental impacts;
- gradual reduction of dependence on energy import by (i) reduction in specific consumption of final energy, (ii) increase in the energy (primary and secondary) generation by utilising own resources and (iii) minimising energy losses from generation to end consumption.

The objective is for Montenegro to become a permanent net exporter of electricity in the short-term;
- considerable implementation of energy efficiency potentials in all consumption sectors, especially in transport sector by improving public transport, including rail transport, promotion of energy efficient and low-emission vehicles, integration of EE criteria in the transport infrastructure projects;
- further research of SES potentials and study work on exploring possibilities to use the remaining available SES potential to achieve the national target with respect to SES share in the final energy consumption, with special focus on the share of SES use in the transport sector and more considerable expansion of buyer-producer concept;
- further exploration of oil and gas offshore Montenegro and preparation of action plan of sustainable implementation of recognised resources while observing international environmental protection standards;
- ensure social protection for jeopardised (vulnerable) buyers of energy.

Specific energy development objectives are:

- achieving national targets set for 2030 and intensification of achieved dynamics until the end of the planning period with regards to:
  - share of renewable energy sources in final consumption,
  - minimisation of greenhouse gas emissions from the energy sector,
  - energy efficiency of final consumption.
- increasing energy independence for at least 30% compared to the baseline year,
- reaching the level of energy intensiveness of final consumption that is characteristic for developed EU countries,
- increasing diversification of energy generating products in the energy balance (increasing the share of new renewable energy sources to at least 30%), parallel development of manageable and non-manageable sources of energy to ensure stability of the power and energy system,
- substituting energy generating products and technologies for their utilisation in order to increase efficiency and minimise negative environmental impact in line with the best technologies available on the market,
- activating all SES potentials, especially with respect to the use of solar energy:
  - centralised electricity generation,
  - distributed electricity generation with a focus on micro-generation and expansion of the consumer-producer concept,
  - meeting the needs for thermal energy in service and household sectors,
  - expansion and considerable share of renewable energy sources in the transport sector,
  - rational consumption of energy while applying technological innovation (kinetic power plants) and energy efficiency with a focus on the building design and construction and transport sectors

Priority objectives:

- construction of the second pole of the HVDC interconnection to Italy,
- construction of 400 kV interconnection to Serbia,
- construction of a new 400 kV interconnection to Bosnia and Herzegovina,

- construction of 110 kV above-ground power line Virpazar-Ulcinj to ensure double supply of the consumption area of Ulcinj,
- construction of 110 kV air power line Vilusi-Herceg Novi to ensure double supply of the consumption area of Herceg Novi (on the territory of Montenegro) and ensuring higher utilisation of solar potential on the territory of Nikšić,
- construction of planned TS 110/35 kV to ensure safer supply of consumers and more efficient exploitation of power distribution network,
- ensuring higher share of non-manageable renewable energy sources (such as wind mills and photovoltaic power plants) through parallel implementation of renewable energy sources (such as planned hydro power plants and energy storage facilities) – 3:1 minimum ratio in favour of new renewable energy sources,
- implementation of solar potentials on the territory of the Capital Podgorica as the largest consumption area in the country with the best prerequisites for connection to the existing power infrastructure,
- construction of renewable energy sources with minimum annual generation of 800 GWh until 2030 and 2000 GWh until 2040,
- integration of infrastructure for charging electric vehicles in the power networks development to allow higher share of electric vehicles in the total number of vehicles.

Hydro power plants proposed in the Draft Plan:

- HPP Perućica – generator A8, Nikšić,
  - installed power: 58.5 MW,
  - planned generation: 50 GWh,
- HPP Komarnica, Šavnik-Plužine:
  - installed power: 171.9 MW,
  - planned generation: 213 GWh,
- HPP Boka, Risan:
  - installed power: 290 MW,
  - planned generation: 670 GWh,
- HPP Kruševo, Plužine:
  - installed power: 90-120 MW,
  - planned generation: 235 GWh.

Solar power plants

- SPP Briska Gora, Ulcinj:
  - installed power: (50 MW + 200 MW),
  - planned generation: (90 GWh + 360 GWh),
- SPP Velje Brdo, Podgorica:
  - installed power: (50 MW + 100 MW),
  - planned generation: (80 GWh + 160 GWh),
- SPP Slano Floating Solar, Nikšić:
  - installed power: 39 MW (50 MW),
  - planned generation: 60 GWh,
- SPP Vilusi – Dragalj, Kotor:
  - installed power: (30 MW + 80-150 MW),
  - planned generation: (45 GWh + 140 – GWh),
- SPP Prediš, Cetinje:

  - installed power: 225 MW,
  - planned generation: 304 GWh,
- SPP Montečevo, Cetinje:
  - installed power: 400 MW,
  - planned generation: 600 GWh,
- SPP Velestovo 1 and 2, Cetinje.

Windmills

The most interesting zones for exploitation of wind potentials are coastal areas – with higher wind speed above 6 m/2 at average and the hill around Nikšić with average wind speed ranging between 5.5 and 6.5 m/s.

- WM Brajići, Budva:
  - installed power: 100.8 MW,
  - planned generation: 250 GWh,
- WM Gvozd, Nikšić:
  - installed power: 54 MW,
  - planned generation: 150 GWh,
- WM Biočki Stan, Nikšić:
  - installed power: (50 MW + 70 MW),
  - planned generation: (150 GWh + 210 GWh),
- WM Bijela, Šavnik:
  - installed power: 94 MW,
  - planned generation: 212 GWh,
- WM Korita, Bijelo Polje:
  - installed power: 79 MW,
  - planned generation: 198 GWh.

1.8.3. Projection of agriculture development

The sustainable development scenario in the area of agriculture can be achieved through rational management and use of water resources.

Table – Water management objectives by individual areas[5]

Utilisation of waters
Strategic objectives
1 Ensure sufficient quantities of water of suitable quality for public water supply of the population and for various economic needs, in a way that does not threaten the environment.
Operational objectives

[5] Water Management Strategy until 2035, 2017.

1.1. Increase the coverage by public water supply system from current 78% to approximately 95%.
1.2. Reduce losses in water supply systems to less than 30%.
1.3. Protect springs, explore, protect and preserve water resources that are used or are intended for human consumption in the future.
1.4. Rational use of water.
1.5. Ensure water for industrial production.
1.6. Ensure irrigation water.

Protection of the quality of water

Strategic objectives

2 Achieve and maintain a good status and good ecological potential of water bodies of groundwater and underground waters to protect human health, preserve aquatic flora and fauna and meet the needs of water users.

Operational objectives

2.1. Prevent pollution of groundwater and underground waters.
2.2. Reduce intake of pollution caused by concentrated sources of pollution.
2.3. Reduce the volume of pollution that reaches groundwater and underground waters from unregulated and unhygienic waste dumpsites.
2.4. Reduce intake of pollution from diffused sources of pollution.
2.5. Establish and use protected areas in accordance with the Law on Waters.
2.6. Protect the quantity and quality of underground waters.

Protection of waters

Strategic objectives

3 Reduce risks of harmful impact of waters.

Operational objectives

3.1. Develop a system for protection from floods caused by external waters.
3.2. Develop water courses in accordance with environmental conditions.
3.3. Preserve and improve water regime by dedicated exploitation of river deposits.
3.4. Improve the conditions for protection from erosion and torrents.
3.5. Monitor the condition and maintain structures and works.

1.8.4. Electronic communication infrastructure

The electronic communications sector influences the development of all other economic sectors. For the development concept for electronic communications presented in the SPMNE draft to be technologically and economically sustainable for the planning period up to 2040, the following specific objectives should be achieved:

- Completion of the construction of communication infrastructure along the priority section of the Smokovac-Mateševo highway, which has been open to traffic, and continuation of

the construction of communication infrastructure on the remaining sections of the Bar-Boljari highway in the period of implementation of this Spatial Plan.

- Planning the construction of new communication infrastructure along the planned Adriatic-Ionian highway, which intersects with the planned Bar-Boljari highway.
- Planning the construction of communication infrastructure along all other new international and national main roads.
- Construction of an underground optical communication infrastructure along the existing road towards Plužine and onwards to the Republic of Srpska or Bosnia and Herzegovina as a missing communication link.
- Ensuring reliable functioning of international communication transport of Montenegro through connection to the international telecommunication networks (Serbia – via Pljevlja, Rožaje and Boljari, Bosnia and Herzegovina – via Nikšić and Plužine, via Herceg Novi and Bar through international underwater connections to Dubrovnik – Zegreb, Albania – via Plav and via Bar – by undersea and land connections, Italy – via Bar to Bari by undersea connections and via Bar and Corfu.
- Ensuring sufficient capacities in the new utility infrastructure for a larger number of communications operators whose distribution would be taken care of by the competent state administration bodies and local self-government bodies by issuing appropriate permits and subsidies for the construction, especially in rural areas.
- Replacing the existing and outdated access networks with copper conductors with modern communications networks based on fibre optic technologies.
- Construction of new optic communication access networks and construction of new and expansion and improvement of existing connection cross-municipal optic roads.
- At system level, the issue of the intensive roll-out of fibre optic communication networks in suburban and rural settlements of municipalities should be addressed, both in terms of ownership and modern regulations and standards for planning and construction.
- Construction, improvement and expansion of the network of base stations of mobile operators, especially in rural areas and along the existing and planned international and national-regional roads on the territory of the State of Montenegro. For this purpose, the resources of existing and planned optical communication routes will be fully utilised.
- The construction of new and the remodelling of the existing network of base stations with optical access in order to establish mobile networks of higher technological levels or mobile networks of the next generations, the so-called 5G and 6G networks. These mobile networks and high technologies, which require a many times higher density of base stations compared to 3G and 4G networks, must be developed under the careful control and approval of experts and relevant national and international health institutions based on adopted comprehensive studies and local and international experience in this field. New urban planning parameters must be created for the development of the 5G and 6G network in order to establish new strongholds for the installation of receiving and transmitting communication technology on the existing and newly planned structures.
- Creating the planning, normative and organisational conditions for the maintenance, improvement and technological modernisation of the postal network while achieving high quality in all segments of the network, including the provision of high-quality services to citizens in remote rural areas.

The planning and development of the electronic communications sector also envisages a technologically sustainable **environmental scenario**. The intensive construction and development of electronic communication and media, especially due to new technologies, inevitably leads to a large amount of electronic and other related waste as a by-product, which is generated due to old and obsolete technologies and has recently increased many times over due

to accelerated technological development. This trend will continue in the next planning period. Therefore, in accordance with European directives and ecological principles, the country must adopt a new or amended system law (Waste Management Act) to regulate the issue of disposal, recycling and storage of e-waste in a socially responsible and organised manner, which can be hazardous to human health and the environment if stored improperly.

1.8.5. Waste Management

The **sustainable development scenario** implies a more efficient use of resources and a reduction in the volume of waste and represents a harmonised system of technical-technological, economic and social activities and waste management on land and at sea.

- **Recycling centres, transfer stations, recycling yards and green islands in the period 2020-2040.**

The Draft proposes four regional centres for utility waste treatment within which sanitary landfills would exist. Of four regional centres, sanitary landfills have already been built in Bar and Podgorica, and construction in the next period is proposed in regional centres in Nikšić and Bijelo Polje.

The Draft Plan foresees that recycling yards are constructed in all municipalities in which this has not been done so far, and that recycling centres are constructed in Bar, Nikšić and Bijelo Polje (which will be regional waste treatment centres). The number of recycling yard will depend only on the number of citizens by municipality. Waste transfer stations are planned in some municipalities of the Northern Region – Plužine, Šavnik, Pljevlja, Kolašin, Bijelo Polje, Berane and Rožaje. It is recommended that municipalities decide which level of transfer station they want to build on their territory in accordance with the mandatory elaboration of the Feasibility Study.

- **Industrial waste management, rehabilitation of space in the period 2020-2040**

The contract with the World Bank on crediting the implementation of the Industrial Waste Management and Cleanup Project, whereby the project foresees rehabilitation of the largest sites where hazardous industrial waste landfills are located enables rehabilitation of two sites so far – in Bijela (grit) and in Gradac (tailing pond).

- **Medical waste management in the period 2020-2040**

In accordance with the Waste Management Law, contracting of activities for disposal of medical waste from all healthcare institutions and pharmacies by professional and qualified organisation that must be verified in the Ministry of Health needs to continue in the period 2020-2040.

- **Sewerage sludge management in Montenegro in the period 2020-2040**

Municipal wastewater treatment in local communities produces sewerage sludge as a byproduct of wastewater treatment. Bearing in mind that Montenegro has 25 local communities, Montenegro is obliged to build wastewater treatment plants in all local communities, including separation of sewerage sludge in them.

The Draft SPMNE includes four plants (incinerators) for thermal treatment of remains of sewerage sludge which should be built in the period 2020-2040:

- Podgorica (with Cetinje, Danilovgrad, Tuzi and Zeta),
- Nikšić (with Pljevlja, Žabljak, Plužine and Šavnik),
- Bijelo Polje (with towns of the Northern Region, without Pljevlja),
- Budva (with towns of the Coastal Region).

The plants that will be built for sewerage sludge incineration or incineration of the sludge remaining after sludge treatment can generated electricity and hot water.

- **Construction waste management in the period 2020-2040**

In accordance with the Waste Management Law in Montenegro and the 2015 National Waste Management Plan, it is planned that all local communities in Montenegro are obliged to define "non-hazardous waste landfills" in their waste management plans.

Directives of the European Union clearly lay down the commitment for Member States, meaning for Montenegro as well, to prepare at least 70% of non-hazardous construction waste for reuse and recycling in the period until 2035. It is also proposed that crushed and milled non-hazardous waste is used to cover municipal waste landfills by inert material, instead of using some other material from the nature.

It is necessary to define a location for construction waste treatment in each of 25 local self-government units. Consider the possibility for processing of non-hazardous construction waste to prepare this type of waste for reuse. Only two municipalities, Kolašin and Danilovgrad, have defined locations for disposal of non-hazardous construction waste, while others do not have designates sites for disposal of non-hazardous construction waste. Therefore, all local self-governments need to define in the next period the adequate sites for disposal of non-hazardous construction waste in accordance with legislation, with a focus on its processing.

- **Management of waste tyres and rubber goods in the period 2020-2040**

It is proposed that 4 (four) waste tyres treatment plants are built in Montenegro, in Bar, Podgorica, Nikšić and Bijelo Polje, in accordance with the Waste Management Law and the Regulation on the manner and procedure for the establishment of the system of taking, collecting and treatment of waste deriving from tyres and on the system functions.

- **Management of end-of-life vehicles**

The Draft SPMNE proposes construction of two new plants for end-of-life treatment in Bar and Bijelo Polje, in addition to the plant that already exists in Podgorica.

- **Management of waste from electric and electronic products**

The Draft SPMNE covers four locations (Bar, Podgorica, Nikšić and Bijelo Polje) within which plants would be constructed for reception and treatment of waste from electric and electronic products.

- **Waste batteries and accumulators management**

The Draft SPMNE proposes that collection and further treatment of waste accumulators and batteries can take place on the same locations where electric and electronic waste is treated.

- **Marine litter**

The analysis of national legislation in Montenegro, which specifically concerns marine litter and waste on beaches, showed that there is no legal instrument prohibiting disposal of solid waste directly to the sea and in the coastal zone, with the exception of the Law on the Prevention of Pollution from Ships (Official Gazette of Montenegro 20/11, 26/11, 27/14).

The legislation in Montenegro needs amendments to reduce the quantity of waste reaching the sea and the coastal zone, to protect the marine environment and conserve natural values of the area.

Prior to the establishment of waste management measures on beaches and in the marine environment, objectives and priorities need to be set taking into account the national and regional political and socio-economic context.

In addition, it is necessary to establish a monitoring mechanism, a long-term one, but also further education and training of people who will be responsible in the management system (especially in control) and implementation of relevant practices.

2. DESCRIPTION OF THE EXISTING STATUS OF THE ENVIRONMENT

Sustainable development of Montenegro has created the basis for political tendencies of national policies for two decades now. By adopting the Millenium Development Goals, the 2030 Agenda and the sustainable development goals through the National Strategy for Sustainable Development of Montenegro until 2030[6] Montenegro demonstrated readiness to base its social and economic development on the global and EU principles and standards while complying with the principles of protection of the environment and human health.

Since the Parliament Declaration on Montenegro's Accession to the European Union dated June 2005, Montenegro embarked on a journey of complete and permanent stabilisation. Confirming commitment to democracy, heritage and objectives underpinning the European Union, Montenegro has already showed a strategic interest in achieving economic stability and prosperity, full freedom of movement of persons, capital, goods and services while observing the principles of sustainable development and the environmental protection.

Since granting of the status of a candidate country (December 2010), through the official launching of the negotiation process (June 2012) to date, the process of accession of Montenegro to the European Union has been considerably conditioned by the establishment of the governance system that is based on the principles of democracy, and the views of the EU are completely accepted, and the country is economically adapting to the Union's system and standards. In order to adopt the EU principles, Montenegro must implement comprehensive reforms in 33 negotiation chapters (freedom of movement of goods and capital, fishery, transport policy, economic and monetary union through to financial and budgetary provisions – Chapters 1-33), including Chapter 27: Environment and Climate Change, one of the most difficult, most demanding, most expensive and most complex negotiation chapters. As environmental protection and climate change affect directly the quality of life of people and challenges and problems caused by progressive technological development result in instability and changes in economic systems globally, the

[6] http://www.mrt.gov.me/ResourceManager/FileDownload.aspx?rId=272986&rType=2

inter-dependence, significance and complexity of the given topics and the need to comply with Chapter 27 entirely is nowadays considered unquestionable. It has been acknowledged that the chapter requires sectoral approach to environmental protection and achieving sustainable development, which implies integration of environmental protection into all other sectoral policies.

The implementation of Chapter 27: Environment and Climate Change essentially means improving the condition and quality of the environment, conservation of biodiversity, human health, etc. by transposing and then implementing more than 200 key legal acts of the EU, which should be accompanied by ensuring and setting up financial mechanisms for their sustainability. One third of the EU legislation concerns the environment and results in high implementation costs due to considerable costs of large infrastructure projects such as wastewater treatment plants and addressing the matter of waste. The implementation of EU standards requires human and financial resources, however, additional funds are needed for labour costs and for maintenance of infrastructure (operating costs) after the implementation, whose functioning is key for a stable economic system.

The process of achieving objectives and implementing commitments under Chapter 27, which was opened in December 2018, and closing of Chapter 27 largely depends on setting up of sustainable financial mechanisms for financing environmental protection activities (one such mechanism is the Eco Fund[7] that would facilitate addressing certain ecological problems, on the one hand, and/or efficient protection and management, on the other hand, with a clear set up of functioning, inflow of funds and financing of projects) and the capacity to mobilise available EU and other funds in this area. In addition to considerable investments, the "green path" that is a platform for achieving more sustainable development of both European Union and Montenegro requires coordination of countries/policies with expert and scientific institutions, civil society, private sector and international organisations as links to certain available funds so that mutual understanding and actions would neglect different interests of parties so as to achieve a balance – "meet the needs the present without compromising the ability of future generations to meet their own needs"[8].

At the moment, European funds – Instrument for Pre-accession Assistance (IPA) and other international financial mechanisms such the Global Environment Fund (GEF) and the Green Climate Fund (GCF) are available to Montenegro for the implementation of commitments defined by opening benchmark for Chapter 27, whose initial estimation amounts to EUR 1.429 billion[9], as well as bilateral support of developed EU Member States, which allocate considerable funds for environmental needs in the Western Balkans (Sweden, Norway, Finland, Austria, Germany, etc.). The Action Plan for fulfilling closing benchmarks, whose adoption is expected by the end of 2020, will provide the financial structure for fulfilling the remaining commitments to temporarily close Chapter 27, until temporary closure of remaining chapters and the decision of the EU Council on accession of Montenegro to the EU and signing of the Accession Agreement. By joining the EU Montenegro will have opportunities to use structural and cohesion funds, which will largely contribute to improvement of the environment and thus the quality of life of citizens of Montenegro.

[7] At the session of 22.11.2018, the Government of Montenegro adopted the Decision on the establishment of the Environmental Protection Fund (Eco Fund).

[8] UN Commission Report on Environment and Development – Bruntland Commission "Our Common Future", 1987.

[9] National Strategy with Action Plan for transposition, implementation and enforcement of the EU acquis on environment and climate change for the period 2016-2020.

The investments in further development and harmonisation requires a carefully planned financial structure, which will include all available funding instruments to ensure a financial framework for the implementation of all infrastructure projects in the areas of environment and climate change until 2035. The matter of readiness is not a challenged limited only to candidate countries such as Montenegro, since capacity – administrative (for writing and applying projects), financial capacities (readiness to co-fund the projects required by the EU) and technical/professional capacities for the implementation/participating in the implementation of project activities, both scientific/professional and technical/technological is essential for mobilising, absorbing and using the available funds. Achieving new political objectives in this area as a result of global trends (reduction of emissions, climate change adaptation and mitigation, reducing biodiversity loss, increasing the availability of drinking water, clean air, sustainable transport, etc.) and the factors that jeopardise human survival is a challenge for developed countries as well, whose economic and human capacities are high.

2.1. Geographic characteristics

Montenegro is a south European country with exceptionally favourable geographic position reflected in specific spatial and geographic features and in the position relative to the wider surrounding. It covers land area of 13812 km^2 and marine aquatorium of about 2540 km^2.

It borders Serbia, Kosovo, Albania, Italy, Croatia, Bosnia and Herzegovina. The land border is 614 km long: with Croatia in southwest (14 km), with Bosnia and Herzegovina in northwest (225 km), with Serbia in the north (125 km) and Kosovo (78 km) in the east, while it borders Albania in the south (172 km) and Italy (Adriatic Sea border).

Montenegro is an Adriatic Mediterranean and Dinaric country with the border in the north 43^0 32' LN and 18^0 58' LE (slopes of the Kovač Mountain near Moćevići), in the south 41^0 52' LN, 19^0 22' LE (Ada Bojana), at Bojana estuary, in the east 42^0 53' LN, 20^0 21' LE (Jablanica village east from Rožaje) and in the west 42^0 29' LN, 18^0 26' LE (Sutorina village – Herceg Novi). The distance between the far south and the far north point is 192 km by air and 163 km between far west and far east point.

2.2. Geomorphological characteristics

Relief is an important and dominant element of appearance and geographic content of the territory of Montenegro. Very complex geological-lithology and tectonic background, with specific impacts of erosion modelling processes, have resulted in the relief that is very dynamic and unique in many aspects. Sudden height changes of land in a relatively small distances are a characteristic and a specificity of the relief of Montenegro. Strong and intense geo-tectonic activity that was particularly dynamic in the period of tertiary alpine orogenesis influenced the development and shaping of the relief of the entire Dinaric mountain system and thus the territory of Montenegro. Current appearance of the relief is a result of great radial and tangential geo-tectonic movements (thrusting of older layers over younger ones, various folding and imbrication), which are shaped by additional effects of external forces. The height structure of relationships represents remains of the recent relief and indicates high dynamic and broken-down relief in the entire territory of Montenegro.

The following 5 belts stand out in terms of height:

- Narrow coastal belt comprising Podgorica-Skadar ravine and Bjelopavlići valley (0-60 m.a.s.l.);
- Deep karst flat: Katunski Krš, Krivošije, Grahovski Kraj, Rudine and Banjani (800-900 m.a.s.l.);
- Depression of the central Montenegro (900-1200 m.a.s.l.);
- Central high flats (1200-1800 m.a.s.l.) intersected by deep canyon valleys with high mountains rising above them with numerous peaks above 2000 m.a.s.l.;
- The area of the northeast Montenegro (600-1500 m.a.s.l.) with numerous mountains, plains, river valleys and ravines, framed with bordering mountains even above 2000 m.a.s.l.

Of the total territory of Montenegro (13.812 km^2), only 10% of land is up to 200 m, 40% between 200 and 1000 m, and 15% above 500 m. Average altitude is around 1050 m. Lithology background, geo-tectonic structure and erosion effects of external forced resulted in the formation of some relief units that differ a lot in the territory of Montenegro.

Figure 2.1. Main relief units

2.3. Geological characteristics

The territory of Montenegro is composed of various types of sediment, magmatic and metamorphic rocks that were created over the last 400 million years. According to the geological time scale, this period in the evolution of the planet Earth belongs to the following eras: Palaeozoic

(with geological periods: Devonian, Carbon and Perm), Mesozoic (with geological periods: Triassic, Jurassic and Cretaceous) and Cenozoic (with geological periods: Paleogene, Neogene and Quaternary).

Four formations of Palaeozoic (Pz) age stand out in the territory of Montenegro: *Devonian-Carbon sediments, Carbon sediments, Perm sediments and conglomerates* (Figure 2-2). The first three formations are composed of mostly sandstone, siltstones and shale, with interbeds and lenses of conglomerates and sandstone, and limestones and dolomites in Permian sediments. These formations differ, mostly by high level of metamorphism and shale of Devonian-Carbon and carbon rocks unlike Permian rocks. They build terrains around Plav and Andrijevica, Kolašin, Mojkovac, Berane and Rožaje. They are most distributed in the wider area of Bijelo Polje, and they are discovered in small areas around Pljevlja, Boan and in Nikšićka Župa.

The geological Triassic period (T) in Montenegro and Dinarides is characterised by rather various geological formations created in marine and continental conditions. The *formation of clastic and limestone rocks* is created during Early Triassic period, which is developing continuously from Paleozoic sediments in the abovementioned areas, then in a wide area around Pljevlja and the Kovač Mountain, in Tara, Bukovica and Tušine valleys and in Crmnica. *Anisian flysch* was discovered in the area of Crmnica and on steep coastal slopes in the form of narrow broken zones, from Sutorina in the northwest to Rumija in southeast, while *Anisian limestone and dolomites* are widely developed in the northeast Montenegro, through Early Triassic sediments and in a small area in Pivska and Nikšićka Župa, Crmnica, in Sozina and around Bar. Volcanic rocks of Triassic age are widespread especially in the northeast Montenegro – in the territory of Bjelasica, Visitor, Sjekirica, Ljubišnja, Krnja Jela and Semolje mountains, then in Nikšićka Župa, Pivska Župa, Crmnica and on south slopes of Sozina and Rumija. By composition or types, volcanic rocks in Montenegro belong to andesites, dacites, diabase, spilite, ceratophyres, quartz ceratophyres and rhyolites. *Ladinian limestone with cherts* are usually found over the described volcanic rocks or over Anisian limestone and dolomites. *Limestone and dolomites of Middle and Late Triassic* stand out in some regions of Montenegro as a separate unit – in the coastal part, then on Rumija, in Nikšićka Župa and on Sinjajevina, Pivska Mountain and Ljubišnja. *Limestone and dolomites with* Late Triassic *megalodons* are widespread on Rumija, between the Skadar Lake and Lovćen, then between Trešnjevo, Grahovo and Osječenica, from Nikšićka Župa to Morača, on the Žijovo Mountain and on Prokletije.

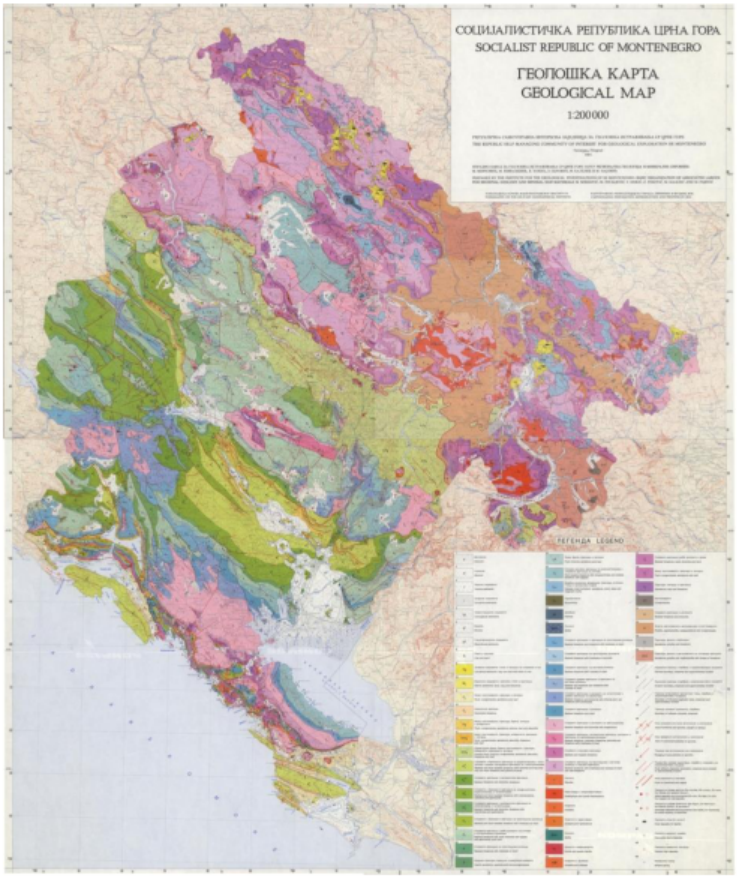


Figure 2.2. Geological map of Montenegro (Mirković et al., 1985)

Geological formations of Jurassic (J) age are widespread in Montenegro. The formations which are different by their composition were created in this period due to very dynamic geological events. *Jurassic limestone and cherts* are represented in the coastal area. *Carbonate sediments of liassic, liassic-dogger, dogger and dogger-oxford* are discovered in a wide area from the Skadar Lake and Rumija to the border with B&H. They are developed in Kuči, Piva and on Vojnik. *Diabase-chert formation* is represented on shales, sandstones, marls, slates and cherts in which there are larger masses of volcanic rocks (diabase and spilite) on Kosanica and in Bjelopoljska Bistrica. This formation is represented in the surrounding of Pljevlja, in Tara Valley, in the surrounding of Berane and Rožaje. *Late Jurassic limestone* is formed over Jurassic bauxite in the central and western Montenegro, and *Jurassic-Cretaceous flysch* was discovered only in one zone from Ljubišnja to Sinjajevina.

Formations of Cretaceous (C) age are developed in central and coastal parts of Montenegro. Most of them belong to sediments of carbonate platform. *Late Cretaceous cherts and Carbonate-Silicon series of Late Cretaceous* occur as narrow and interrupted zones in the Budva zone.

Early and Late Cretaceous limestones and dolomites are widespread in almost entire zone of Visoki Krš, and on the coast on Luštica and Grbbalj and between Bar and Bojana. *Durmitor flysch* is a specific geological formation that is regionally distributed from the Alps to Prokletije. It spreads in the northwest-southeast direction as a wide belt in the central Montenegro and divides external Dinarides from internal Dinarides. It is composed of three facies: breccia facia, breccia, limestone, marly limestone and marls and facies of sand-marly sediments.

At the beginning of Paleogene (Pg), most of the current territory of Montenegro became land where only the deepest synclinal recesses and trenches remained under the sea. *Paleogene flysch of the Budva zone* on the coast, from Sutorina to Rumija, and *Palaeogene flysch of the Zeta synclinorium* are formed in these structures. These formations and *Eocene flysch* in the coastal part of Montenegro are composed of clastic rocks. Eocene foraminifera limestone occurs in a form of narrow zone on Late Cretaceous limestone in the region of Luštica and Grbalj and in the area of Ulcinj.

Neogene period (Ng) is marked with two geological formations: *marine Miocene sediments* which are developed in the vicinity of Ulcinj and *lacustrine Neogene sediments* in the territory of Pljevlja and in the area of Berane. All economic coal reserves, main reserves of cement marlstone and heavy clay in Montenegro are discovered in these lacustrine sediments.

Geological sediments of Quaternary (Q) sediments connected with the Ice Age are formed in the last 1.8 million years of geological history. These are primarily Quaternary clays in the Bjelopavlićka Plain; moraines created by crushing of rocks due to movement of glaciers are widespread in the area of Maganik, Prekornica, Žurimova, Golija, Bioča, Durmitor, Sinjajevina, Komovi, Prokletije and on the south of Lovćen and Orjen; glacio-fluvial sediments in the form of gravel and sand are created by washing and transporting of moraine sediments into surrounding depressions and karst fields. This created gravel and conglomerates of the Skadar depression (Ćemovsko Field), Nikšić, Cetinje, Grahovo, Dragalj fields, etc. Limnoglacial sediments are deposited in the lake environment in the form of sand and clay. They are represented in the Skadar Lake, Nikšić field and the like. Of Quaternary sediments, deluvium is developed on steep slopes and alluvium along river valleys.

2.4. Pedological characteristics

Soil

Soil includes physical space – pedosphere, which was created under certain topographic conditions (relief) due to geology (parent substrate and hydrogeological circumstances), hydrosphere (groundwater and/or underground waters), climate (precipitation and temperature), vegetation (natural and anthropogenic biocenosis) and activities of people (hydro-melioration, terracing, fertilisation, cultivation of soil …).

Agricultural land

Agricultural land of 515.740 ha in total accounts for 37.4% of the entire territory of Montenegro. Compared to the number of citizens, this is 0.79 ha per capita, which is at the first glance an important resource for the development of agriculture. According to these data, Montenegro is ahead of all European countries, after the Northern Ireland (1.36 ha/capita).

However, the structure of use of agricultural land is unfavourable as pastures (323.953 ha) and natural meadows (126.990 ha) have a dominant share (87% together). The share of ploughland and gardens, orchards and vineyards with the area of 62.154 ha or 0.095 ha/capita is below the European average and the average in all neighbouring countries.

Due to strongly prominent orography-dynamic of the relief, geological composition and other conditions, this land is used very extensively.

Negative demographic trend in the rural region of Montenegro has a negative impact and prevents more complete enhancement of pastures and meadows, which are gradually overgrown by forests transforming these areas into forestland.

Most soil here is shallow with low plant-nutrition potential. The soils of Montenegro are classified into five categories of effective fertility. High-fertility soil of categories I and II cover the area of 20.000 ha or 200 km^2, which accounts for only 1.5% of the total territory of Montenegro. The soil of medium fertility and categories III and IV cover the area of 40.000 ha or 400 km^2, which accounts for one quarter of the territory of Montenegro. The most represented are low-fertility soils of categories VII and VIII covering 640.000 ha or 6400 km^2, which is close to half of the territory of our country (49%). Areas under barren land are significant here and it is not categorised into any land capability class. These areas cover 312.000 ha or 3120 km^2, which accounts for around 23% of the territory of Montenegro.

In specific Montenegrin topographic conditions of strong dynamic of relief, under combined influences of groundwater and underground waters, precipitation and temperatures, vegetation that protects the soil from degradation in different ways in different regions of Montenegro, and under human influence, numerous types of soil have developed, with the most dominant being: (1) rocky ground (lithosol) and sirozem (regosol); (2) limestone-dolomite chernozem (calcomelansol); (3) rendzina; (4) humus silicate soil (ranker); (5) brown acid soil (distric cambisol); (6) brown eutric soil (eutric cambisol); (7) brown soil on limestone and dolomite; (8) red soil (terra rossa); (9) deluvial, alluvial and wetland. Of these nine types of soil (Figure 2.3.), seven characteristic types are represented (for the clarity of this map in terms of its scale, rocky land and ranker are not presented as separate units as they are integrated into other types that they overlap in space).

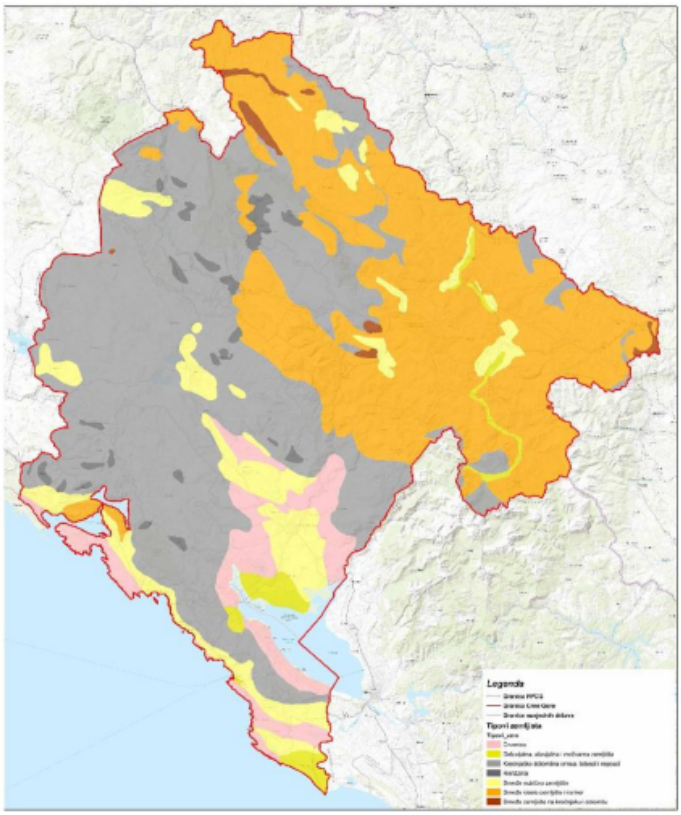


Figure 2.3. Soil map of Montenegro

1 – Rocky land (lithosol) and sirozem (regosol). The soils developed on magmatic, compact rocks and scattered regolit, which produce detritus in the process of mechanical decomposition. They are represented in the area of 38.470 ha or 385 km^2, which is an area of around 3% of the territory of Montenegro. They fall in the group of undeveloped or poorly developed soil. This is the soil dominated by skeletal fractions, i.e. stone and gravel. The capability of this soil does not exceed 20 cm per vertical profile. They have a very low natural production capability. Rocky land (lithosol) in modern agricultural conditions, use of agricultural machines (rotary cultivator) that can crush stone or rocks, can be transformed, with irrigation, into sites for growing olive, vine and stone fruit while adding more fertile soil in planting holes. Sirozem (regosol) is created by erosion of flysch and marly sediments. This is also young soil of undeveloped class. They are primarily used for vineyards, but very good olive groves can be found on them as well. Limitations in relief, erosion of soil and lack of nutrients, as well as excess carbonate pose the main constraints of these soils.

2 – Limestone-dolomite black soil (calcomelansol) is the most widespread soil in Montenegro and covers an area of around 660.000 ha, which accounts for 6600 km^2 or 50% of the territory of our country. They are formed on hard and compact limestone and dolomites where only chemical decomposition is prominent. They belong to dry and warm, very porous soils with high content of supercapillary pores. These soils are highly permeable and well-aerated, which often leads to water deficit in the soil for plants. These soils are mainly dominated by xerophyte vegetation. Plants on these soils often perish under the influence of drought due to high permeability and small depth of the soil.

Reactions of this soil are neutral to weakly acid. They are more acid on higher mountains due to running off of bases and are neutral to weakly acid on lower hights as there is no running off of substances. They are rich in humus (10-25%), which also results in high adsorption capacity.
Most of these soils are under meadows and pastures, and a smaller part if used for cultivating vegetable and crop varieties (potato, rye, barley, wheat). These soils are not exposed to erosion caused by water due to high permeability, however, they are often exposed to Aeolian erosion, particularly if the plant cover is weakened or destroyed.

3 – Rendzina spreads over an area of 31.205 ha (312 km^2), which accounts for 2.5% of the territory of Montenegro. This humus accumulative soil is similar to limestone black soil in terms of profile and characteristics, but is formed on loose carbonate substratum: marls, flysch, soft limestone, carbonate deluvium and dolomites. It contains more skeleton than black soil, and arable areas are deeper varieties of karst sinkholes, karst fields and smaller plateaus. Rendzinas are shallow to moderately deep soils whose productivity and ecological depth of the profile can be improved by loose parent substrate, which can be especially important for olives. Rendzinas on marks are mainly vineyard and olive growing soils. Rendzinas on dolomites are the least suitable soils for olive growing as they are shallow, and the parent rock has no cracks and roots cannot penetrate deep and they are permanently unsuitable soils for olives. However, rendzinas on soft limestone can also be crushed by rotary cultivator and thus create anthropogenic soils with the site that is suitable for establishing olive groves.

4 – Humus silicate soil (ranker) is represented on negligible areas in Montenegro (6825 ha, less than 70 km^2, 0.5% of the territory). It is formed on silicate bases above 1500 m.a.s.l., on carbonate, hard and loose silicate rocks. It is characterised by strong acid reaction and a high content of humus. Rankers developed on hard rocks belong to permanently unsuitable soils. Rankers on loose silicate rocks can be suitable soils with moderate to large limitations, but we have a very small number of such types of soils and substratum in the zone of olive growing and they are not interesting for specific research.

5 – Acid brown soil (distric cambisol) with an area of 394.825 ha (around 4000 km^2 or 30% of the territory of Montenegro) takes the second place in terms of representation. It is mostly represented in the northeast Montenegro. It is limited by poor pedo-chemical properties, primarily high acidity which poses a limitation for numerous cultivated plants. Although it accounts for about one third of the total pedological cover of Montenegro, it demonstrates high fertility only on some smaller, flat sites due to geographic position, relief and prominent erosion, and due to acid reaction and high skeleton of the profile. The large distribution of distric cambisol is influenced by high share of silicate rocks in the geological framework of the territory of Montenegro. Among these, sandstone and shale of Paleozoic and Mesozoic age, eruptive Triassic rocks and diabase-chert formations, followed by cherks, quartzites, breccias and conglomerates and Late Cretaceous or the so-called Durmitor flysch have considerable representation. We find them as mosaics on flat foothills and terraces of Lim, Tara and Ćehotina basins.

6 – Brown eutric soil (eutric cambisol) covers areas of 118.275 ha (around 1200 km^2 or around 9% of the territory) and occupies the lowest parts of river valleys (old river terraces), ravines and karst fields. Eutric brown soil is very good soil with average good physical and chemical properties. Variability of fertility and usability of these soils depend mostly on the parent substrate and relief. Loose parent substrates deepen the ecological depth of this type, and these soils are a very good site for growing for example olives and similar cultures. The most fertile soils of this type are developed on marly sediments of flysch, which often should be deepened by harrowing.

7 – Brown soil on limestone (calcaric cambisol) is formed on karstified clean limestones, dolomite limestone and dolomites. In Montenegro, it is found in the area of 35.000 ha (350 km^2, 2.5% of the territory of Montenegro). It is primarily formed on softer relief forms where the natural vegetation is broadleaves forests – brushwoods and grass communities in lower zones, with mixed and conifer forests and grasslands. There is a small number of arable areas on this type of soil and is often called forestland. The profile of calcaric cambisol is mostly of medium depth, rarely shallow or deep. It is mostly clay soil and well-compacted due to low content of skeleton in the profile. Calcaric cambisol is poor in phosphorus as any profile rarely contains more than 10 mg per 100 grams of soil. The content of potassium is medium to good, which especially applies to topsoil. The content of potassium gradually drops with depth. Varieties of deeper soil in karst sinkholes, depressions and fields have the highest production value and fertility.

8 – Red soil (terra rosa) is the soil types that is characteristic for Mediterranean karst area, i.e. terrains built of limestone that absorb considerable precipitation during the year. It is found here on areas of around 84.000 ha (840 km^2 and accounts for 6.5% of the total territory of Montenegro). It is distributed on the Montenegrin coast and in the Skadar Lake basin to around 500-600 m.a.s.l. Red soil is heavy soil, compacted, with small amount of humus substances. It easily absorbs and retains water for a long time, which allows plants to survive during dry, hot and long Mediterranean summer.

This soil type is created by dissolution of limestone and dolomites and makes its undegradable remains. It is formed on the bottom of karstic sinkholes, depressions and karst fields. Red soil in Montenegro occurs from Herceg Novi to Bojana estuary. It is further found on slopes of perimeter of the south shore of the Skadar Lake and in Bjelopavlićka Plain. Tera rossa is of clay, grainy structure. The content of humus is around 1-3%. It contains iron and aluminium oxides that give it red colour, hence its name. On higher altitudes it turns into forest brown soil and podzol due to increase in the precipitation. Red soil is suitable for cultivating vine and fruits (figs, olives, etc.).

9 – Deluvial, alluvial and wetlands are represented with around 43.500 ha (435 km^2, 3.5% of the total territory of Montenegro). Alluvial soil (allivion, lat. alluvius, fluvisol) is loose and porous soil

of fluvial origin. The process of its creation starts with erosion, continues by reshaping by water and transport down slopes, and ends with depositing or creation of alluvial sediments. In most cases aluvion consists of different materials such as small sludge and clay particles or larger particles such as sand and gravel. Deluvial, alluvial and wetlands cover the lowest terrains, foothills and alluvial plains along water courses and on shores of Šasko, Plav and Skadar lakes.

Bearing in mind that we have limited resources in terms of high fertility soil (200 km^2, 1.5%) and medium-fertility soil (400 km^2, 3% of the total territory), we as the society must counter soil degradation in Montenegro. Pressures by sectors are made by 1) agriculture (less now than in previous periods); 2) forest management. Another wave of pressures comes from 3) industry (less now than in previous periods); and 4) energy sector. Recently, 5) transport; 6) urbanisation; 7) impact of mines; 8) impact of landfills have a more significant impact of land degradation here. Research conducted by scientists globally consider 9) soil degradation due to climate change. This problem should be studied more seriously and counter this problem in an organised manner by engaging multidisciplinary teams of own experts into the analyses while using the experiences of advanced developed countries.

Soil degradation by erosion caused by water belongs to important soil degradation processes here. Therefore, preparing studies that are planned at the local level in this area should be insisted on. The problem we could face in the future is compression (compacting) of soil due to the use of heavy tractors and machines for intensive soil exploitation. Permanent soil monitoring should be established to monitor closely the condition and loss of organic matter or impoverishment of soil in terms of nutrients while addressing biological degradation and soil contamination.

The processes of degradation of agricultural land are mitigated in case of soil erosion caused by water by terracing of slopes, by introducing contour treatment and planting, and the choice of proper crop rotation and sowing in beds. Competent services should insist before agro-chemistry institutions to control the use of mineral fertilizers and control of soil fertility, rational use of pesticides. Intensification of agricultural production will require modernisation of irrigation systems. Alkalisation should be prevented within this initiative. Efforts are needed to improve soil in terms of acidity and structure of soil and stimulate introduction of larger volumes of organic and lime fertilizers and soil enhancers. Education of agricultural producers plays an important role, according to experiences of other developed countries, where application of anti-erosion measures and sustainable management of agricultural land and environmental protection plays an important role. One of the first steps in combating land soil degradation is to establish databases for agricultural land by using earlier pedological research (1964-1988) by conducting monitoring and quality control.

Combating hazards (floods and fires) also influence soil degradation here. Fires increasingly often cause huge damage. Activities in this segment should be aimed at improving the protection system for agricultural and forestland from fires in regulatory and operational terms. Lay down additional protection measures for some sites jeopardised by degradation processes for faster regeneration of vegetation.

One of important segments in combating soil degradation is treatment of waste emissions, wastewater treatment from plants prior to their discharge into water courses.

Gradually introduce the obligation of selective and proper disposal of solid waste while continuously monitoring the extent of soil degradation in the vicinity of industrial plants by frequent inspections. Soil degradation in the zone of immediate impact of energy facilities and infrastructure needs to be compensated for adequately while complying with spatial-functional

criteria and the principles of sustainable development. One of specific activities that can have a considerable impact on soil degradation is ore exploitation. The status, form and extent of degradation and the degree of contamination of soil and the surrounding, as well as the impact of ore exploitation on human health, should be monitored continuously. Wastewater treatment prior to their discharge into water courses should be strongly monitored. Recultivation and rehabilitation of soil after completed exploitation must always be conducted based on previous contracts. Water from landfills must be collected and treated to protect underground and groundwater and surrounding soil from contamination.

Accelerated urbanisation is fatal for agricultural land in Montenegro where we have only up to 5% of the territory of Montenegro with average fertility. It is important to get to grips with illegal construction on agricultural land in suburbs of almost all of our towns while paying attention to the protection of high and medium fertility soil by implementing measures to stop or mitigate soil degradation. This is particularly required to prevent erosion processes and regulate torrents.

2.4.1. Quality of soil

Monitoring of the status of soil and examination of the content of hazardous and harmful substances in soil is implemented in accordance with the Law on Environment (Official Gazette of Montenegro 052/16, 073/19), the Law on Agricultural Land (Official Gazette of the Republic of Montenegro 015/92, 059/92, 027/94, Official Gazette of the Republic of Montenegro 073/10, 032/11) and the Rulebook on allowed concentrations of harmful and hazardous substances in soil and methods for their examination (Official Gazette of the Republic of Montenegro 018/97) and is aligned with the requirements of the Stokholm Convention on persistent organic pollutants (POPs).

Monitoring of the quality of soil in Montenegro was not implemented in 2021 due to the lack of funds.

2.5. Hydrological characteristics

Montenegro has a very interesting hydrogeology, primarily due to wide distribution of karst (more than 60% of the territory is composed of permeable limestone and dolomite). Only its northeast part is dominated by poorly permeable rocks (clay, marls, sandstone and shale) over which a dense network of water courses is developed.

Hydrogeology of the basin of the Adriatic Sea

It can be seen on the hydrogeological map (Figure 2.4.) that karst aquifer characterised by high permeability is dominantly spread in the region of the Adriatic basin.

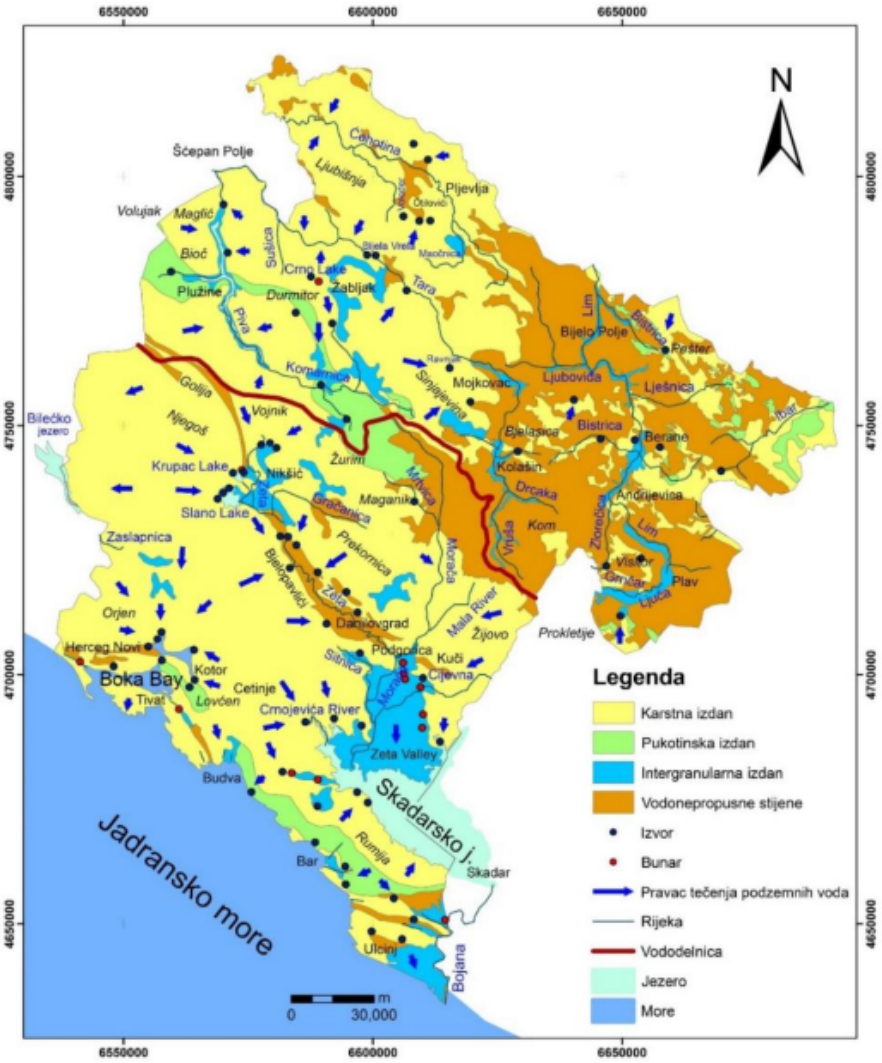


Figure 2.4. Hydrogeological map of Montenegro (Sekulić and Radulović M.M. 2019)

Intergranular aquifer has a more considerable distribution in the area of the Zeta Valley, Nikšić and Ulcinj.

Fractured aquifer is distributed only along the Adriatic shore and in the northern part of the basin (headwater of Morača).

Low-permeable and impermeable rocks are present along the belt stretching from Kuči, via the area of the Bjelopavlića Plain and Nikšić to Golija, except in the northeast part of the basin (headwater of Morača and Mala Rijeka).

Karst aquifer in the Adriatic basin

Karst aquifers are replenished mainly by infiltration of precipitation in the area of high karst plateaus (800-1200 m.a.s.l.). Numerous villages found on these karst plateaus are completely arid, although these are areas with perhaps highest precipitation in Europe (mean multiannual precipitation in the Boka Bay hinterland range between 3000 and 5000 mm/year). Due to high permeability of rocks, almost all precipitation infiltrates very quickly deep into the underground

and discharge at the sea level or along the perimeter of large karst depressions. Even the deepest wells in these villages remain dry in the summer and often need to be drilled deeper than 300 m do reach the level of underground waters. There is almost no water on the surface, and even if brooks are formed somewhere, after a short surface running, they usually sink in a concentrate manner through abysses. Arid karst plateaus occupy around 35% of the territory of Montenegro.

Water reaches the aquifer discharge zone from the replenishment zone very quickly (in a few hours) since the network of karst canals, which play the role of conductors towards springs is highly developed. Average speed of underground water as determined by numerous tracer tests is around 2.65 km/day (Radulović M. 2010).

Karst aquifers discharge through strong karst spring catchment which are mainly distributed:

- along sea shore,
- along the perimeter of karst depressions (Nikšić Field, Bjelopavlići Plain, Zeta Plain, Skadar Lake, Bilećko Lake), and
- along deep canyons (Morača, Mrvica, Mala River, Cijevna and Zaslapnica).

Sometimes underground water of karst aquifer discharge only below the sea level or below the level of rivers, as the case is in the Boka Bay and Skadar Lake, where there is a large number of strong submarine/sub-lacustric springs.

The quality of underground water of karst aquifers is relatively good, except for water of coastal aquifers where the salinity is high due to sea intrusion. After extreme precipitation, turbidity and the content of bacteria in the spring water often increases. Generally, underground water has low mineralisation (TDS is around 300 mg/l), with higher contents of HCO_3^{2-} and Ca^{2+} ions.

High water potential (at mid-year level) on the one side and uneven regime of aquifer discharge and intrusion of marine water on the other side cause contradiction between possibilities and the problem of insufficient quantities of water during summer months.

Intergranular aquifer in the Adriatic catchment area

Intergranular aquifers have a significant distribution on the territory of Nikšić, Zeta Plain and Ulcinj Field. In addition to infiltration of precipitation, intergranular aquifers are replenished by infiltration of river water and inflow of underground water from floor-confined karst aquifers. The general direction of underground water flow within the three mentioned intergranular aquifers is from the north to the south.

The most important intergranular aquifer is located in the territory of the Zeta Plain. It is very rich in water and characterised by a rather high filtration coefficient. This aquifer is discharged naturally through diffuse springs along the south perimeter of the plain. Artificial discharge of the aquifer is not negligible since large quantities of underground water used for water supply of a part of Podgorica and for irrigation and industry is captured through wells. The quality of underground water is distorted in the areas downstream from larger agricultural areas and industrial facilities.

Hydrogeology of the Danube catchment area

An important section of the Danube catchment area in the territory of Montenegro is composed of low-permeable and impermeable rocks which are mainly distributed in the northeast part of the territory.

Of permeable rocks, limestone and dolomites (karst aquifer), which mainly build mountain areas, are dominant. Intergranular aquifer is mainly represented by alluvial sediments of main river courses (Piva, Tara, Lim, Ćehotina and Ibar). Fractured aquifers are distributed in limited areas within Piva and Ibar catchment areas.

Karst aquifer in the Danube catchment area

Karst aquifers in the territory of the Danube catchment area are replenished mainly by direct infiltration of precipitation, but concentrated infiltration in places of sinking of mountain brooks is frequent. The amount of precipitation in the Danube catchment area is considerably lower compared to the Adriatic catchment area, which influences the conditions for replenishment of karst aquifer.

The karst aquifer replenishment zone is represented by mountain areas and high karst plateaus (Sinjajevina plateau is a typical example). Underground water runs from the replenishment zone towards erosion bases, mainly towards the closest river valleys, along which strong karst springs occur. Direction of flow of underground water is estimated on the basis of the analysis of hydrogeological characteristics of the area, and on the basis of results of tracer tests. The results were often surprising, which is not a rare case on karst terrains with well-developed underground network of canals and caves, such as the terrains of Montenegro (Radulović M. 2005).

All water systems in the northern part of Montenegro (Danube catchment area) are based on water of karst springs, which mainly have a good quality throughout the year. An occasional problem occurs on these springs with regard to increased turbidity and the content of bacteria (this mainly happens after intense precipitation; especially prominent in the area of Pljevlja).

Intergranular aquifer in the Danube catchment area

Intergranular aquifer is mainly distributed along Piva, Tara, Lim, Ćehotina and Ibar rivers. These are relatively narrow, but elongated alluvial aquifers whose filtration characteristics vary spatially.

In the rainy period of the year when water levels are high, intergranular aquifers are replenished by river water and movement of underground water from the river towards the perimeter of alluvial plain. In the dry period of the year, the situation is opposite; underground water from the intergranular aquifers run off towards river beds and replenish rivers.
These alluvial aquifers are very rich in underground water in some places. One of them is the spring in the Tara alluvium (upstream from Kolašin), which comprises four wells 20-25 m deep. Wells are drilled through sandy-gravel sediments of relatively high permeability. Pumping of underground water from the wells in the quantity of 89 l/s decreases the level by only 0.3 m (Matović at al. 2018). the results of physical, chemical and microbiological analyses indicated good quality of underground water of this spring.

The list of main springs in Montenegro, with estimated flows, is found in the listed sources of literature (Radulović M. 2010; Sekulić and Radulović M.M. 2019).

Figure 2.5. Underground water bodies in the Adriatic catchment area

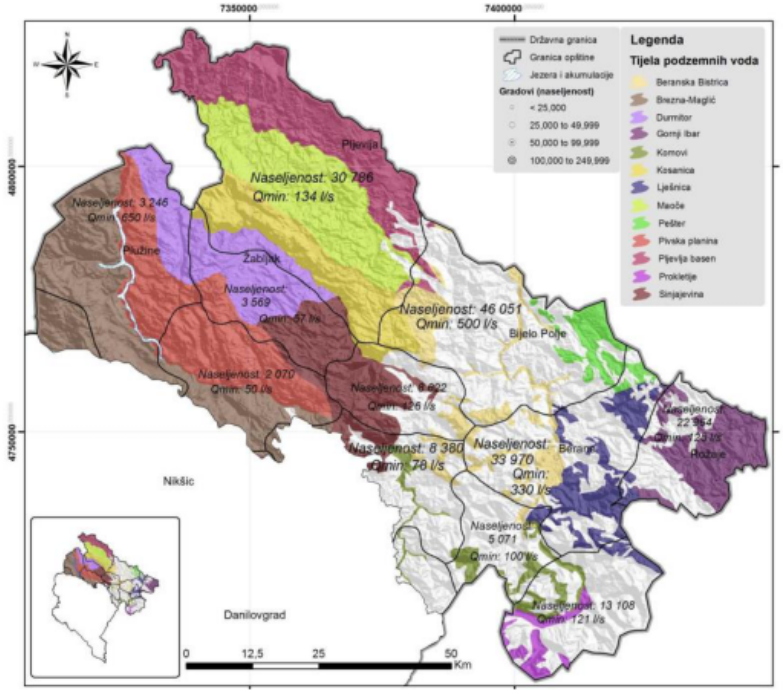


Figure 2.6. Underground water bodies in the Danube catchment area

2.5.1. Quality of underground water

Monitoring of groundwater and underground water was conducted in 2021 in accordance with the Water Framework Directive (WFD), the Rulebook on the manner and deadlines for determining groundwater status (Official Gazette of Montenegro 25/2019) and the Rulebook on the manner and deadlines for determining underground water status (Official Gazette of Montenegro 52/2019). These rulebooks on the manner and deadlines for determining groundwater and underground water status define the manner and deadline for determining groundwater and underground water status, manner of conducting monitoring of chemical and environmental status of groundwater, provide a list of priority substances for groundwater, define the manner of conducting monitoring of chemical and quantitative status of underground water and measures to be implemented to improve groundwater and underground water status.

The network of stations and the work programme cover underground water: aquifers and drilled wells, wells – old and new, which are used by water supply enterprises or will be used for exploitation of drinking water, as well as wells located in vulnerable area. The network of measuring testing sites comprised 48 measuring sites. Sampling in the area of Zeta Plain – a part that is considered to be vulnerable – was carried out on three drilled wells that are privately-owned and not piezometric wells.

In addition to the existing network, a network for monitoring of underground water that will be a part of the future monitoring system was established under the project “Strengthening the Administrative Capacities for Implementation of the Water Framework Directive in Montenegro”. Frequency of monitoring with respect to supervision monitoring should be at least twice a year (spring and autumn or during high and low water level), with the following parameters: temperature, oxygen content, pH value, conductivity, nitrates, ammonia and phosphates.

Underground water was tested in 2021, in two rounds, in characteristic hydrological conditions, low and high water level.

Underground waters in Montenegro ensure around 92% of total quantity of water for supply of settlements. The main natural negative factor of the quality of underground water in the coastal region is the influence of marine water on low karst aquifers on the coast. Numerous occurrences of underground water in this zone are either salted or become exposed to the influence of marine water during exploitation to the extent that they cannot used as drinking water.

Natural quality of water in almost all springs of underground water in the continental part is worsened by dominantly anthropogenic impacts and is a result of inadequate sanitary protection and inadequate sanitation of the catchment area.

As stated in the section on the quality of water, monitoring of 48 underground waters was conducted in 2021: springs/aquifers (14), drilled wells (8) and new wells (23). The water from some of them (8 wells and 12 springs/aquifers) are used or are planned to be used to collect water for human use. The water of the first aquifers of the Zeta Plain was sampled from three underground wells.

On the basis of the Rulebook on the manner and deadlines for determining underground water status (Official Gazette of the Republic of Montenegro 52/2019), underground waters can have good chemical status and poor chemical status. In addition to this Rulebook, the Rulebook on parameters, conformity checking, methods, manner, scope of analysis and implementation of

monitoring of health safety of water for human use (Official Gazette of Montenegro 64/2018, 101/2021) was also used to assess the status and interpret results.

The quality status was determined on the basis of mean values of 12 main physical and chemical parameters: BOD5, TOC, conductivity, alkalinity, pH, $NH4^{+}$, NO^{3-}, $NO2^{-}$, TN, total P, o-PO_4^{3-}, SO_4^{2+}. Some other related parameters were assessed, but their values were not considered for determining the status due to specificity of the quality of underground waters, such as: T water, content of O_2, % of O_2 and suspended matter, as well as three biological parameters. As far as pollutants are concerned, the following metals were assessed: Pb, Cd and Hg, as well as pesticides (176 substances of this group).

The results of the analysis of the quality of underground water by measuring (stations) sites are presented below:

1. Sveti Đorđe is a new well located in Ulcinj hinterland and belong to a group of underground water bodies (GVTPV) Ulcinj Field. This water body has a cross-border nature. From the aspect of main physical and chemical elements, water showed poor quality status.
2. Gač spring (drilled well) is located in Ulcinj hinterland and belongs to GVTPV Možura-Paštrovići. Water is used by the Water Supply Company Ulcinj. From the aspect of main physical and chemical elements, water showed good quality status.
3. Lisna Bori spring (drilled well BN8) is located in Ulcinj hinterland and belongs to GVTPV Ulcinj Field. From the aspect of main physical and chemical elements, water showed poor quality status.
4. Kajnak is a new well located near the Kajnak spring in the hinterland of Bar. It belongs to GVTPV Možura-Paštrovići. Water from the Kajnak spring is used by the Water Supply Company Bar. From the aspect of main physical and chemical elements, water showed good status.
5. Popovići is a new well located in Bar (in the school yard) and belongs to GVTPV Možura-Paštrovići. From the aspect of main physical and chemical elements, water showed poor quality status.
6. Velje Oko spring is located in the Crmničko Field-Gluhi Do and belongs to GVTPV south perimeter of the Skadar Lake. From the aspect of main physical and chemical elements, water showed good status.
7. Orahovo spring is located in the area of Crmnica and belongs to GVTPV Orahovštica-Rijeka Crnojevića. Water from the spring is used by the Water Supply Company Bar. From the aspect of main physical and chemical elements, water showed poor status.
8. Sjenokos is a new well located in the area of Crmnica and belongs to GVTPV Orahovštica-Rijeka Crnojevića. From the aspect of main physical and chemical elements, water showed poor quality status.
9. Podgorska Vrela spring is located in the area of Crmnica and belongs to GVTPV Orahovštica-Rijeka Crnojevića. Water is used by Water Supply Companies Cetinje and Budva. From the aspect of main physical and chemical elements, water showed poor status.
10. Reževića Rijeka spring belongs to GVTPV Možura-Paštrovići. Water is used by the Water Supply Company Budva. From the aspect of main physical and chemical elements, water showed good status.
11. Budva – a new well near school that belongs to GVTPV Grbalj-Luštica. From the aspect of main physical and chemical elements, water showed poor quality status.
12. Jaz is a new well located in the surrounding of Budva and belongs to GVTPV Grbalj-Luštica. From the aspect of main physical and chemical elements, water showed poor quality status.

13. Risan cave is a new well located in Risan and belongs to VTPV Orijen. From the aspect of main physical and chemical elements, water showed poor quality status.
14. Goljemadi is a new well located in the surrounding of Podgorica and belongs to GVTPV Karuč-Sinjac. From the aspect of main physical and chemical elements, water showed poor quality status.
15. Kaluđerovo Oko is a new well located in the surrounding of Podgorica and belongs to GVTPV Karuč-Sinjac. From the aspect of main physical and chemical elements, water showed good quality status.
16. Bolje Sestre is a new well located in the surrounding of Podgorica and belongs to GVTPV Karuč-Sinjac. From the aspect of main physical and chemical elements, water showed good quality status.
17. Bolje Sestre spring is located on the perimeter of Veliko Blato, Podgorica area, and belongs to GVTPV Karuč-Sinjac. Water from the spring is used by the Regional Water Supply System of the Montenegrin Coast. From the aspect of main physical and chemical elements, water showed good status.
18. Plantaže is a new well located in the surrounding of Podgorica and belongs to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed good quality status.
19. Cijevna estuary is a new well located in the surrounding of Podgorica, close to flow of Cijevna into Morača, and it belongs to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed good quality status.
20. Ćemovsko Field is a system of wells located in Podgorica and used by the Water Supply Company Podgorica. Wells belong to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed good quality status.
21. Vrelo Ribnice is a spring in the surrounding of Podgorica and belongs to GVTPV Zeta Plain. Water is not used for supplying of the water supply system. From the aspect of main physical and chemical elements, water showed good status.
22. Zagorič is a system of wells located in Podgorica and used by the Water Supply Company Podgorica. Wells belong to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed good quality status.
23. Bioče is a system of wells located in Bioča and is a part of the Water Supply Company Podgorica. Wells belong to GVTPV Kuči. From the aspect of main physical and chemical elements, water showed good quality status.
24. Mareza spring is located in Podgorica area and belongs to GVTPV Prekornica-Bjelopavlići. Water is used for supplying the water supply system. A sample was taken from collective water intake structure. From the aspect of main physical and chemical elements, water showed good status.
25. Vučji Studenac is a new well located in Bandići, Podgorica, and belongs to GVTPV Garač. From the aspect of main physical and chemical elements, water showed good quality status.
26. Radovče is a new well located at the outskirts of Podgorica and belongs to GVTPV Prekornica-Bjjelopavlići. From the aspect of main physical and chemical elements, water showed good quality status.
27. Well in Gostilje (Prenkić house) is a part of monitoring of vulnerable areas according to the requirements of the Nitrates Directive. It belongs to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed poor quality status.
28. Well in Vranje (Majkić house) is a part of monitoring of vulnerable areas according to the requirements of the Nitrates Directive. It belongs to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed poor quality status.
29. Well in Drešaj (Drešević house) is a part of monitoring of vulnerable areas according to the requirements of the Nitrates Directive. It belongs to GVTPV Zeta Plain. From the

aspect of main physical and chemical elements, water showed poor (moderate) quality status.

30. Trgaj is a new well located in the territory of Tuzi and belongs GVTPV Kuči. From the aspect of main physical and chemical elements, water showed good quality status.
31. Vuksanlekići is a well located in the surrounding of Tuzi and used by the Water Supply Company Podgorica. The well belongs to GVTPV Zeta Plain. From the aspect of main physical and chemical elements, water showed good quality status.
32. Čevo is a new well located near Čevska pit and belongs to GVTPV Garač. From the aspect of main physical and chemical elements, water showed poor quality status.
33. Vidrovan spring is located in the surrounding of Nikšić and belongs to GVTPV Vojnik. Water is used for supplying the water supply system of Nikšić. A sample was taken from the fountain connected to the water intake structure. From the aspect of main physical and chemical elements, water showed good status.
34. Riječani is a new well located in the surrounding of Nikšić and belongs to GVTPV Trebišnjica. From the aspect of main physical and chemical elements, water showed good quality status.
35. Zaljutnica is a new well located in the surrounding of Nikšić-Golija area and belongs to VTPV Brezna-Maglić. From the aspect of main physical and chemical elements, water showed poor quality status.
36. Šavnik is a new well located in Šavnik, near the school, and belongs to VTPV Brezna-Maglić. From the aspect of main physical and chemical elements, water showed poor quality status.
37. Glava Šavnika spring is located in the territory of Šavnik and belongs to VTPV Pivska Mountain. Water is used to supply water supply system of Šavnik. A sample was taken from the canal that leads the water to the water intake basin. From the aspect of main physical and chemical elements, water showed good status.
38. Mateševo is a new well located in the surrounding of Kolašin and belongs to GVTPV Komovi. From the aspect of main physical and chemical elements, water showed good quality status.
39. Ravnjak is a new well located in the surrounding of Mojkovac and belongs to VTPV Sinjajevina. From the aspect of main physical and chemical elements, water showed good quality status.
40. Gojakovića Vrela spring is located in the area of Mojkovac and belongs to VTPV Sinjajevina. Water from the spring is used to supply the water supply system. A sample was taken from the overflow canal. From the aspect of main physical and chemical elements, water showed good status.
41. Bijelo Polje is a new well located in Bijelo Polje, near the school, and belongs to GVTPV Beranska Bistrica-Ljubovića. From the aspect of main physical and chemical elements, water showed poor quality status.
42. Vrelo Bistrice spring, Bijelo Polje area, belongs to GVTPV Beranska Bistrica-Ljubovića. Water is used for the water supply system of Bijelo Polje. A sample was taken from the water intake overflow canal. From the aspect of main physical and chemical elements, water showed good status.
43. Manastirsko Vrelo spring, Berane areaa, belongs to GVTPV Beranska Bistrica-Ljubovića. Water is used occasionally to supply the water supply system. A sample was taken from the overflow canal. From the aspect of main physical and chemical elements, water showed good status.
44. Vrelo Ibra spring, Rožaje area, whose water is used to supply water to the water supply system of Rožaje, belongs to GVTPV Gornji Ibar. A sample was taken from the overflow. From the aspect of main physical and chemical elements, water showed good status.

45. Ali Pašini Springs, Gusinje area, belongs to GVTPV Prokletije. Water is used to supply the water supply system. A sample was taken from one of many existing springs. From the aspect of main physical and chemical elements, water showed good status.
46. Breznice spring, Pljevlja area, whose water is used to supply the water supply system of Pljevlja, belongs to GVTPV Maoče. A sample was taken from the water intake basin. From the aspect of main physical and chemical elements, water showed good status.
47. Pljevlja is a new well located in Pljevlja, on the right bank of Ćehotina, belongs to GVTPV Basen Pljevlja. From the aspect of main physical and chemical elements, water showed poor quality status.

2.5.2. Quality of drinking water

Health safety of drinking water refers to microbiological and physical-chemical safety of drinking water, with ensured protection of the spring, health safety in supplying and handling drinking water.

In 2021, drinking water from the water supply system was tested in the Institute for Public Health of Montenegro, the Hygienic and Epidemiological Service of the Primary Healthcare Centre Bar, the Water Supply and Sewerage LLC Podgorica.

Based on the results of testing of hygienic safety of drinking water, the following conclusions can be made: a total of 20041 samples of drinking water from municipal water supply systems and other public water supply facilities were tested in the territory of Montenegro in 2021: 10164 microbiological testing and 9877 physical and chemical testing.

According to the results of microbiological testing, 2.05% of tested samples of chlorinated water did not meet the prescribed hygienic safety standards, most often due to increased total bacteria count and identification of coliform bacteria.

Based on the results of physical and chemical tests, 5.54% of tested samples of chlorinated water did not comply with applicable regulations. The most frequent cause to unsafety was the insufficient concentration or complete lack of residual chlorine and increased turbidity in the period of higher precipitation.

The review of the sanitary-hygienic status stated that all legally provided zones of sanitary protection had not been established, i.e. most of water intake structures had only the immediate protection zone established.

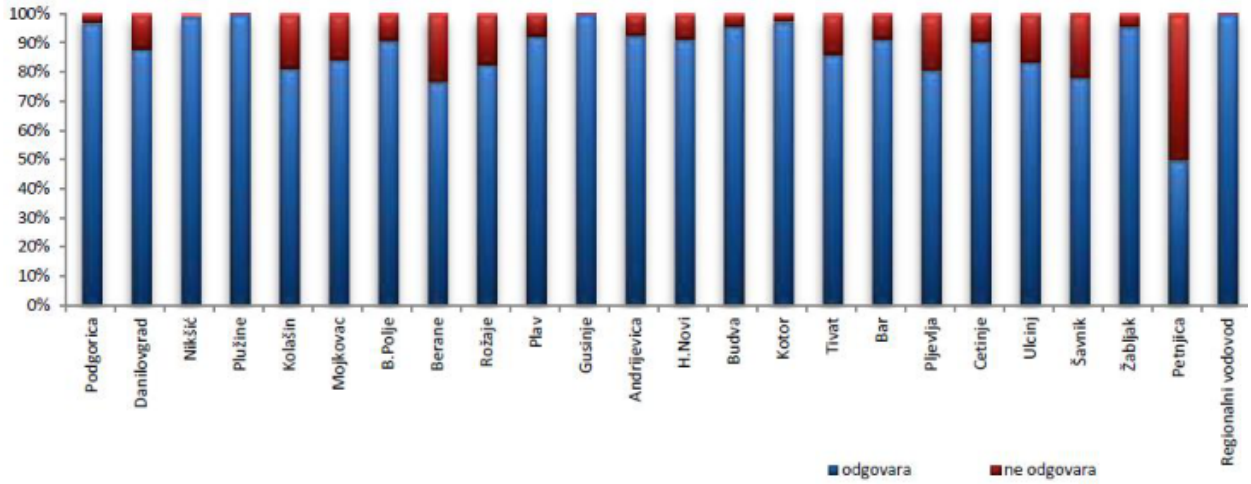


Figure 2.7. Results of physical and chemical tests of samples of chlorinated drinking water in 2021

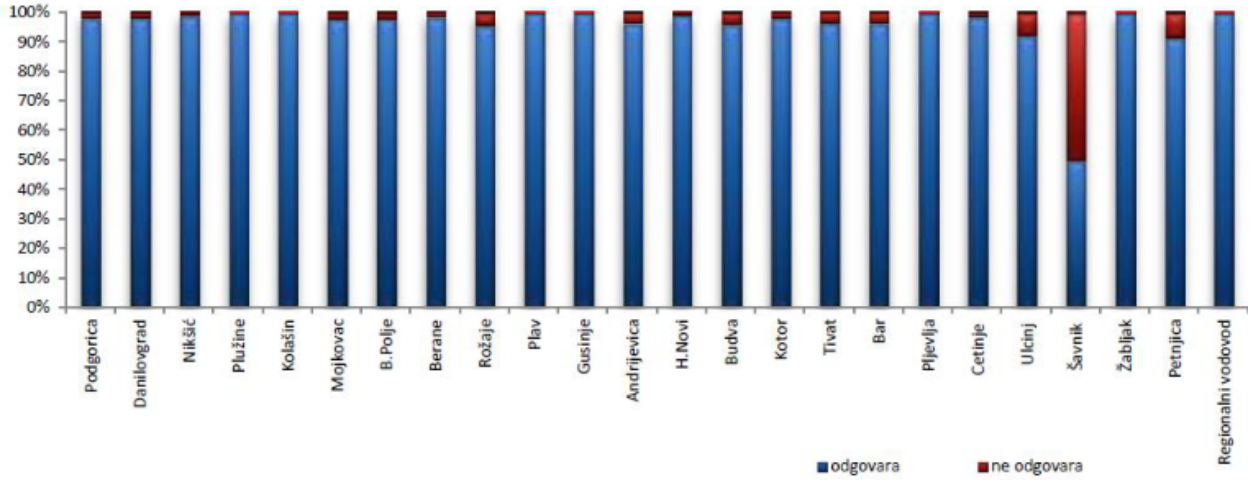


Figure 2.8. Results of microbiological tests of samples of chlorinated drinking water in 2021

2.6. Hydrological characteristics

The Republic of Montenegro covers distinctly mountainous area extending from northeast from the Adriatic Sea and this fact determines not only climate and geological conditions, but hydrological characteristics in both main catchment areas as well.

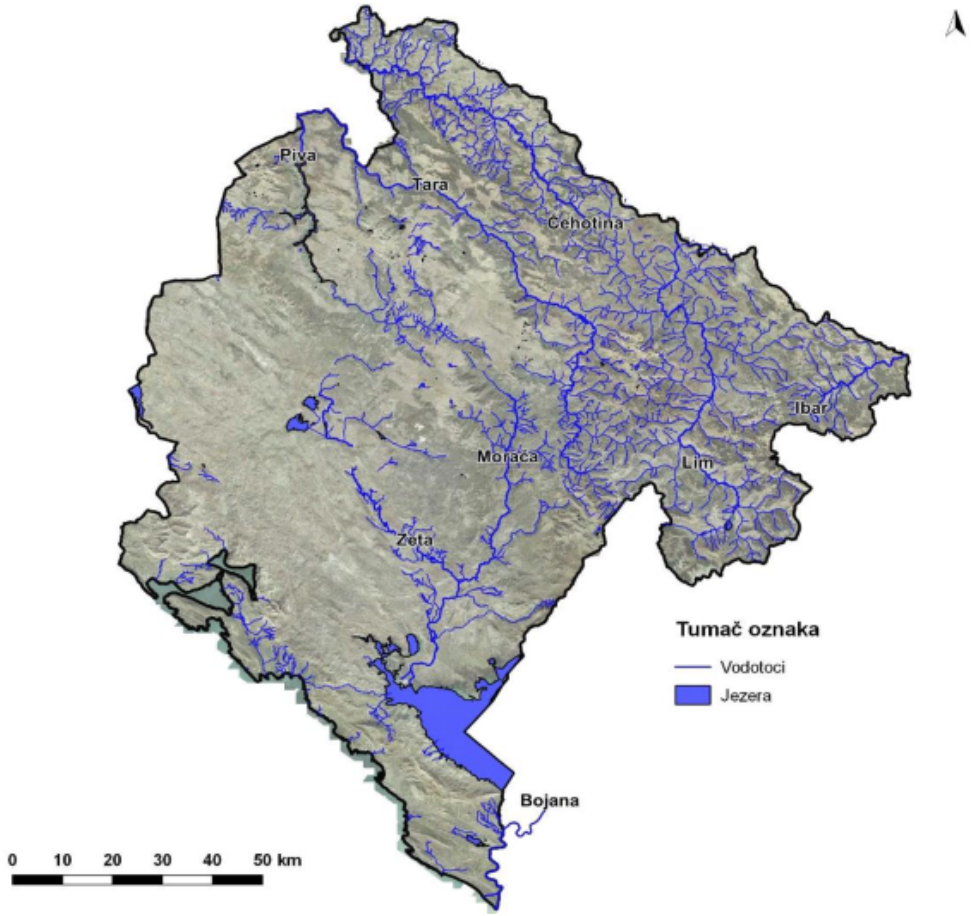


Figure 2.9. Hydrographic network of Montenegro

Several important water courses are formed in the territory of Montenegro, and they flow into two catchment areas: Adriatic and Danube (Black Sea). The total area of the Black Sea part of the catchment area is around 7.260 km^2 or 52.5% of the territory of Montenegro. Rivers Tara, Piva, Ćehotina, Lim and Ibar run off from this catchment area. The total area of the section of the Adriatic catchment area of Montenegro is around 6.560 km^2 or 47.5% of the territory of Montenegro.

The Morača River with its most important tributary Zeta and Sitnica, Ribnica, Cijevna, Orahovštica and Rijeka Crnojevića flow towards the Adriatic Sea. All their waters flow through the River Bojana into the Adriatic Sea. In addition to Bojana, several smaller torrent water courses for which there are no observations and measurement of parameters of the hydrological balance flow directly into the sea.

A considerable part of the territory of Montenegro is composed of carbonate rocks (karst area) without permanent surface running off (wider hinterland of Boka Kotorska), but with numerous sinkholes receiving groundwater that flow underground further towards the sea, or towards territories outside of Montenegro, to catchment areas of Trebišnjica or Konavli.

Hydrological observations that have been conducted for 70 years now have allowed the existence of a quality hydrological database for most of Montenegro. There is a sufficiently long dataset for the main water courses and for the Skadar Lake. Unfortunately, there are no sufficient data for smaller water courses based on which more precise hydrological parameters could be defined.

An example of available data can be reviewed best through already published presentation of hydrological parameters of larger water courses and the Skadar Lake.

Table 2.1. Hydrological parameters of the rivers of the Adriatic catchment area

No.	Water course	HS	Surface of catchment area (km^2)	Analysed period	Characteristic flows (m^3/s)				
					Q_{min}	$Q_{min\ mean}$	Q_{mean}	$Q_{maxmean}$	Q_{max}
1	Morača	Pernica	440.9	1956-2014	1.14	3.29	29.04	428.7	812
		Zlatica	985.3	1983-2012	0	1.619	59.64	885.6	1.369
		Podgorica	2.628	1948-2014	7.93	15.78	159	1.261	2.073
2	Zeta	Duklov Most	342.2	1955-2014	0.07	0.271	18.9	182.9	286
		Danilovgrad	1.215,8	1948-2000	4.68	7.99	77.9	278.2	577
3	Rijeka Crnojevića	Brodska Njiva	79.3	1987-2002	0.458	0.676	6.25	153.9	228
					Characteristic levels (m.a.s.l.)				
					H_{min}	$H_{minmean}$	H_{mean}	$H_{maxmean}$	H_{max}
4	Skadar Lake	Plavnica	4.179	1948-2014	4.54	5.107	6.421	8.444	10.44
5	Bojana	Fraskinjel	16.520	1960-2014	0.019	0.469	1.816	4.764	6.359

Table 2.2. Hydrological parameters of rivers of the Danube catchment area

No.	Water course	HS	Surface of catchment area (km^2)	Analysed period	Characteristic flows (m^3/s)				
					Q_{min}	$Q_{minmean}$	Q_{mean}	$Q_{maxmean}$	Q_{max}
1	Lim	Plav	364	1948-2012	0.244	3.212	19.23	145.5	324
		Bijelo Polje	2183	1948-2014	8.20	12.14	57.14	512.8	1077
2	Tara	Crna Poljana	247	1957-2014	0.72	1.448	12.01	175.7	468
		Trebaljevo	506	1959-2014	1.55	2.668	24.64	307.8	701
3	Ćehotina	Ćirovići	120	1978-2006	0.248	0.487	2.117	38.41	106
		Pljevlja	361	1948-2007	0.320	1.274	6.31	65.11	145
		Gradac	810	1963-2011	2.10	3.737	12.90	160.6	414

2.6.1. Quality of surface waters

Art. 75 and 77 of the Law on Water (Official Gazette of the Republic of Montenegro 027/07, Official Gazette of Montenegro 073/10, 032/11, 047/11, 048/15, 052/16, 055/16, 002/17, 080/17, 084/18) create the legal basis for the protection of groundwater and underground water in Montenegro.

Monitoring of groundwater and underground water was conducted in 2021 according to the Water Directive (WFD), the Rulebook on the manner and deadlines for determining groundwater status (Official Gazette of Montenegro 25/2019) and the Rulebook on the manner and deadlines for determining underground water status (Official Gazette of Montenegro 52/2019). These rulebooks on the manner and deadlines for determining groundwater and underground water status define the manner and deadline for determining groundwater and underground water status, manner of conducting monitoring of chemical and environmental status of groundwater, provide a list of priority substances for groundwater, define the manner of conducting monitoring of chemical and quantitative status of underground water and measures to be implemented to improve groundwater and underground water status.

The state administration body responsible for hydrometeorological affairs (Institute of Hydrometeorology and Seismology of Montenegro) tests the quality of waters in accordance with the annual programme for monitoring groundwater and underground water adopted by the Ministry of Ecology, Spatial Planning and Urbanism, with prior opinions of the state administration bodies responsible for health and environmental protection.

Groundwater – a network of stations for the quality of groundwater in 2021 comprised 19 water courses from 28 measuring sites, four natural lakes from seven measuring sites, one artificial lake from one measuring site, five mixed waters from five measuring sites and the coastal sea from five measuring sites, which is addressed within the thematic section on the sea.

In accordance with the WFD, monitoring of groundwater should include:

- biological monitoring that should cover five elements of biological quality: phytoplankton, phytobenthos, macrophytes, fauna of benthic invertebrates and fish;
- monitoring of general physical and chemical parameters accompanying biological monitoring (analysis of main parameters of the quality of water such as pH value, temperature, oxygen level, alkalinity, salinity and nutrients);
- monitoring of specific pollutants;
- monitoring of hydro-morphological elements that accompany biological monitoring: quantities and dynamic flow of water, connection with underground water, river continuity, variation of width and depth of rivers, structure and sediment of the riverbed, structure of the coastal belt and the like;
- chemical monitoring should include an analysis of 45 priority substances.

Testing of the quality of groundwater in Montenegro was conducted in 2-4 series in 2021 to measure main physical and chemical parameters in the period June-December and covered three seasons and the period of low water when the water pollution is the highest, as well as their use. One series was conducted for biological testing that is representative for the characteristic biological cycle on shores and in the water for the following elements: phytobenthos, macrophytes and macrozoobenthos, and also two series for phytoplankton.

Based on the values of main physical and chemical elements of quality, 19 rivers or 28 of their locations were tested. The status of waters was: very good status on seven measuring sites (25.0%) (1 location on the river of the Adriatic catchment area: Mrtvica-above the estuary and six locations on the rivers of the Danube catchment area: Tara on all five sites: Trebaljevo, below Mojkovac, below Crna Poda – below the camp, above Đurđevića Tara, Šćepan Polje and Ćehotina-Glava Ćehotine), good status on 14 measuring sites (50.0%) (seven locations on the rivers of the Adriatic catchment area: Bojana-R, Morača-Ljevište, below the Monastery, Pernica-

Međurečje; Zeta-Vranjske Njive, Cijevna-Dinoša, downstream from the bridge; Mrtvica-central flow and seven locations on the rivers of the Danube catchment area: Veruša-above the bridge; Vrbnica, below the plant; Bijela-downstream from the bridge, Bukovica-above Timar, Bistrica Berenska-below Lubnice; Perućica-Jošanica; Grlja-Vusanja) and moderate status on seven measuring sites (25.0%) (one location on the river of the Adriatic catchment area: Morača-below Cijevna estuary and six locations on the rivers of the Danube catchment area: Lim-Dobrakovo, Bistrica Bjelopoljska-above Bistrica; Ljubovića-above the estuary, Ribarevina; Kutska River-below Kuti; Ibar-Bać; Ćehotina-Gradac).

As far as natural lakes are concerned, the status of water of four lakes or at their seven tested locations had a good status at six locations (85.7%) (all measuring sites on the Skadar Lake: Kamenik, Moračnik, central part of the Lake and Podhum; Black Lake-next to the raft, Plavsko Lake-next to the raft), while the status was moderate at one location (14.3%) (Šasko Lake-next to the raft).

The status of water of artificial lakes and ZPVT was tested for the Plavsko Lake-below Plužine, i.e. the water status was good with better potential at one of its test locations.

As far as mixed waters are concerned or their five tested locations, the status of water was good at one location (20.0%) (area of inflow of the Škudra River) and moderate status at four locations (80.0%) (Sutorina estuary, Risan River estuary, brook mouth near Opatovo and Bojana River estuary). The environmental status determined on the basis of results of biological elements of groundwater bodies is classified into categories: very good, good, moderate, poor and very poor status.

On the basis of the values of biological element of phytoplankton, the mass and the number of algae cells in water – the water quality status at locations of five rivers or their five tested measuring sites was: good at two sites (40.0%) (Zeta-Vranjske Njive, Lim-Dobrakovo) and moderate at three sites (60.0%) (Bojana-Reč, Morača-above Cijevna estuary and Ćehotina-Gradac).

As far as natural lakes are concerned, the water status of four lakes and seven tested locations was: moderate at six locations (85.7%) (Šasko Lake-next to the raft, all sites on the Skadar Lake-Kamenik, Moračnik, central part of the Lake and Podhum and Plavsko Lake) and very poor status at one location (14.3%) (Black Lake-next to the raft).

As for the aspect of the quality of phytoplankton content, the water potential of the artificial lake/ZPVT-Plavsko Lake or of its one tested location (the first sampling above the dam and the second sampling below Plužine-beach zone) was good (100.0%).

Based on the values of biological element phytobenthos, the structure and number of silicate algae, the water quality status of tested locations: 19 water courses – their 28 measuring sites: very good status at 18 locations (64.3%), good status at seven locations (25.0%) and moderate status at three locations (10.7%) (Veruša-above the bridge, Bukovica-above Timar and Ćehotina-Gradac).

As far as four artificial lakes are concerned or their six tested locations, the water status was very good at three locations (50.0%), good status at three locations (50.0%). The status/water potential VVT/JMVT – from the aspect of the quality of phytobenthos content, the potential of the Pivsko Lake or their one tested location below Plužine-beach zone was moderate (100.0%).

On the basis of the values of biological element of macrophytes in water – the water quality status of 15 rivers or their 17 measuring sites tested where macrophytes could be analysed and the status could be determined was: very good at six locations (35.3%), good status at two locations (11.8%), moderate status at two locations (11.8%) (Zeta-Duklov Most and Bijela downstream from the bridge), poor status at six locations (35.3%) (Bojana-Reč, Morača-below Cijevna estuary, Veruša-upstream from the bridge, Tara-Trebaljevo, Ljubovića-Ribarevina and Bistrica Beranska-below Lubnica) and very poor at one location (5.9%) (Ćehotina-Gradac).

As far as natural lakes are concerned, the water status of four lakes or its six locations where macrophytes are found was: good potential at one location (16.7%) (Skadar Lake-Podhum), moderate status at four locations (66.6%) (Šatsko Lake-next to the raft, Skadar Lake-Moračnik, central part of the Lake and Plavsko Lake) and poor status at one location (16.7%) (Skadar Lake-Kamenik).

On the basis of the value of the biological element of macrozoobenthos, the structure and number of eight taxa of found organisms, the water quality status at locations of 19 water courses or their 27 tested measuring sites, there was no place with satisfactory status – the quality status at all sites was outside the good status: moderate status at five locations (18.5%), poor status at 12 locations (44.4%) and very poor status at 10 locations (37.0%) (Bojana-Reč, Cijevna-Dinoša, downstream from the bridge, Bukovica-above Timar, Lim-Dobrakovo, Bistrica Bjelopoljska-above the Bistrica settlement, Ljubovića-Ribarevina, Bistrica Beranska-below Lubnica, Kutska River-below Kuti, Grlja-Vusanje, above the waterfall, and Ćehotina-Gradac).

An overview of assessments of the environmental status/groundwater potential of all measuring sites based on five elements of the quality and the derived overall quality status (presented by colours in line with the WFD recommendations for groundwater) is given in *Table 2.3.*

Based on all segments of testing of five elements of water quality, which were not conducted in the same number, the same frequency and representation of all measuring sites, the status of groundwater quality was as follows: of 28 tested river sites, the overall water status met the required quality and water status only at one site (3.6%) and the status was good (Mrtvica, central flow), and other sites were outside of the satisfactory status: the status of the water quality at five locations was moderate (17.8%), the status at 12 sites was poor (42.9%) and the status at 10 sites was very poor (35.7%). All quality elements contributed to this situation with various shares: main physical and chemical parameters in 25.0% of cases were outside the good status (7/28); biological elements: phytoplankton in 60.0% of cases (3/5), phytobenthos in 10.7% of cases (3/28) and macrozoobenthos in 100% of cases was outside of the good status (27/27).

The overall quality at seven tested sites of natural lakes (not sampled or macrozoobenthos community was not identified) was outside the required status at all sites: moderate at five sites (Šasko Lake-near the restaurant, Skadar Lake-Moračnik, Centre and Podhum and Plavsko Lake-near the raft), poor at one site (Skadar Lake-Kamenik) and very poor (Black Lake, behind the raft). Various shares of all elements of quality contributed to this situation, except for phytobenthos according to which the lake status had a very good or good status: main physical and chemical parameters contributed as well, but to the lowest extent and in 14.3% of cases was outside the good status (1/7), while the found phytoplankton communities were outside the good status (7/7) in 100% of cases, and the macrophyte status was outside the good status in 83.3% of cases (5/6). Testing on the artificial lake – VVT/JMVT – was carried out for the Plavsko Lake (macrophyte and macrozoobenthos communities were not found)and the quality of the potential was moderate. The identified phytoplankton communities identified are the elements that contributed to this situation.

The assessed quality based on the main physical and chemical elements for five tested sites of mixed waters – river estuary (biological elements were not tested) was good at one site in the area of Škuda mouth to the sea and moderate at the remaining four sites – estuary: Sutorina, Risan River, the brook near Opatovo and Bojana River.

Table 2.3. *Overview of the assessment of the environmental status/potential of groundwater, overall status and the status by elements of the quality of the overall physical, chemical and biological parameters for 2021*

Nazivi vodnih tijela		Površinsko VT	Tip VT	Redni broj	Naziv mjernog mjesta	Ekološki status kvaliteta voda						Ukupni ekološki status / potencijal bez makrozoobentonske zajednice
						Opšti fizičko hemijski parameti	Fitoplankton	Fitobentos	Makrofite	Makrozoobentos	Ukupni ekološki status / potencijal na osnovu 5 elemenata	
1.	Bojana	Bojana 1	R9	1.	Reč	D	U	VD	L	VL	VL	L
2.	Morača	Morača 1	R1	2.	Ljevište- iznad mosta	D	-	VD	VD	L	L	D
		Morača 2	R5	3.	Ispod Manastira	D	-	VD	-	U	U	D
		Morača 3	R5	4.	Međuriječje-Pernica	D	-	VD	-	L	L	D
		Morača 6 (JMVT)	R8	5.	Ispod ušća Cijevne	U	U	VD	L	L	L	L
3.	Cijevna	Cijevna 1	R6	6.	Dinoša- nizv. o mosta	D	D	D	-	VL	VL	D
4.	Zeta	Zeta 4	R8	7.	Vranjske njive	D	-	D	U	L	L	U
5.	Mrtvica	Mrtvica 2	R2	8.	Središnji tok	D	-	VD	VD	-	D	D
		Mrtvica 3	R5	9.	Međuriječje-iznad ušća	VD	-	VD	VD	L	L	VD
6.	Veruša	Veruša 1	R1	10.	Ispod mosta	D	-	VD	L	U	U	L
7.	Tara	Tara 3	R4	11.	Trebaljevo	VD	-	D	L	L	L	L
		Tara 3	R4	12.	Ispod Mojkovca	VD	-	VD	-	L	L	VD
		Tara 4	R5	13.	Crne pode	VD	-	VD	-	L	L	VD
		Tara 4	R5	14.	Đurđevića Tara	VD	-	VD	-	U	U	VD
		Tara 5	R7	15	Šćepan polje	VD	-	D	-	U	U	D
8.	Vrbnica	Vrbnica 2		16.	Ispod mini centrale	D	-	D	D	U	U	D
9.	Bijela	Bijela 1	R1	17.	Gornja Bijela	D	-	D	U	L	L	U
10.	Bukovica	Tušina/Bukovica 1	R1	18.	Iznad Timara	D	-	U	VD	VL	VL	U
11.	Lim	Lim 3	R7	19.	Dobrakovo	U	D	VD	-	VL	VL	U
12.	Bistrica Bijelop.	Bistrica 1	R2	20	Iznad Bistrice	U	-	VD	-	VL	VL	U
13.	Ljubovidja	Ljubovida 3	R5	21.	Ribarevina	U	-	VD	L	VL	VL	L
14.	Bistrica Beran.	Bistrica 2	R4	22.	Ispod Lubnica	D	-	VD	L	VL	VL	L
15.	Perućica	Perućica 1	R1	23.	Jošanica	D	-	VD	-	L	L	D
16.	Kutska rijeka	Kutska Rijeka 1	R1	24.	Ispod Kuti	U	-	U	VD	VL	VL	U
17.	Grlja	Grlja 1	R10	25.	Vusanje, iznad vod.	D	-	VD	VD	VL	VL	D
18.	Ibar	Ibar 2	R4	26.	Bać	U	-	U	D	L	L	U
19.	Čehotina	Čehotina 1	R1	27.	Glava Čehotine	VD	-	VD	-	L	L	VD
		Čehotina 6	R5	28.	Gradac, niz. od mosta	U	U	D	VL	VL	VL	VL
1.	Šasko jezero	Šasko jezero 1	L3	29.	Kod splava	U	U	D	U	-	U	U
2.	Skadarsko jezero	Vučko blatoWB1	L4	30.	Kamenik	D	U	VD	L	-	L	L
		Jugozapad W3	L5	31.	Moračnik	D	U	D	U	-	U	U
		Pelag zona W4	L5	32.	Centar	D	U	-	-	-	U	U
		Sjever WB2	L5	33.	Podhum	D	U	VD	D	-	U	U
3.	Crno jezero	Crno jezero 1	L1	34.	Kod splava	D	VL	VD	U	-	VL	VL
4.	Plavsko jezero	Plavsko jezero 1	L1	35.	Kod splava	D	U	D	U	-	U	U
1.	Pivsko Jezero	Rijeka Piva JMVT	R7	36.	Plužine	D	D	U	-	-	U	U
1.	Hercegnovski Z.	TW 4	T3	37.	Ušće Sutorine	U	-	-	-	-	U	U
2.	Risanski Z.	TW 2	T1	38.	Ušće Risanske rijeke	U	-	-	-	-	U	U
3.	Kotorski Z.	TW 1	T1	39.	Ušće Škudre	D	-	-	-	-	D	D
4.	Tivatski Z.	TW 3	T2	40.	Ušće potoka kod Opatova	U	-	-	-	-	U	U
5.	Rijeka Bojana	TW 5	T4	41.	Ušće Bojane desni rukavac	U	-	-	-	-	U	U

Monitoring of groundwater is being conducted by priorities since 2019 and all sites will be covered in the period of three years. In 2021, testing was carried out in zones or parts of the river basin that have tertiary priority.

2.7. Seismic characteristics

The tectonic and seismic activity in the area of Dinarides, which includes Montenegro, are primarily caused by geodynamic processes in the Mediterranean basin. Tangential pressures from the contact zone between African and Euro-Asian plates are transmitted via the Adriatic micro-plate whose complex rotary and translational movement leads to the concentration of tension in the Dinarides. This process also includes deeper rocks of the Earth crust, sinking of the subduction plate of the Apennines – towards the Tyrrhenian Sea. On the other hand, thick sediment complex of the Adriatic resists the horizontal deformations in the Adriatic region and at the same time causes strong tectonic process in the outer and internal Dinarides. They are often characterised by regional dimensions, with inclination angle towards the land of 20 to 50 degrees relative to the horizontal plane. Transcurrent faults in the Dinarides are mainly created squarely to the previous one and are characterised by relatively small dimensions and very steep slope of the fault plane. They practically allow relative movements of blocks within the large Dinaric mass.

Basically, the entire area of the south Dinarides is seismically active. Hot spots in this area are characterised by very diverse extents of the seismic potential, while the central part of the Adriatic micro plate in the zone of the southern part of the Adriatic is manifested practically as aseismic. The nature and the intensity of seismic activity in this area is expressed best by the map of epicentres of earthquakes that happened in the region over the last five centuries (Figure 2.10.).

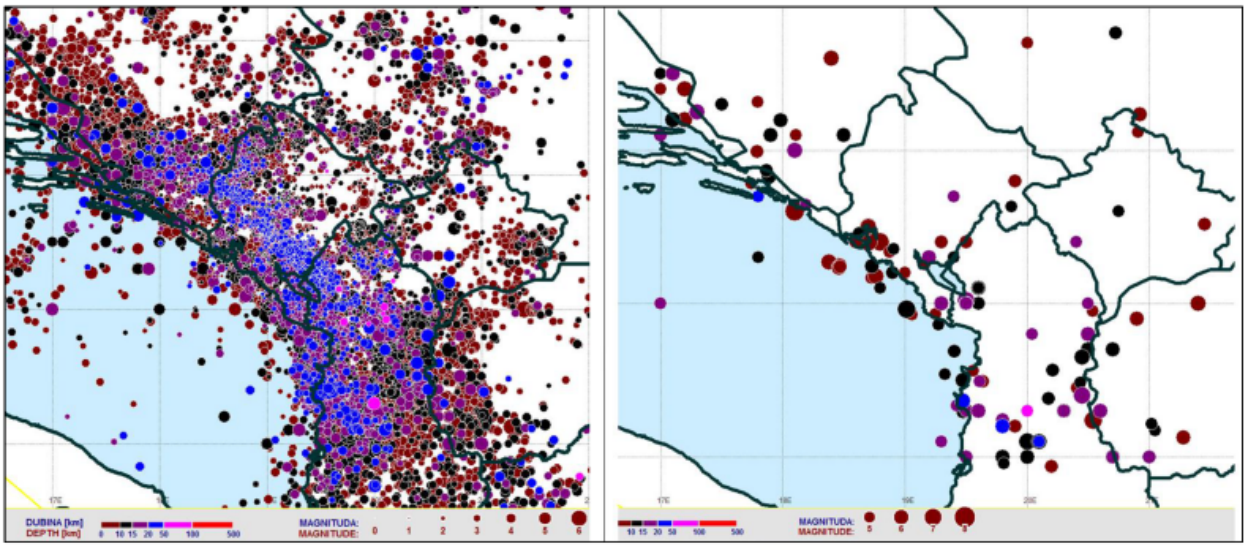


Figure 2.10.

a) b)

Map of epicentres of earthquakes in Montenegro and the immediate surrounding in the period 1944-2021. b) Stronger earthquakes (M>5). According to the legend, the size of symbols on the map indicates its strength, and the colour indicates the depth of epicentres.

It is clear that earthquakes are generated in the entire territory of Montenegro and the surrounding area. Significant seismogenic zones have been identified around Ulcinj and Bar, Budva and

Brajići, and near Boka Kotorska, but also in the immediate vicinity of Berane, the entire region of the Skadar Lake, Maganik, etc. The seismicity in Montenegro is influenced by numerous seismogenic zone – from the area of southern Croatia, eastern Herzegovina, northern Albania and southern and southeast Serbia.

Documents on earthquakes go around fifteen centuries back in the past. Archives in Dubrovnik and Kotor testify frequent and destructive earthquakes that happened in the area between Dubrovnik and Boka Bay between the 15th and the 17th century (in 1563 and 1608, both with destructive intensity of 9 degrees of MSC (*Mercalli-Cancani-Sieberg*) or the magnitude (M) of 6.3 units of the Richter scale; 1667 – an earthquake in the vicinity of Dubrovnik with the intensity of 10 degrees of MCS and 7.4 units of the Richter scale and effects of 8 MCS in the area of Boka and Budva). The earthquake that happened in Skadar and its surrounding in 1905 caused destruction of the intensity of 9 degrees of MCS scale, while destruction was recorded in Podgorica at the time of the intensity of 8 MCS degrees.

The strongest earthquake in the 20th century in this region that happened on 15 April 1979 (at 7.19 h local time) was M 7.0 units of the Richter scale and epicentral intensity of 9 degrees of the MCS scale. The effects of the earthquake were demonstrated across an area of more than 50.000 km^2, including Dubrovnik and also the area of Shkoder and Lezhe in Albania.

Decades between 1980 and 2020 can be characterised as period of seismic “calm” that occurred due to exhaustion of enormous amount of seismic energy in the main earthquake in 1979 and huge sequence of subsequent impacts.

A strong earthquake M 5.0 of the Richter scale that occurred in the surrounding of Plav on 4 January 2018 was the first earthquake in Montenegro that after almost 40 years caused considerable material damage. The epicentral intensity was 7 units of the Mercalli scale. Prior impacts did not happen in case of this earthquake, while a significant series of around 200 earthquakes was registered. The strongest documented earthquake in a wider area of Polimlje happened in 1926 with testimonies of huge rocks breaking off on both sides of Lim, opening of cracks, turbidity/drying out of springs, collapse and damage on houses (Mihajlović, 1927).

The sector study „Natural disasters and risk of technical incidents“ (hereinafter referred to as the „SS ENTRI“, S. Janović, M. Radulović, B. Glavatović, B. Micev, MORT 2018) provides comprehensively the research of seismo-tectonic characteristics of the territory of Montenegro and the affected surrounding, as well as a new regional seismogenic model.

The nature of the mechanism of the origin (epicentre) of earthquakes indicates that faults on the coast, undersea and outside areas of the entire Dinarides are of dominantly reverse nature, which is complementary to dominant compressive nature of the tectonic tension field. Northern parts of Montenegro and the rest of the western Balkans is dominated by the dilatation status of the tension field causing the horizontal type of tectonic faulting that results in the creation of vertical faults (with dominant horizontal sliding of fault blocks). The so-called normal type of tectonic faulting is characteristic for the far northeast of Montenegro.

The study concludes that the undersea and coastal parts of Montenegro have a considerably higher seismogenic potential compared to the northern region. Earthquakes with the magnitude above 6.5 can be expected with high probability in the next period practically in the entire coast, undersea and the immediate hinterland of Montenegro, with a possibility to form larger tectonic ruptures and deformation of the Earth’s crust. The seismogenic potential of the territory of

Montenegro slowly drops towards the inland, so that the expected maximum magnitudes of earthquakes in the far north does not exceed 5.5 (units of the Richter scale).

The construction of hydrotechnical facilities with large artificial reservoirs inevitably increases hydrostatic pressures and causes a considerable change in the status of pore pressures in rocks of the Earth's crust in the wider zones of the reservoir. These tensions are a stimulative "trigger" component for the process of seismic energy release, which we call induced seismicity. The phenomenon almost regularly occurs in large reservoirs in tectonically active regions.

Intense construction of river dams and formation of artificial lakes (40 such facilities in the period 1954-1991) started since mid-fifties of the last century in the region of southern Dinarides which include the territory of Montenegro. The frequency of earthquakes and the entire seismic regime of this wide region has been largely modified and changed. The Mratinje reservoir on the Piva River is a typical example of highly developed induced seismicity. We can say with certainty that the seismic regime of this region has been changed by this reservoir. Opposite to this, the extent to which this regime has been changed compared to the previous natural stateus cannot be completely precisely determined since the establishment of a wide network of seismic stations happened relatively shortly after the first filling of the dam. According to current surveys, the wider area of the Piva reservoir is predisposed to create earthquakes of moderate magnitude – to 5.4 Richter scale (Communication of the Institute of Seismology of Montenegro on seismic activity in the zone of the reservoir of the HPP Piva at the end of 2010 and beginning of 2011).

2.8. Climate characteristics

Climate characteristics means the average status of atmospheric processes – average status of the atmosphere of an area over a longer period of time[10]. Meteorological characteristics give us meteorological information about what the planned purpose of some space can currently "face"[11].

The basic climate condition of a larger area can be reviewed through the Koppen climate classification[12]. However, we must keep in mind the fact that considerably different meteorological features that are characteristic for a region and may be an advantage or disadvantage of the region are possible within one climate of a region.

Climate and meteorological regions

Generally, climate and meteorological regions (CMR) that can be singled out by their rather homogenous characteristics, primarily with typical climate patterns, are the following:

- (CMR1) Coast. Coastal part up to around 500 m.a.s.l.;

[10] A period of 30 years is taken as a climate period. In addition to climate characteristics, which means an average status of the atmosphere, knowledge of meteorological characteristics, i.e. of the current meteorological processes which are inherent for an area, is required. The climate characteristics provide a general picture for the purpose of planning and some very important meteorological characteristics (for PP) "sink in" for the purpose of averaging.

[11] Meteorological characteristics are short in time and very dynamic but have a highly significant impact on space. Meteorological characteristics may last for e.g. around 10 minutes, a couple of hours, one day, three to four days to around 10-15 days.

[12] Koppen climate classification is a generally accepted method and is used worldwide to have an insight into general climate characteristics of a wider region. It comprises determination of climate.

- (CMR2) Mountainous region in the Adriatiic hinterland. A wider mountainous belt from Orjen to Rumija that suddenly descends on the southwest side and mildly on the northeast side, around 500-600 m.a.s.l. to more than 150 m.a.s.l.;
- (CMR3) Central part. Zeta-Bjelopavlići plain and its surrounding (Podgorica, Danilovgrad, Skadar Lake basin) up to around 800-1000 m.a.s.l.;
- (CMR4) Western part. Region of Nikšić, Plužine, Šavnik towards Orjen and Čevo, around 500 m to around 1000-1100 m.a.s.l.;
- (CMR5) Northern region. Valleys, ravines and lowland fragments in the northern and eastern parts at around 600 to around 1000-1100 m.a.s.l.;
- (CMR6) Mountainous part. Central and northern mountainous regions at more than 1000-1100 m.a.s.l.

In line with the formal spatial division of Montenegro into coastal, central and norther regions, it can be said that CMR1 belongs to the coastal region, CMR2, CMR3 and CMR4 belong to the central region, CMR6 and CMR6 belong to the northern region. There is no clear boundary to mark that a climate and meteorological region belongs to a specific region according to the formal regional division of Montenegro.

Main climate characteristics

CMR1. **Situation:** Moderately warm and humid summer, mild winters with maritime type of precipitation which reaches its maximum in the colder season of the year and minimum during summer. No high amplitudes of temperatures with a low probability of severe cold. Favourable, typically local circulation of air, wind comes from the sea during the day and from the land at night. Very strong – northeast windstorm – Bora – in certain meteorological situations, also with a high probability of south windstorm in certain meteorological situations. Extremely high temperatures are not expected along the shore due to local circulation of air, but further from the coast it is likely that high tropical temperatures will reach around 37~40 degrees. The average annual air temperature in this climate region is around 14~16 degrees, the average annual rainfall is around 1400~2200 l/m^2, average maximum snow cover is around 0~20 cm, and the average annual insolation – sunlight – is around 2200~2500 hours.

CMR2. **Situation**: This region has a very specific and original climate and meteorological setting. Quality aeration, clean sea air masses enrich the air of this area, high precipitation, temperatures with rather high amplitude, the annual amplitude may reach around 50 degrees, and daily amplitude in one typically summer day may reach around 20 degrees. High cyclonic rainfall happens in certain meteorological situations, strong windstorm and intense snowfall with formation of a snow cover that can reach the height of around 200 cm. The average annual air temperature in this climate region is around 7~10 degrees, the average annual rainfall is around 2200~5000 l/m^2, the average maximum height of the snow cover is around 50~160 cm[13], and the average annual insolation – sunlight – is around 2000~2300 hours.

CMR3. **Situation:** This CMR is characterised by high tropical temperatures in the summer. Summers are mainly long and dry and warm with high tropical temperatures above 35 degrees, occasionally around 40 degrees. The number of tropical days is high. The average number of tropical days per season has increased substantially in the last ten-twenty years, i.e. it has a tendency of considerable increase. This region is characterised by frequent strong-very strong

[13] MSc Branko Micev, calculations of average maximum snow height for elaboration of the map Climate Atlas of Montenegro, CANU.

north wind which certainly can have storm and destructive character. Strong north wind in the summer is dangerous for agricultural production and very dangerous for breaking out and uncontrolled spreading of fires (wildfire). Winters are mainly mild with dominant absence of snow. The average air temperature in this climate region is around 10~16 degrees, the average annual precipitation is around 1600~2200 l/m^2, the average maximum height of snow cover is around 20~70 cm, and the average annual insolation – sunlight – is around 2200~2400 hours.

CMR4. **Situation:** The climate conditions in this region are rather homogenous and continental, but at the same time modified by mountainous and even maritime influence. Strong gusts of south and north winds happen in certain meteorological situations. This climate region is characterised by precipitation, snow and moderately warm summers and rather cold winters. Spring late-early frost and early autumn frost are highly likely and can have a significant impact on the course of phenological phases of some plant and fruit species. Severe cold is likely during clear summer nights, high rainfall especially in autumn where daily amount may reach around 270~280 l/m^2. The average annual air temperature in this climate region is around 6~12 degrees, the average annual rainfall is around 1800~2400 l/m^2, the average maximum heigh of snow cover is around 80~160 cm, and the average annual insolation – sunlight – is around 1800~2300 hours.

CMR5. **Situation.** Northern lower parts of the valley and ravine are positioned in the zone of large climate and meteorological contrasts with the surrounding. This CMR has the lowest rainfall in the territory of Montenegro. Daily and annual temperature amplitudes are extremely high in this region and range between 50 and 60 degrees at the annual level, and the daily amplitude can reach around 20-25 degrees. “Cold air clouds” filled with fog with extremely strong temperatures inversions are created in this climate and meteorological region, in ravine parts, during winter at clear nights. The lowest temperatures which can go down to around -28 ~ - 32 degrees are found in the lowest parts of ravines, and the temperature can reach around 35~40 degrees in the same areas during summer. The average air temperature in this climate region is in the range of around 6~9 degrees, the average annual rainfall is around 700~1000 l/m^2, the average maximum height of snow cover is around 50~80 cm, and the average annual insolation – sunlight – is around 1700~1900 hours.

CMR6. **Situation.** This CMR has very significant climate and meteorological characteristics from the aspect of resources and spatial planning. This region has continental alpine climate with modification under the Mediterranean influence (warm south-southwest altitude current) which reached Durmitor, Sinjajevina, Bjelasica, Komovi and Prokletije. A part of this region, mostly mountains, have the average annual temperature below zero. The main climate and meteorological characteristic in the CMR is snow, wind and a relatively favourable thermal condition in a rather short time interval in the summer period. The daily temperature in the summer period is around 25 degrees, while it can reach even 30 degrees in extreme meteorological situations. The average annual air temperature in this climate region ranges between around -2 and 5 degrees, the average annual rainfall is around 1400~2200 l/m^2, the average maximum height of snow cover is around 110~200 cm, and the average annual insolation – sunlight – is around 1400~1600 hours.

2.9. Air quality

The air quality in Montenegro has been monitored continuously since the middle of 2009 in accordance with European standards of air quality transposed into the Montenegrin legislation.

An optimal territorial coverage with the data on air quality has been established in accordance with the Regulation establishing the network of measuring stations for monitoring over the air quality (Official Gazette of Montenegro 44/10, 13/11, 64/18). The defined measuring points are representative, both from the aspect of the type of the measuring station and the compatibility with other macro and micro locations within the same air quality zone.

In accordance with the Regulation, the territory of Montenegro is divided into three zones (Table 1.), which are determined by the preliminary air quality assessment relative to the boundaries of assessment of pollutants on the basis of available data on concentrations of pollutants and modelling of the existing data. Boundaries of air quality zones coincides with outer administrative boundaries of municipalities located within these zones.

Table 2.4. Air quality zones

Air quality zone	Municipalities within zones
Northern air quality zone	Andrijevica, Berane, Bijelo Polje, Gusinje, Pljevlja, Kolašin, Mojkovac, Petnjica, Plav, Plužine, Rožaje, Šavnik and Žabljak
Central air quality zone	Podgorica, Nikšić, Danilovgrad and Cetinje
South air quality zone	Bar, Budva, Kotor, Tivat, Ulcinj and Herceg Novi

The Rulebook on manner and conditions for air quality monitoring (Official Gazette of Montenegro 21/11) provides for the manner of air quality monitoring and data collection, as well as the reference measuring methods, the criteria for achieving data quality, ensuring data quality and their validation.

During 2021, measurements were carried out at nine locations within the national network for air quality monitoring (Pljevlja 2 – Gagović property, Gradina, Bijelo Polje, Podgorica 2 – Block V, Podgorica 3 – roundabout Zabjelo, Podgorica 4 – Gornje Mrke, Nikšić 2, Bar 3 and Kotor). Pursuant to Article 14 of the Law on Air Protection, local self-government units can establish a network for air quality monitoring in their territories. The Capital Podgorica continued good practice and conducted air quality monitoring at four locations in the narrow and wider city area in 2021.

The Environment Protection Agency is continuously publishing air quality data, both on its website – real time data, and monthly reports.

The air quality assessment was carried out in accordance with the Regulation on determining the types of pollutants, limit values and other standards for air quality (Official Gazette of Montenegro 45/08, 25/12).

The analysis of air testing in 2021 shows the following[14]:

Northern air quality zone: Improvement of air quality was noted in 2021 compared to 2020 in terms of the concentration of sulphur(IV)oxide at the measuring point in the urban zone of Pljevlja. There was no exceedance of the limit value for mean daily concentrations of 125 $\mu g/m^3$, while 13

[14] Environment Protection Agency (EPA), Information about the condition of the environment in 2021, Podgorica, 2022.

mean hourly values of sulphur(IV)oxide were above the prescribed limit value of 350 μg/m^3 (24 is permitted). On the measuring station where 10 mean hourly values of sulphur(IV)oxide were above the prescribed limit value of 350 μg/m^3 in 2021, and all daily mean values were below the low limit of assessment for health protection. The annual mean value was below the upper limit of assessment for the protection of ecosystem.

All hourly mean values of nitrogen(IV)oxide were below the prescribed limit value (200 μg/m^3), and the mean annual concentration which was also below the limit value (40 μg/m^3) at all measuring points of the northern region.

Maximum eight-hour mean daily concentrations of ozone at the measuring station Gradina were below the prescribed target value.

Maximum eight-hour mean annual concentrations of carbon(II)oxide – CO were below the prescribed limit value for the protection of health at measuring points in Pljevlja and Bijelo Polje.

In 2021, mean daily values of PM_{10} particles at the measuring station Gagović property in Pljevlja (UB) were above the prescribed limit value over 114 days (35 days is permitted). The mean annual value of PM_{10} suspended particles at this location was also above the limit value of 40 μg/m^3 and was 50 μg/m^3. Mean daily values of PM_{10} suspended particles at the measuring station in Bijelo Polje were above the prescribed limit value of 50 μg/m^3 over 97 days. The annual mean concentration of PM_{10} particles also exceeded the limit value and was 42 μg/m^3. It can be stated on the basis of the results that the ambient air is largely burdened by PM_{10} suspended particles that exceed all prescribed limit value in Pljevlja and Bijelo Polje.

Mean annual concentration of $PM_{2.5}$ particles in Pljevlja was 37 μg/m^3, in Bijelo Polje 32 μg/m^3, which is above the prescribed limit value (20 μg/m^3).

The content of lead at the measuring stations in Pljevlja and Bijelo Polje, counted as the mean value of weekly samples, was below the prescribed limit value. At the same time, analyses of samples of PM_{10} suspended particles was carried out for the content of arsenic, cadmium and nickel. The results of the analysis show that the content of cadmium, nickel and arsenic was below the target value prescribed for the protection of human health.

The mean annual values of the content of benzo(a)pyrene of 3 μg/m^3 in Pljevlja and 4 μg/m^3 in Bijelo Polje exceed the prescribed target value (1 μg/m^3).

The analysed data indicate a serious problem with air quality in the northern zone during summer months or during heating season. Despite a slight improvement of the quality of air in Pljevlja ravine from the aspect of the presence of sulphur(IV)oxide and $PM_{2.5}$ particles compared to the previous year, the data still indicate a considerable pollution of the ground layer of the atmosphere over a period of almost seven months (January – April, October – December). The situation is similar in other parts of the northern zone for which a milestone is the measuring station installed in Bijelo Polje. The lowest quality of air is registered in the period January – March and end October-December, which coincides with the period with the most activity of individual and collective furnaces, i.e. with the heating season.

Central air quality zone: All measured hourly and mean daily concentrations of sulphur(IV)oxide, considered in relation to the limit values, were below the prescribed limit value of 350 μg/m^3 for the hourly value and 125 μg/m^2 for mean daily value.

All hourly mean concentrations of nitrogen(IV)oxide (NO_2) at all measuring points were below the prescribed limit value (200 $\mu g/m^3$), except at the measuring station in Podgorica, roundabout Zabjelo, where two hourly mean values of NO_2 were above the limit value (200 $\mu g/m^3$ – must not be exceeded more than 18 times a year). Although the permitted number of exceedances of hourly concentration of NO_2 was not exceeded, the presence of increased concentration of this pollutant is obvious at this location, which is to be expected bearing in mind the frequency of traffic in the vicinity of the measuring station and the most frequent origin of this pollutant – traffic. The mean annual concentration of nitrogen(IV)oxide – NO_2 was below the limit value for the protection of health (40 $\mu g/m^3$) at all measuring points, except at the measuring station Podgorica, roundabout Zabjelo, where the concentration of 42 $\mu g/m^3$ was measured (limit value is 40 $\mu g/m^3$).

Maximum daily eight-hour mean values of ozone at the measuring station of Gornje Mrke were above the target value during six days. Target values for ozone at the measuring stations in Nikšić were not exceeded.

Maximum eight-hour mean annual concentrations of carbon(II)oxide – CO_2 were below the prescribed limit value for the protection of health (Nikšić and Podgorica 3, roundabout Zabjelo).

Mean daily concentrations of PM_{10} suspended particles in Podgorica (at the measuring point Podgorica Zabjelo (UT)) were 70 days above the prescribed limit value (50 $\mu g/m^3$), 56 days at the measuring point Podgorica Block V (UB), and 62 days in Nikšić. The permitted number of exceedances is 35. The annual mean concentrations of PM_{10} suspended particles at these locations did not exceed the prescribed limit value of 40 $\mu g/m^2$.

Mean annual concentrations of $PM_{2.5}$ particles of 23 $\mu g/m^2$ in Nikšić and 21 $\mu g/m^3$ in Podgorica (at the measuring point Podgorica 2 Block V) were above the prescribed limit value (20 $\mu g/m^3$).

Mean annual values of the content of lead, cadmium, arsenic and nickel in PM_{10} suspended particles at the measuring stations Nikšić and Podgorica 3, roundabout Zabjelo (UT) were below the prescribed limit and target values.

The analysis of PM_{10} suspended particles was carried out for the content of benzo(a)pyrene and other relevant polycyclic aromatic hydrocarbon (PAH): benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indene(a,2,3-cd)pyrene and dibenzo(a,h)anthracene and other PAHs for which air quality standards are not prescribed, but only emission control measures.

The concentration of benzo(a)pyrene, calculated as the mean value of weakly samples at the measuring point in Nikšić, was above the target mean annual value (1 $\mu g/m^3$) that is prescribed for the protection of human health and amounted to 3 $\mu g/m^3$. The exceedance of the target mean annual value of this pollutant was also registered at measuring stations in Podgorica. The measured value was 2 $\mu g/m^3$.

Compared to 2020, the quality of air in the central zone was better. This improvement was not sufficient, as the number of days with exceedances of mean daily concentration of PM_{10} particles in the air was still above the permitted ones (at the measuring station Podgorica 3, roundabout Zabjelo, the number of days with exceedances was two times above the permitted number).

South air quality zone: All measured values of sulphur(IV)oxide – SO_2, compared to the limit value for the protection of health (hourly and daily mean values), were considerably below the prescribed limit values of 350 $\mu g/m^3$ or 125 $\mu g/m^3$.

The concentration of PM_{10} suspended particles was below the prescribed values for the mean annual concentration.

The mean annual concentration of $PM_{2.5}$ particles was below the prescribed limit value (measuring station in Bar).

All maximum eight-hour mean values of ozone were below the prescribed target value (measuring station in Bar).

The mean annual maximum eight-hour value of carbon(II)oxide was considerably below the prescribed limit value of 10 mg/m^3 (measuring station in Kotor).

Suspended particles PM_{10} were analysed at annual level for the content of heavy metals, benzo(a)pyrene, pollutants for which standards for air quality are prescribed and other relevant polycyclic aromatic hydrocarbons: benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indene(a,2,3-cd)pyrene and dibenzo(a,h)anthracene and other PAHs for which standards for air quality are not prescribed, but only control measures.

The annual mean concentration of lead was considerably below the limit value. Mean annual values for the content of lead, cadmium, arsenic and nickel in PM_{10} suspended particles at the measuring stations in Bar and Kotor were considerably below the prescribed limit and target values.

The content of benzo(a)pyrene of 0.3 $\mu g/m^3$, as the mean annual value of weakly samples, at the locations in Bar and Kotor as below the prescribed target value for the protection of human health of 1 $\mu g/m^3$.

2.10. Biodiversity

The diversity of environmental factors (climate, pedological, edaphic, orographic, hydrological), and the refugial character of the Balkan Peninsula during the Ice Age have enabled the development of a very rich biodiversity.

In accordance with this, despite the small size, Montenegro is characterised by rich biodiversity, both species and genetic and ecosystem.

Overview of flora, vegetation and internationally important habitats

Flora

Based on the data published so far, it is assessed that around 3600 species and sub-species of vascular plants grow on the territory of Montenegro. Since a new plant species is published in the territory of Montenegro every year, this certainly is not the final number. If flora richness of an area

is expressed by the number of species per unit of space, Montenegro then takes the first place among European countries.

Endemic plants, the species protected by national legislation and the ones that are recognised in international documents as important for protection stand out in the flora of every country. Slightly over 10% of the Montenegrin flora is composed of Balkan endemic species, the species whose area does not go beyond the boundaries of the Balkan Peninsula. High alpine endemism is dominant in Montenegro and in the entire Balkans, so that most of endemic species have not been jeopardised by urbanisation.

The latest list of protected plant and animal species of Montenegro comprises 300 plant species and sub-species. An aggravating circumstance in the definition of protection measures and making recommendations while elaborating spatial planning documents for these plants is the lack of IUCN categories of vulnerability (vulnerability categories are known for a small number of species). Internationally important species in the flora of Montenegro are the plants that are on the European Red List, the Bern Convention, CITES Convention, Habitat Directive. The plants that grow on the territory of Montenegro and included in these documents fall under the NT category (Near Threatened), LC (Least Concern) and DD (Data Deficient). The species with these statuses are considerably less important compared to the ones which have been allocated a vulnerability level. Only two species of the Montenegro flora are designated as threatened: *Cerastium dinaricum* Beck & Szysz, (VU-vulnerable), *Najas flexilis* (Wild) Rostk. & Schmidt (VU-vulnerable). It should be pointed out that EU countries were in the focus in the collection of data for the preparation of the European Red List, so many vulnerable species which grow in the territories of non-EU countries are omitted. By ratification of the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats) Montenegro committed to ensuring protection of species which are included in this Convention and grow on the territory of the country. The species which are included in the Bern Convention are also protected by the national legislation, with the exception of *Eleocharis carniolica* W. D. J. Koch because this species was discovered recently in Montenegro. Of 81 plant species which are included in the CITES Convention and are elements of our flora, 79 are protected by the Law on Nature Protection.

Vegetation and internationally important habitats

The vegetation setting in Montenegro is very complex. In addition to zonal types of vegetation which are a result of general climate conditions, diverse types of azonal, intrazonal and extra zonal vegetation occur as a result of specific environmental factors in a habitat. An overview of the most important types of vegetation, i.e. those with wider distribution or those that are important from the aspect of the Habitat Directive, is provided below.

Forest vegetation in the Mediterranean is most often represented by degradation stages, while well-preserved stands of forest vegetation are rare.

Climatogenic (zonal) vegetation of the first belt, from the seashore to around 300 m.a.s.l. (350 m.a.s.l.), in the Mediterranean region is represented by evergreen hard-leaved forests. There is a very small sites in the Mediterranean with this type of vegetation which is nowadays replaced by degradation stages – the first degradation stage maquis or the next one in the form of stonesteppe or rocky pastures. This is the situation in Montenegro and small stands of preserved hard-leaved forests can be found only sporadically in the foot of southern slopes of Rumija (between Bar and Ulcinj).

In the most part of the Montenegrin coast maquis is represented by the plant community whose edifiers are flowering ash (*Fraxinus ornus*), evergreen oak (*Quercus ilex*) and myrtle (*Myrtus communis*). Maquis is dominated by shrubs, while trees are rarely observed. An interesting maquis community, which is very rara on the Adriatic coast of the Balkan Peninsula, is found in the surrounding of Ulcinj. Its edifiers are kermes oak (*Quercus coccifera*) and ash (*Fraxinus ornus*). Although the community in the surrounding of Ulcinj (the best stands have developed on Bijela Gora and Pinješ) is not widespread, these stands belong to the better developed stands of kermes oak on the Adriatic coast. This vegetation is developed as low maquis with the best expressed canopy of shrubs.

An interesting azonal type of forest vegetation on the Montenegrin coast are chestnuts forests that are developed in Boka Kotorska (Stoliv, Lepetane, area above Tivat, Kostanjica between Morinj and Kamenari, Savina). They belong the community of *Lauro-Castanetum sativae* and their stands are found at low altitudes of only around ten metres above sea level to maximum 200 m. *Erica arborea* has an important environmental and phytocoenological role in thinned communities of chestnut and laurel. Chestnut forest stands in Donji Stoliv are dense and well-preserved.

Thermophile broadleaved forests and shrubs in northern expositions go down to the seashore, while they are found above evergreen hard-leaved vegetation in south expositions. Thermophile broadleaved forests are represented by a large number of plant communities where the most widespread are the ones in which oriental hornbeam (*Carpinus orientalis*) is an edifier or an important constituent. The community whose edifiers are butcher's broom and oriental hornbeam (*Rusco-Carpinetum orientalis*) and its degradation stages are widespread. Layers in the typical form of this community are well-expressed, where canopies are dominated by the following species: oriental hornbeam (*Carpinum orientalis*), pubescent oak (*Quercus pubescens*), black ash (*Fraxinus ornus*), the most frequent species in shrub layers are the following: oriental hornbeam (*Carpinus orientalis*), stone lime-tree (*Phyllirea media*), myrtle (*Myrtus communis*), hawthorn (*Crataegus monogyna*), ashes (*Acer monspessulanum, Acer campestre*). The following occur in the layer of herbaceous plants: rough bindweed (*Smilax aspera*), ivy (*Hedera helix*), tuberous comfrey (*Symphytum tuberosum*), old man's beard (*Clematis vitalba*), *Vincetoxicum huteri …* This community is represented in the Mediterranean zone by a sub-community in which myrtle (*Rusvo – Carpinetum orientalis subas. Myrtetosum*) is the differential species and tree canopy is poorly developed.

On south slopes of the coastal Dinarides (Orjen, Lovćen, Rumija), the oriental hornbeam belt continues into the hop hornbeam belt (*Ostrya carpinifolia*) in which Turkey oak forests (*Quercus Cerris*) and Macedonian oak forests (*Quercus trojana*) occur. These forest types are widely distributed in the sub-Mediterranean and the central part of the country.

Natural forests of Skadar common oak that occur in the floodplains of the Mediterranean and sub-Mediterranean rivers on the south of Montenegro are the communities of broadleaved forests that are specific for the Mediterranean and sub-Mediterranean area of Montenegro. Common oak (*Quercus robur subsp. scutariensis*) is a thermophile Mediterranean sub-species of common oak. In Montenegro, it is found on the north shore of the Skadar Lake (Gostilje Village) where it grows in a community with narrow-leaved ash (*Fraxinus angustifolia*) and silkvine (*Periploca graeca*). This sub-species is widespread on the territory of Velika Plaža near Ulcinj. Natural humid forests of Skadar oak with oriental hornbeam (*Robureto-Carpinetum orientalis*) are found along the River Bojana at a distance of 200-300 m from the sea.

The interesting type of azonal broadleaved forests of the Mediterranean and sub-Mediterranean area also include Hungarian oak forests (*Quercus conferta*) from the surrounding area of Ulcinj

(Zoganj, Kolonza, Donja and Gornja Klezna, Možura), which belong to the community *Rusco aculeati – Quercetum frainetto – cerris*. Important constituents of these forests are the following: Turkey oak (*Quercus cerris*), Hungarian oak (*Q. frainetto*), butcher's broom (*Ruscus aculeatus*), spiny asparagus (*Asparagus acutifolius*), oriental hornbeam (*Carpinus orientalis*), turpentine tree (*Pistacia terebrinthus*), *Cornus sanguineus, Acer monspesulanum*.

A large number of types of vegetation created by degradation of forests and further degradation of maquis are found on the Montenegrin coast. These are stonesteppes of various phytocoenological classes, meadows (created by clearing of forests), rocky pastures represented by a large number of plant communities. Stonesteppes are dominated by bushes (usually up to 1 m high) which are scattered and with low coverage. Regardless of harsh conditions of life (summer drought, poor soil), this type of habitats is characterised by rich flora. *Erico-Cystetum cretici*, a community of tree heath and shrubs, is a community of stonesteppes with wide distribution on the Montenegrin coast. It is dominated by the following bushes: tree heath (*Erica arborea*), shrubs (*Cistus creticus ssp. eriocephalus*), buckthorn (*Frangula rupestris*), myrtle (*Myrtus communis*), Jerusalim thorn (*Paliurus spina christi*), pomegranate (*Punica granatum*), Phoenician juniper (*Juniperus phenicea*). The stonesteppe community dominated by thorn (*Paliuretum adriaticum*) via which the community of oriental hornbeam and butcher's broom (*Rusco-Carpinetum orientalis*) attaches indirectly to the zone of evergreen oak forest. The layer of trees is missing from the community of Jerusalim thorn, and it can be found only as scattered individual trees on some sites. The layer of bushes is developed best and in some places has a cover of up to 90%. The layer of bushes is dominated by Jerusalim thorn (*Paliurus spina christi*), Spanish broom (*Spartium junceum*), common hawthorn (*Crataegus monogyna*) …

Communities of grasslands and rocky pastures is the final stage of degradation of thermophile Mediterranean and sub-Mediterranean forests. This type of vegetation includes various grass biotopes, but they are all characterised by a small quantity of water sediment and nutrients. The best stands of this type of habitat in the coastal zone are developed between Budva and Tivat, on Luštica and Vrmac, above the Old Bar and in the surrounding of Ulcinj. There is a recent trend of reduction of areas under this type of habitats, which is the main reason of its occurrence and maintaining of pastures, and the livestock population in the Mediterranean part of Montenegro is declining in recent years.

More than 30 types of NATURA 2000 sites have been identified in the Mediterranean area of Montenegro. The following habitats connected to beaches and their hinterland are particularly vulnerable: 1140 Muddy and sandy bottoms which are not covered by seawater during tides, 1210 Annual vegetation on nitrified gravel dunes, 2240 Dune pastures with annual species, 3170* Mediterranean occasional puddles, etc. Most of vulnerable (rare, rather devastated) NATURA 2000 habitats which are connected to beaches and their hinterlands are located on Velika Ulcinj Plaža and Ada Bojana. The richest biodiversity is found in 6430 Mediterranean high hydrophile meadows (*Molinio-Holoschoenion*), 6220 Euro-Mediterranean xerophile grasslands (*Thero-Brachipodietea*), while forest Mediterranean habitats with small areas are covered by: 91F0 lowland hygrophile forests of English oak (*Quercus robur*), narrow-leafed ash (*Fraxinus angustifolia*) and common elm (*Ulmus campestris*), 9260 chestnut forests, 9280 Mediterranean Hungarian oak forests, 9340 Holm oak forests (*Quercus ilex*), etc.

The already mentioned community of oriental hornbeam and butcher's broom (*Rusco-Carpinetum orientalis*) is widely distributed in the sub-Mediterranean area, and it is represented in the sub-Mediterranean area by the sub-community *Rusco-Carpinetum orientalis subas. Quercetosum* where the layer of trees is developed better than in the Mediterranean sub-community.

Considerable areas are also covered by thermophile oak forests which the belt of hop hornbeam (*Ostrya carpinifolia*) is attached to and turns into a beech belt at higher altitudes.

Evergreen oak or Macedonian oak (*Quercus trojana*) occurs as an element of various communities in a wide height range, starting from 50 m.a.s.l. to 700 m.a.s.l. It is a characteristic species of the sub-community *Rusco-Carpinetum orientalis subas. Quercetosum*, Blečić et Lakušić, which is most often widely distributed as shrubs in the sub-Mediterranean zone of Montenegro. Forests and shrubs of this oak are attached to the belt of evergreen oak or to extra zonal forests of Hungarian oak forests or English oak forests. In addition to the Macedonian oak, the following species have an important role in the layer of trees: *Fraxinus ornus, Acer monspessulanum, Carpinus orientalis, Pistacia terebrinthus, Quercus cerris*. The layer of herbaceous plants is composed of: Primula *vulgaris, Anemone apenina, Silene italica, Carex flacca, Symphytum tuberosum* …

Bitter oak forests (*Quercetum cerridis mediterraneo-montanum*) are most often found in the belt of hop hornbeam and cover the height range from 700 to 1300 (1500) m.a.s.l. The Mediterranean-montane hornbeam community most often borders the community of *Seslerio-Ostryetum carpinifoliae* which has a similar floristic composition. They are found in mosaics on some sites, whereby the Mediterranean-montane hornbeam forests occupy thermophile habitats compared to hop hornbeam and autumn moor grass forests. The layer of trees in bitter oak forests is composed of the same species as in the community of hop hornbeam and autumn reed. The main difference is that *Quercus cerris* in bitter oak forests is very dominant in the layer of trees.

Bitter oak and autumn moor grass forests (*Seslerio-Ostryetum carpinifoliae*) cover large area in Montenegro between the oriental hornbeam belt and (thermophile oaks) and the beech belt. The layer of trees is floristically poor. The main constituents are hop hornbeam (*Ostrya carpinifolia*) and bitter oak (*Quercus cerris*) and beech (*Fagus sylvatica*) occurs occasionally at higher altitudes. The tree cover in well-preserved stands, usually those that are not easily accessible to people, exceeds 80%, while it is below 50% in some other degraded stands.

Beech forests of the sub-Mediterranean area belong to the thermophile variant of beech forests which is represented by the community *Seslerio autumnalis-Fagetum sylvaticae*. These forests form a belt on the coastal Dinarides, but reach inside of the Piva and Tara canyons. Layers in this community are well-expressed, where *Fagus sylvatica* as an edifier defines conditions in lower layers. Hop hornbeam (*Ostrya carpinifolia*) occurs as an important constituent in the layer of trees in lower parts of the beech forest belt to around 980 m.a.s.l. Beech is absolutely dominant at higher altitudes, and *Acer obtusatum* rarely occurs. The floristic composition of the shrub layer is slightly more diverse compared to the layer of trees. Beech occurs as the most important elements, and other species are registered more often: *Fraxinus ornus, Viburnum lantana, Crataegus monogyna, Lonicera alpigena*. Autumn moor grass (*Sesleria autumnalis*) is the characteristic species for the community and is dominant in the layer of herbaceous plants.

The highest forest belt on the coastal Dinarides if formed by white-bark pine forests (*Pinetum heldreichii mediterraneo-montanum, Fritillario-Pinetum heldreichii*), which are largely degraded. It shows prominent domination of Balkan endemic plant species followed by sub-Mediterranean species. *Lonicera formanekiana, Viburnum maculatum, Senecio visianianus, Thymus balcanus, Festuca vallesiaca, Globularia bellidifolia*, etc. occur.

NATURA 2000 habitats that are identified in the sub-Mediterranean area are: 62A0 East sub-Mediterranean dry grasslands, 6430 Hydrophilous tall herb fringe communities, 91K0 Ilirian beech forests, 9250 *Quercus trojana* forests, 9260 *Castanea sativa* woods.

Beech forests in the central, northern and eastern parts of Montenegro occupy terrains of different elevations and all expositions. Sometimes they are linked to open and exposed habitats, and sometimes they occupy steep, sheltered shaded slopes and inlets, or even gorges and canyons where impacts of general climate and mitigated towards higher relative air humidity, slight fluctuations of humidity and reduced summer midday temperatures.

Montane beech forests (*Fagetum moesiacae montanum*) occupy vast areas and form a separate forest belt above oak forests which at places reached width of more than 1200 m. They are distributed in central and continental Dinarides in Montenegro, form a belt between mesophile oak and hornbeam forests on the lower side, and beech and fir forests on the upper side. They occupy different types of parent substratum and soil, and netrophilic-basophilic and acidophilic forests are identified based on the substratum.

Beech and fir forests (*Abieto-Fagetum moesiacae*) are distributed in the central and northern Montenegro and form a belt of up to 600 m width. Edifiers of this community are beech and fir and spruce (*Picea abies*) joins in the continental Dinarides.

Moesian beech and mountain maple forests (*Fageto-Aceretum visianii*) are developed in the sub-alpine belt of the mountains of Durmitor and Prokletije sector. They occur in the range between around 1400 and 1800 m.a.s.l., at all expositions and different slopes, and the geological background is created by Mesozoic limestone. The physiognomy of this phytocoenosis on the mountains of the Durmitor sector is most often determined by beech – its dwarfed trees that are bent towards the bottom, while montane maple is considerably less represented. The situation is reverse on Bjelasica and the mountains of the Prokletije sector and on some sites that belong to the Durmitor sector – the physiognomy of the phytocoenosis is determined by montane maple.

Sub-alpine beech forests (*Asyneumo-Fagetum moesiacae*) occupy vast areas of southeast Dinarides, in the sub—alpine belt, between 1500 and 1800 m.a.s.l. at all expositions and elevations between 10^0 and 40^0. The physiognomy of the phytocoenosis is determined by the sub-alpine beech form, which is dominant in the layer of low trees and bushes. Fir joins occasionally beech in the layer of bushes at the lower boundary of this belt.

The above types of beech forests belong to the NATURA 2000 habitat 91K0 Ilirian beech forests.

Floristically, acidophilic forests *Luzulo-Fagetum s. lat.* are highly uniform and their composition is very similar throughout Europe. The main difference is the presence of some boreal species in the central Europe and some Balkan and southeast flora elements in the territory of former Yugoslavia and in Montenegro. They occupy larger areas in the western part of former Yugoslavia. They grow on non-carbonate rocks of various chemical composition. Two types of this community are indicated in montane and sub-alpine belt of Montenegro. Acidophilic beech forests stand out as a separate type of NATURA 2000 habitats 9110 Acidophilic beech forests (*Luzulo-Fagetum*).

Black pine forests are identified on Durmitor, in Tara and Piva canyons, on mountains around Nikšić (Vojnik, Golija, Ledenica, Njegoš), in the surrounding of Pljevlja. They belong to the NATURA 2000 habitat 9530* (sub)Mediterranean pine forests with endemic black pine.

Spruce forests occupy mainly flat and slightly elevated habitats with deeper humus profile. Montenegro has almost clear spruce forests, but also the forests in which spruce is mixed with fir, rarely while pine and beech. In the layer of bushes, which is usually underdeveloped, in addition to offsprings of the layer of trees, there are common juniper (*Juniperus communis*), rowan (*Sorbus aucuparia*), mountain rose (*Rosa penduline*). European blueberry (*Vaccinium myrtillus*), greater

woodrush (*Luzula sylvatica*), *Melampyrum sylvaticum*, etc. are frequent elements of the layer of herbaceous plants in spruce forests. The layer of moss is often well-developed, and a characteristic species of spruce forests in this layer is *Lephozia lycopodioides*. Spruce forests are recognised in the European Union countries as important for protection, and the Habitat Directive granted them the code 9410 Acidophilic montane spruce forests (*Vaccinio-Piceetea*).

There are several different variants of white-bark pine in Montenegro: *Pinetum heldreichii mediterraneo-montanum* includes forests in the maritime Dinarides and on the mountains around Nikšić, *Pinetum heldreichii bertiscum* includes forests on Prokletije and Komovi, while the geographic variant of *Pinetum heldreichii continentale* is present on Bjelasica and Sinjajevina. Mediterranean-montane forests of white-bark pine occur in the range from around 1200 m.a.s.l. to around 1800 m.a.s.l., while continental forests occur in the altitude range between 1500 m.a.s.l. and 2000 m.a.s.l. White-bark pine forms clear stands or Macedonian pine (*Pinus peuce*), black pine (*Pinus nigra*), beech (*Fagus sylvatica*) joins it. Macedonian pine forests are developed on the mountains of Prokletije sector, from around 1500 m.a.s.l. to around 2000 m.a.s.l. White-bark pine and Macedonian pine forests are covered by the Habitat Directive as 95A0 High oro-Mediterranean white-bark pine and Macedonian pine forests.

Analysis of forest status

Forests are one of the main natural resources of Montenegro. According to the Forest Law of Montenegro (Official Gazette of Montenegro 74/10 and 75/15), forests are property of general interest, and the principle of durability is set as the basis. Forests and forestland enjoy special attention, which is achieved through:

- permanent conservation and improvement of forests and forestland and their functions;
- sustainable and multifunctional forest management;
- preservation and improvement of biological and landscape forest diversity and the quality of their environment.

The purpose of forests is defined by the forest development plan for a forest area. Forest complexes for which valid planning documents do not exist are designated as unplanned forests, i.e. the forests without defined priority purpose (Figure 2.11.).

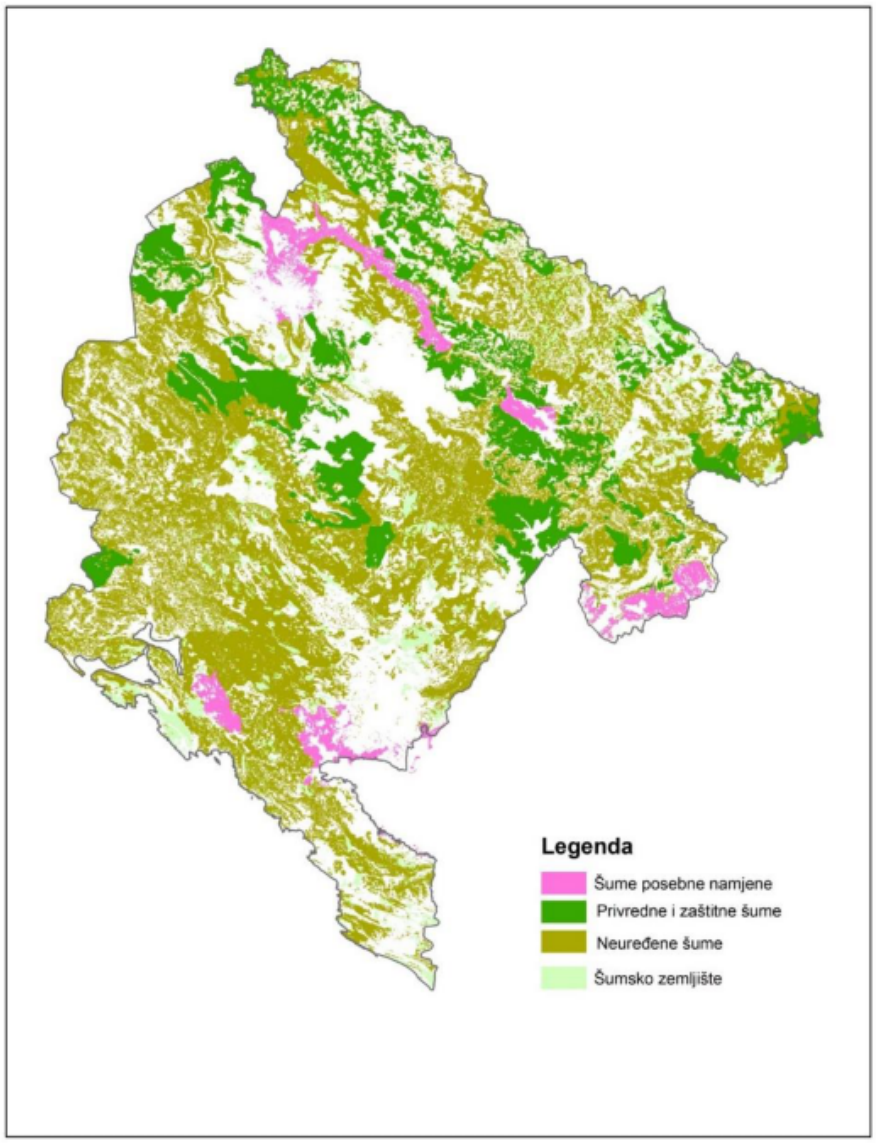


Figure 2.11. Map of forest use (based on currently available data)

Based on the forest cover, Montenegro belongs to top European countries. Of the total territory of Montenegro, considering statistical data of the National Forest Inventory adopted in 2008, a total of 45% of the territory (621.609 ha) is under forests. Forestland, which includes shrubs, bushes, maquis and stonesteppes according to international definition, covers 9% in total (123.000 ha), which altogether amounts to 54% (743.609 ha) of the total territory of Montenegro.

Another insight into the forest cover of Montenegro can be found in FRA (Forest Resources Assessments) reports and FAO (Food and Agriculture Organisation of the United Nations) by individual periods and are generated by an analysis of data in the period 1990-2010. According to this source, forests cover 39.3%, forestland 12.7% and together 52% of the territory of Montenegro.

According to the data extracted from LANDSAT images, forests cover 50.8% (705.605 ha), forestland 7.4% (102.712 ha) and together 58.1% of the territory of Montenegro.

Differences are obvious when it comes to data of the Real Estate Administration – REA, and the data published in statistical yearbooks of the Statistical Office of Montenegro according to which areas under forests account for 621.000 ha.

Numerous forest communities resulting from climate (climatogenic forests) and orographic-edaphic factors (climate-regional forests) are differentiated on the horizontal and vertical profiles. Besides the main forest communities, there a set of transitional ecosystem forms on micro locations. Differences in the composition of individual communities and their structural characteristics on a habitat differentiate and form the basis for defining spatial components of natural segments in general, including forests.

Table 2.5. Growing stock of Montenegro by individual forest types (NFI)

Forest type	Forest area (P)	P %	Trees / ha	Volume (V) 1000 m^3
1. Willow and poplar forests (*Salix sp, Populus sp*)	3939.1	0.5	521.0	228.6
2. Hungarian oak forests (*Quercus frainetto*)	2891.7	0.4	1126.0	297.8
3. Holm oak forests (*Quercus ilex*)	1011.0	0.1	1613.0	22.6
4. Oriental hornbeam forests	19115.7	2.6	1547.0	552.6
5. Macedonian oak forests (*Quercus trojana*)	6114.4	0.8	764.0	132.8
6. Pubescent oak forests (*Quercus pubescens*)	29483.9	4.1	839.0	739.4
7. Bitter oak and pubescent oak forests (*Qu. cerris and Qu. pubescens*)	35858.9	4.9	908.0	1088.4
8. Bitter oak forests (*Quercus cerris*)	53255.8	7.3	864.0	3150.3
9. Sessile-flowered oak forests (*Quercus petraea*)	6655.5	0.9	842.0	663.8
10. Sessile-flowered oak and bitter oak forests (*Qu.petraea and Qu.cerris*)	14835.0	2.0	996.0	1573.4
11. Sessile-flowered oak and hornbeam forests (*Qu. petraea and Carpinus betulus*)	8057.8	1.1	1271.0	1003.9
12. Hornbean forests (*Carpinus betulus*)	10521.1	1.4	1318.0	982.3
13. Hop hornbeam forests (*Ostrya carpinifolia*)	7148.4	1.0	1364.0	331.4
14. Hop hornbeam and flowering ash forests (*Ostrya carpinifolia*)	76775.5	10.6	1121.0	1907.9
15. Beech and hop hornbeam forests (*Fragus moesiaca and Ostrya carpinifolia*)	14652.2	2.0	1134.0	1555.1
16. Beech and sessile-flowered oak forests (*Fagus moesiaca and Quercus petraea*)	6446.7	0.9	765.0	1288.9
17. Beech and hornbeam forests (*Fagus moesiaca and Carpinus betulus*)	13370.7	1.8	936.0	2141.5
18. Beech forests (*Fagus moesiaca*)	142521.8	19.6	834.0	34537.4
19. Fir and beech forests (*Abies alba and Fagus moesiaca*)	44150.4	6.1	539.0	13722.0
20. Fir, spruce and beech forests (*Abies alba, Picea abies, Fagus moesiaca*)	34195.5	4.7	567.0	12408.3
21. Fir and sprice forests (*Abies alba, Picea abies*)	26306.6	3.6	683.0	11108.1
22. Spruce forests (*Picea abies*)	53749.5	7.4	475.0	12917.6

23. Black pine forests (*Pinus nigra*)	12140.7	1.7	477.0	2320.3
24. White pine forests (*Pinus silvestris*)	4985.3	0.7	649.0	647.4
25. White pine and spruce forests (*Pinus silvestris and Picea abies*)	7352.4	4.0	683.0	2030.4
26. White-bark pine forests (*Pinus heldreichii*)	10817.7	1.5	483.0	2340.1
27. Hoe pine forests (*Pinus peuce*)	3875.6	0.5	642.0	696.5
28. Hoe pine and spruce forests (*Pinus peuce i Picea abies*)	4147.1	0.6	529.0	1516.8
30. Maritime pine forests (*Pinus halepensis, Pinus maritima, Pinus pinea*)	1890.2	0.3	377.0	277.4
32. Birch forests (*Betula verrucosa*)	5023.7	0.7	403.0	279.7
33. Forest cultures of autochthonous species (*Pinus nigra and/or Pinus silvestris*)	2001.9	0.3	681.0	258.6
37. Other forests dominated by conifer tree species	4482.3	0.6	480.0	925.8
38. Other forests dominated by broadleaved tree species	58643.3	8.1	586.0	2551.7
Forest types with estimated coverage below 1000 ha	707.8	0.2		
Total	727125.0	100	814.0	116216.7

Forest types with estimated coverage below 1000 ha: Juniper forests (*Juniperus sp*), forest cultures of allochthonous species (*Pinus strobus, Larix europea*, forest cultures of allochthonous species and the like).

Montenegro is characterised by dominance of broadleaved trees whose forests cover 76.2% of the territory. Volume per hectare of broadleaves is only 136.3 m^3/ha, and 293.5 m^3/ha for conifers. The share of conifers in the total volume is 40.2%. Volume increment of conifers if 8.1 m^3/ha and is considerably higher than for broadleaves of 2.9 m^3/ha. Conifers contribute to the total volume increment with 46.6%.

Ecological networks

EMERALD ecological network, the international networks of areas of special interest for nature protection, which extends across the territories of Europe, North Africa and Asia, has been established in Montenegro. The foundation for the establishment of this ecological network was the Bern Convention – Convention on the Conservation of European Wildlife and Natural Habitats. Montenegro ratified the Berne Convention. The Project "Establishing Emerald network in Montenegro" was implemented in the period 2006-2008. It was finalised by 32 proposed Emerald sites, whereby systemic field surveys were not conducted, but the sites were dominantly identified based on the literature data. The EMERALD network includes the following areas: 1. Kotor-Risan Bay, 2. Platamuni, 3. Katići Island with Donkova and Velja Seka, 4. Tivat Salina, 5. Buljarica, 6. Spas Hill, 7. Pećin Beach, 8. Orjen, 9. Lovćen, 10. Rumija, 11. Velika Plaža, 12. Bojana River, 13. Skadar Lake, 14. Ćemovsko Field, 15. Đalovića Gorge, 16. Cijevna, 17. Mala Rijeka, 18. Mrtvica Canyon, 19. Komarnica, 20. Remaining part of the Piva Canyon, 21. Golija and Lebednica, 22. Komovi, 23. Durmitor, 24. Bjelasica, 25. Visitor and Zeletin, 26. Prokletije, 27. Hajla, 28. Sinjajevina, 29. Maglić, Volujak and Bioč, 30. Ljubišnja, 31. Ćehotina river valley, 32. Lim Valley.

Surveys have been conducted in Montenegro for a several years now with a view to establishing the NATURA 2000 network of protected areas. NATURA 2000 is a network of protected areas in European Union countries that is based on the Habitat Directive and the Bird Directive. The establishment of the NATURA 2000 network in Montenegro started in 2016 and was preceded by

comprehensive preparations in the form of collection of all relevant literature data. The project implementation implies detailed field surveys and mapping of species and habitats that occur in the territory of Montenegro and are important for the EU. NATURA 2000 areas will be selected on the basis of these surveys. In addition to National Parks, the potential areas of NATURA 2000 network are the following: Komarnica Canyon, Ćehotina and Lim valleys, Moračke mountains, Ljubišnja, Hajla, etc. Surveys aimed at the establishment of NATURA 2000 network have not been implemented in the Mediterranean and sub-Mediterranean area of Montenegro.

Fungi

This group of organisms have not been sufficiently explored in Montenegro, despite the fact that around 2200 species have been assessed. Using the material from Montenegro, two new genera have been described for the science: Perzia and Pseudoboubovia, as well as 18 new species of three are still specific only for the territory of our country (Environment Protection Agency (EPA), 2001).

In Montenegro, 111 specifies of macromycetes have been protected since 2006, of which 98 belong to the sub-species Basidiomycotina, and 13 to Ascomycotina. Families with the highest number of protected species are the following: Boletaceae (14), Hygrophoraceae (13), Thelephoracaceae (10), Gaeastraceae (8), Amanitaceae (6). Since fungi are used to a high extent for commercial purposes, the Rulebook on the detailed manner and conditions of collection, use and circulation of unprotected wild species of animals, plants and fungi species (from 2010) defines species that are used for commercial purposes. This list includes 17 fungi species that belong to the following genera: Lactarius, Boletus, Cantharellus, Hydnum, Armillaria, Morchella, Marasmius and Tuber (white and black truffle) Četković, 2023).

Fungi are most often threatened because their habitats are threatened by degradation, fragmentation or disappearance of habitats, then due to environmental protection, climate change, harvesting and forest fires, intensive agriculture, introduction invasive species, but also due to unprofessional and excessive harvesting. Aside from personal use, fungi are exported in large amounts out of Montenegro (several thousand tons of edible fungi are exported annually to countries of western Europe (Environment Protection Agency (EPA), 2001).

FAUNA

Invertebrates constitute the most numerous groups of living beings which is highly important for the survival and functioning of biosphere. Around 1.7 million have been described to date, and it is considered there are many more (even up to 30 million species). Despite their importance, they belong to the most underexplored organisms. More than 6000 species of terrestrial, fresh water and marine invertebrates have been identified on the territory of Montenegro, but their number is considered to be between 30.000 and 40.000. Findings so far indicate that the fauna of invertebrates is very rich in Montenegro, whereby the material collected from the territory of our country was used to also describe a considerable number of species which are new to the science. More than 4000 terrestrial and fresh water invertebrates have been identified in Montenegro (Table 2.6.). (Environment Protection Agency (EPA), 2001).

Table 2.6. Invertebrates

Invertebrates (groups)	Number of species
Fresh water sponge (Porifera)	1
Freshwater Cnidaria	2
Flat worms (Platyhelminthes)	33
Round worms (Nematoda)	16
Gordius, horsehair worms (Nematomorpha)	4
Segmented worms Anelida (Oligochaeta and Hirudinea)	151
Rotatoria, Gastrotricha, Acanthocephala	85
Molluscs (Molusca) – terrestrial and freshwater snails and freshwater shells 517	
Freshwater crabs (Crustacea)	130
Joint-legged arthropods (Arachnida): spiders (Araneae), scorpions (Scorpiones), pseudo-scorpions (Pseudoscorpiones), moths and thicks (Acari).	720
Centipede (Myrapoda)	73
Insects (Insecta): hard-winged Coleoptera, bed bugs (Heteroptera), right-winged (Orthoptera), dragonfly (Odonata), water flowers (Ephemeroptera), caddisflies (Trichoptera), stoneflies (Plecoptera), flies (Diptera), net flies (Neuropterida), ants (Formicoidea), Collembola, mantises (Mantodea), thermites (Isoptera), day and night butterflies (Lepidoptera).	2380

Snails – 502 species and subspecies of terrestrial and freshwater snails have been recorded in Montenegro, three of which are edible: *Helix pomatia*, *Helix lucorum* and *Helix aspersa*. In the group of slugs, 25 species are represented in the fauna of Montenegro, nine of which are endemic. Five species of snails are protected in Montenegro by the 2006 Decision: *Tandonia reuleaxi, Limax wohlberedti, Deroceras maasseni, Helix vladika* and *Helix dormitoris dormitoris* (Environment Protection Agency (EPA), 2001).

Twenty-seven species of insects from Annexes II and IV of the Habitat Directive (NATURA 2000) have been registered in Montenegro until now.

Insects, butterflies – 192 species of day butterflies and 250 species of night butterflies have been registered in Montenegro. The following species are protected by the law in Montenegro: Apollo (*Parnassius apollo*), scarce swallowtail (*Iphiclides podalirius*), old world swallowtail (*Papilio machaon*) and southern swallowtail (*Papilio alexanor*). Butterflies are threatened due to degradation and disappearance of habitats.

Insects, ants – the ant fauna of Montenegro comprises 140 species (around 180 are expected), whereby most of them are registered in the southern part. Until now, three species have the status of endemic species of Montenegro (*Crematogaster auberti savinae Zimmermann, Crematogaster gordani, Crematogaster montenigrinus*), and three species belong to endemic species of the eastern Adriatic coast. The law protects red wood ant (*Formica rufa*). Three species from the

Formica rufa group have been registered on the territory of Montenegro: *Formica polyctena, Formica pratensis* and *Formica rufa*.

Insects, wasp flies – they constitute one of the most numerous two-winged families with around 6000 species that have been described in the world, of which 815 species live in Europe. Compared to other European countries, Montenegro has a very rich and diverse fauna of wasp flies with 398 species so far. Almost one quarter (around 90 species) are considered rare and threatened in Europe, Balkans or Montenegro. The main reason that wasp flies are threatened is the loss of natural habitats necessary for the survival of the species (due to fragmentation, deforestation, fires, drying out, changing land use, various types of pollution, etc.). Based on the material collected in our country, a number of species have been described which are new to the science, including: *Anasimyia femorata, Cheilosia alba, Cheilosia balkana, Cheilosia barbafacies, Chrysogaster mediterraneus, Eumerus montanum, Merodon adriaticus, Merodon luteomaculatus, Merodon virgatus, Pipizella bispina, Pipiza laurusi, Psilota nana, Riponnensia morini*.

Insects, hard-winged – insufficiently explored group of insects in Montenegro with around 900 species that have been registered until now. The protected species include: *Cerambyx cerdo* (the great Capricorn beetle), *Lucanus cervus* (European stag beetle), *Oryctes nasicornis* (European rhinoceros beetle).

Insects, ladybugs – 64 species have been registered in Montenegro. Ladybugs are extremely important due to their nutrition since most species feed on plant lice, which is very important in agriculture. These insects are threatened due to anthropogenic activity, loss of habitats and intensive spreading of invasive Asian lady beetle (*Harmonia axyridis*), which influenced considerably the reduction of the number of local species seven-spotted ladybird (*Coccinella septempunctata*).

Insects. Dragonflies – 67 species (or 47% of the European fauna) have been registered in Montenegro, of which 52 species live in the territory of the Skadar Lake. They are extremely important as predators for parasitic two-winged insects, whereby some species are considered good indicators of the quality of the environment. Of globally threatened and important species of dragonflies, Balkan goldenring (*Cordulegaster heros*), bladetail (*Lindenia tetraphylla*) and Eastern spectre (*Caliaeshna microstigma*) live in Montenegro. Dragonflies are threatened due to anthropogenic impacts and climate change.

Freshwater crabs – out of five autochthonous species of freshwater crabs of the Astacidae family which are present in Europe, the studies conducted to date have registered the following three species in Montenegro: *Austropotamobius pallipes* (downstream Zeta), *Austropotamobius torrentium* and *Astacus astacus*. Their habitats are cold waters, fast watercourses rich in oxygen, at higher altitudes or calmer waters where temperatures must be above 10 ^{0}C in the summer.

Within invertebrate fauna of Montenegro, more than 350 terrestrial and freshwater species are found on the global or European IUCN Red List. The national legislation provides for protection of 69 species of invertebrates. The most frequent factors of threats to this group of organisms are fragmentation, degradation and loss of habitats, urbanisation, pollution, climate change, introduction of invasive species (Environment Protection Agency (EPA), 2001).

Freshwater fish

Eighty-nine fish species have been registered in Montenegro, of 14 are considered not be present in our fresh waters any longer (species introduced in the ‘70s from China and did not manage to

adapt to new conditions) and the freshwater ichthyofauna comprises 62 autochthonous species, while 13 have been introduced. There are 48 species of autochthonous, resident (non-migratory) or typically freshwater species, and 14 (autochthonous) migratory species and the species that populate brackish water. There 43 autochthonous species in the Adriatic catchment area, and 19 in the Back Sea catchment area. Four species are endemic for Montenegro: softmouth trout (*Salmo zetensis*), Skadar guddgeon (*Gobio Skadrensis*), Zeta stone loach (*Barbatula zetensis*) and Montenegrin goby (*Knipowitschia Monteneginus*). Eight endemic species have been registered in the basin of Skadar Lake (Montenegro and Albania). There are 18 endemic species that are registered in Montenegro and present in the wider area of this basin or in the southeast Adriatic environmental region. Several species have been translocated from basin to another, such as grayling (*Thymallus thymallus*) that was introduced in Morača or *Squalius platyceps* that was introduced in the Piva River basin (they are considered autochthonous for this basin and, therefore, the Black Sea basin has seven allochthonous species, and the Adriatic basin has 13 species) (Environment Protection Agency (EPA), 2001).

Amphibians

Fifteen species and eight subspecies of amphibian have been registered in Montenegro. Amphibian salamander (*Proteus anguinus*) is indicated as a potential representative of the cave fauna, whose presence has not yet been confirmed. Important herpetological sites include the lake under the lake top of Lovćen and other marshy habitats of this mountain due to the presence of the Macedonian crested newt (*Triturus macedonicus*) and yellow-bellied toad (*Bombina variegata scabra*), a Balkan endemic species. The Lake is an important reproductive centre for other amphibians; the surrounding of Virpazar and the neighbouring marshy areas of Crmnica and Orahovštica on the Skadar Lake are known as locus typicus of the Albanian water frog (*Pelophylax shqipericus*), a Balkan endemic species; Prokletije, Bukumirsko and Hridsko lakes are important due to the presence of neotenic population of alpine newt (*Ichthyosaura alpestris*); another two endemic species of frogs live on Prokletije: the Albanian water frog (*Pelophylax shqipericus*) and Greek stream frog (*Rana graeca*), as well as alpine salamander (*Salamandra atra*); Biogradsko Lake is important as it is considered the reproductive centre for the Greek stream frog, but also for other frog and alpine newt populations; Zminičko Lake is a habitat of endemic alpine newt (*Ichthyosaura alpestris serdarus*), which is highly threatened by fish stocking of this lake and it is questionable if this species exists in this lake all. Globally, amphibians belong to the most threatened vertebrates, since degradation, fragmentation and destruction of natural habitats, water pollution, fish stocking of mountain lakes are only some threats for the life of this group of animals, while climate change and global warming pose increasing threats (Environment Protection Agency (EPA), 2001).

Reptiles

Thirty-seven reptile species have been registered in Montenegro: seven turtle species, 15 species of lizards and 15 species of snakes (including read-eared slider, introduced species of freshwater turtle and one potentially introduced species of lizards, Italian wall lizard). According to the 2006 Decision, 26 taxa are protected. Three areas of Montenegro stand out in terms of abundance of reptile species and their numbers: Bjelopavlićka Plain, the area of the Skadar Lake and delta of Bojana River. The key problem faced by this group of animals and loss of habitats caused mostly by uncontrolled and illegal urbanisation, fires and fragmentation of habitats (Environment Protection Agency (EPA), 2001).

Birds

Avifauna of Montenegro is considered rich and one of the reasons is the fact that it is located on the Adriatic migratory route of birds that fly from Siberia, Central, Northern and Eastern Europe to Africa and vice versa. Until now, 352 bird species have been registered in Montenegro, of which 215 are nesting birds. Compared to Europe (533 species), this is 66% of the total European fauna. The sea with sandy beaches, via dunes in the hinterland of the longest beach, Velika Plaža, through salt marshes, lagoons and salina is an important belt for residing and living of birds. Special place belongs to the delta of the River Bojana with Ulcinj salina as the most important habitats for birds on the east side of the Adriatic since millions of birds stay here every year for nesting, wintering or on their route to Africa and vice versa. More than 250 bird species fly over this area during the year. Another important area is the Skadar Lake. The capacity of the Lake is high and enables it to provide suitable living conditions for hundreds and thousands of nesting birds pairs, primarily cormorants, Eurasian coot, several species of herons and terns, including pelicans. Another important area is the Ćemovsko Field, semi-steppe that gathers some species that are of special interest for protection, since these habitats are undergoing intense transformation and some bird species, such as Eurasian thick-knee, large lark and short-toed lark, have become threatened in Europe. Zeta River valley is an important bottle neck for bird migration which thousands of predators, shorebirds, singing birds and especially cranes pass through on their way to the north. Karst fields are important bird resting, wintering and nesting sites. The largest karst field in Montenegro, the Nikšić Field, with artificial reservoirs, is one of the most important bird sites in the country. Floodplains, river meanders, extensive agriculture are the conditions that have made sure that this field becomes a shelter for birds such as corn crake, lesser grey shrike, barred warbler, and a resting site and wintering site for goby, cranes, Eurasian coot and a large number of Charadriiformes. Richness in forests makes Montenegro of the richest countries in Europe, which contributes to the presence and numbers of species such as grouse and hazel grouse, several species of owls and all ten species of woodpeckers that are found in Europe. Durmitor, Biogradska Gora, Prokletije, Ljubišnja are only some of the so-called hot spots of avifauna diversity of Montenegro, with Durmitor being the first one of them with 172 registered species so far or almost half of the total number of registered birds in the country. Thirty-three potential SPA areas (Special Protection Areas under the Bird Directive) have been identified in Montenegro, which is almost 55% of the territory of the country. Due to birds, we have three Ramsar areas in Montenegro (wetland of international importance): Skadar Lake, Tivat Salina and Ulcinj Salina (Environment Protection Agency (EPA), 2001)).

Mammals

Of the total number of European species (270 mammal species), 85 terrestrial mammals have been registered in Montenegro, which accounts for 1/3 of the mammal fauna in Europe on only 0.1% of the area of the European continent. Since 2006, 10 mammal species have been protected in our country and all bats (*Chiroptera*). The mammal fauna in our country of characterised by very interesting, rare and endemic species whose ecological types are reflected through underground, aboveground, aquatic and flying species (Environment Protection Agency (EPA), 2001)).

2.11. Marine area

The Law on Coastal Zone (Official Gazette of the Republic of Montenegro 14/92) specifies the area, facilities and resources that fall under the coastal zone, such as: “seashore, ports, breakwaters, slipways, embankments, sandbanks, bathing areas, cliffs, liman, reefs, submerged

springs, springs and source springs on the shore, estuaries flowing into the sea, canals connected to the sea, undersea zone, sea bottom and underground zone, as well as inland seawater and territorial sea, living and non-living resources therein and living and non-living resources of the epicontinental belt. Within the meaning of this Law, the coastal zone is considered to also include waters of Bojana riverbanks on the territory of Montenegro".

The coastal zone refers to the narrow coastal belt of around 58 km^2 and the territorial sea of 2.540 km^2.

The total shores length is 336.6 km, of which the coastal shore of Montenegro is 288.2 km long (of which 105.5 km in the Bay), the length of island shores is 25.61 km, and the total length of the coastal part of Bojana River belonging to Montenegro is 22.8 km.

Territorial sea extends over 12 NM (18.520 m) from the main line towards the open sea.

The main line is the line of the lowest tide along the shoreline and island or the straight line that closes entrances to bays. This line is also the boundary of inland marine waters. This sea belt is a part of the national territory where the costal country achieves its sovereignty, besides the right to harmless passage of ships under foreign flags.

Inland marine waters are the waters of the Boka Bay, with the exception of the part that belongs to the Republic of Croatia, waters of the Trašte Bay and Budva and Spičansko-Bar bays.

The area of the territorial sea limited like this covers around 2.172 km^2, while the size of inland marine water is 368 km^2. Therefore, Montenegro has a marine area of around 2.540 km^2.

Marine ecosystem

The sea as a resource of exceptional importance for Montenegro as a maritime country, both with respect to nature and environment protection, conservation of biodiversity and the marine ecosystem, and with respect to numerous different activities that are closely connected to maritime transport, development of transport and utility infrastructure, tourism, maritime economic activity and exploitation of marine mineral resources.

Montenegro has internationally recognised areas – two Ramsar and two UNESCO sites. Ramsar sites are the special (specific) flora and fauna reserve Tivat salina declared in 2013 and located in the coastal belt of the Tivat Bay, and the Montenegrin part of the Skadar Lake that has been a Ramsar site since 2006. UNESCO sites are: National Park Durmitor (which has been on the world heritage list since 1980) and Kotor-Risan Bay, which has been on the list of world natural and cultural heritage since 1979.

For the purpose of sustainable management and utilisation of marine and coastal zone, it is necessary to implement integrated management taking into account the specificity of the area, sensitivity of the ecosystems and landscapes, richness of natural resources and dues to physical limitations of the space, a development of a synergetic impacts of important economic activities (tourism and recreation, agriculture connected with local varieties, fishery and mariculture, exploitation of underwater mineral resources, exploitation of sea salt, maritime transport, etc.) should be kept in mind. All activities should be planned so as not to distort a good status of the marine ecosystem (GES – *Good Environmental Status*), which a commitment of Montenegro as a future EU Member State. The same is provide under the Law on Protection of Marine Environment of Montenegro (Official Gazette of Montenegro 73/19) which is fully harmonised with

EU Directives and which will form the basis for the adoption of the Strategy for the Protection of Marine environment in the period to come and will be based on ecosystem-based approach to managing human activities, and on the principles of integrated coastal zone management.

- Boka Bay

Given the depths, the entire Boka Bay belongs to the coastal and littoral system. The littoral area is not only the most productive area in terms of trophic segment, but also the most diverse zone of the sea. Distorting any abiotic parameter: light, temperature, amount of dissolved oxygen, salinity, transparency, amount of nutrients or chemism of substratum, very quickly leads to important qualitative and quantitative changes in the composition of species.

Years of research of the living world of the Boka Bay identified that the occurrence of degradation of various intensity, especially on the sea bottom or in the benthos zone. Given the widespread distribution of habitats, most of the area of the Bay is covered by the habitat of coastal terrigenous mud, while biocenosis of muddy detritus bottom and muddy sand covers only small parts of the Bay. The biocenosis of coastal terrigenous mud is characterised by a large number of species, i.e. the quality dominates the quantity. The total biomass reduces gradually towards the exit from the Bay. Communities of sciaphile algae are widespread in the internal part of the Bay and due to complexity of geo-morphology of the sea bottom, these communities often occur as mosaics, combined with other communities.

Coralligenous habitats occupy around 0.18% of areas of the bottom and are very important for protection. This strong type of habitats is found at five sites (Strp, Perast, around western part of Perast, around St. Đorđe island and Gospa of Škrpjela and Dražin Vrt). Other less coralligenous associations are found in the central and northern parts of the Kotor-Risan Bay. The coralligenous communities sometimes occur as a mosaic with sciaphile algae and coastal terrigenous muds. Associations of particularly rare coralligenous species *Savalia savaglia* and *Leptogorgia sarmentosa* are found on Dražin Vrt and cover the area of about 5.000 m^2 (RAC/SPA, MSDT, 2017).

As far as habitats of seagrass meadows are concerned, Dobrota stands out as a particularly important site, since the entire area covered by seagrass meadows on this site is 21.000 m^2. Also, an important area is found on the sites in the Herceg Novi Bay, in Igalo-Njivice and Mamula-Luštica.

The table below shows a distribution of habitats on the territory of the Boka Bay and the area they occupy.

Table 27. Types of habitats in the Boka Bay (source: RAC/SPA MSDT, 2017)

Type of habitat	**Size (ha)***	**Share (%)**
Community of coastal terrigenous muds	5172.92	61.5
Communities of unstable (mobile) bottom	55.46	0.66
Community of muddy detritus bottom	77.95	0.93
Community of muddy sand in depressions	14.69	0.17
Community of sciaphile algae	14.58	0.17
Coralligenous biocenosis	15.34	0.18

Cymodocea nodosa meadows	0.15	0.00
Deep pits with potential presence of *Cladocora* species	4.74	0.06
Hard bottom and rocks	102.61	1.22
Mixed meadows composed of species of seagrass *Cymodocea nodosa*, *Nanozostera noltii* and *Zostera marina*	0.83	0.01
Mixed meadows composed of seagrass species *Posidonia oceanica* and *Cymodocea nodosa*	0.09	0.00
Mosaics of communities of sciaphile algae and corrals	24.79	0.29
Mosaics of communities of sciaphille algae and muddy sands	0.39	0.00
Mosaics of communities of sciaphile algae and coastal terrigenous muds	8.13	0.10
Mosaic association with dominant species *Savalia savaglia* and the association with *Leptogorgia sarmentosa*	0.51	0.01
Mosaic of infralittoral rocks and gravel, community of sciaphile algae and muddy sands	1644.74	19.6
Mosaic of muddy sands and terrigenous muds	8.45	0.10
Mosaic of photophile and sciaphile algae	1.75	0.02
Mosaic of coralligenous species and coastal terrigenous muds	15.69	0.19
Posidonia oceanica meadows	145.12	1.73
Coastal terrigenous muds with dense presence of dead *Cladocora*	18.88	0.22
Coastal terrigenous muds on loose substratum	1080.92	12.8

Fishery and mariculture

The study of biodiversity of ichthyoplankton in the Boka Bay has confirmed the presence of a large number of eggs and larvae of pelagic and demersal fish species, of which the highest percentage belongs to economically important species. It was found that 38 different fish species spawn in the Bay (28 genera and 18 families), while the analysis of biodiversity has shown an important degree of diversity on some positions where water flow is expressed (Komborski Vijenac and Verige).

Based on the series of multiannual data on spatial distribution of early development stages of fish (ichthyoplankton), it can be concluded with certainty that the Boka Bay is a feeding zone for a significant number of pelagic and demersal fish species, but also the spawning zone for anchovies (*Engraulis encrasicolus*), annular seabream (*Diplodus annularis*), sharpsnout seabream (*Diplodus puntazzo*), white seabream (*Diplodus sargus*), Mediterranean rainbow wrasse (*Coris julis*) and Atantic mackerel (*Scomber scombrus*), striped seabream (*Lithognatus mormyrus*) whose eggs are found in a considerable number at the most studied positions.

Sea currents have a strong impact on the spatial distribution of ichthyoplankton, given that fish eggs and larvae are not capable of moving independently or to confront water movements, but their position depends solely on the dynamic of water masses which carry them passively. The fish spawning and/or feeding zones are considered the zone of special importance and it is necessary to ensure their preservation, improvement and protection.

Mariculture means the production of high-quality food in the sea, in natural conditions and artificially. The development of marine fishery, which essentially includes mariculture, is a strategically important matter in food production programmes for the local market. The rational exploitation of edible marine organisms implies strict strictions in space, time, quality and quantity. This form of sea exploitation can be permanent only if it is rational and protected.

Cultivation of the Mediterranean mussel (*Mytilus galloprovincialis*) is the most important for the territory of the Boka Bay with the annual production of 228 tons, while the production of the European flat oyster (*Ostrea edulis*) is still at a very low level (17 tons, MONSTAT, 2018), with exceptional cultivation potential. This production is achieved by slightly less than 30 farms of shells on the territory of the Boka Bay which occupy the average area of around 1 ha per farm. When the total length of the shore of the Boka Bay (105 km) is compared with the length with the marine aquatorium occupied by farms (around 100 m per farm at average), we get the data that shell cultivation in Montenegro occupies less than 3% of the coastline of the Bay. Since this refers to the production of healthy food in clean environment, which extensive by nature and does not imply intake of food, antibiotics, means against predator or overgrowing species, this type of production needs to be maintained, branded and improved.

The analysis of suitability and attractiveness of the area of the Boka Bay for cultivating shells was conducted on the basis of preconditions for the definition of sites for mariculture that are accepted as a recommendation of the General Fisheries Commission of the Mediterranean – GFCM that Montenegro is a member of, and which are aligned with the needs and specific features of the Montenegrin coast. The analysis was carried out by using data on pressures on mariculture (fishing posts, eutrophication, contamination, important marine habitats, shore type, urbanisation) and on the basis of environmental data (climatology, exposure to the open sea, characteristics of the sea bottom, quality of water, trophic status, organographic conditions, shore type).

The results of the analysis of suitability of the bay for mariculture confirmed that all existing shell farms are found on the sites that are suitable for mariculture development but that a significant part of the Boka Bay is very suitable but unused for the mariculture programme. Potentially suitable sites that are indicated by the analysis should be a part of new spatial plans of use of the sea of the Boka Bay (Figure 2.12). The analysis was carried out for shell farming bearing in mind that fish farming has a considerable environmental impact and thus constitutes an additional type of pressure, especially in semi-closed systems such as the Boka Bay where exchange of water masses is very low, especially during summer period.

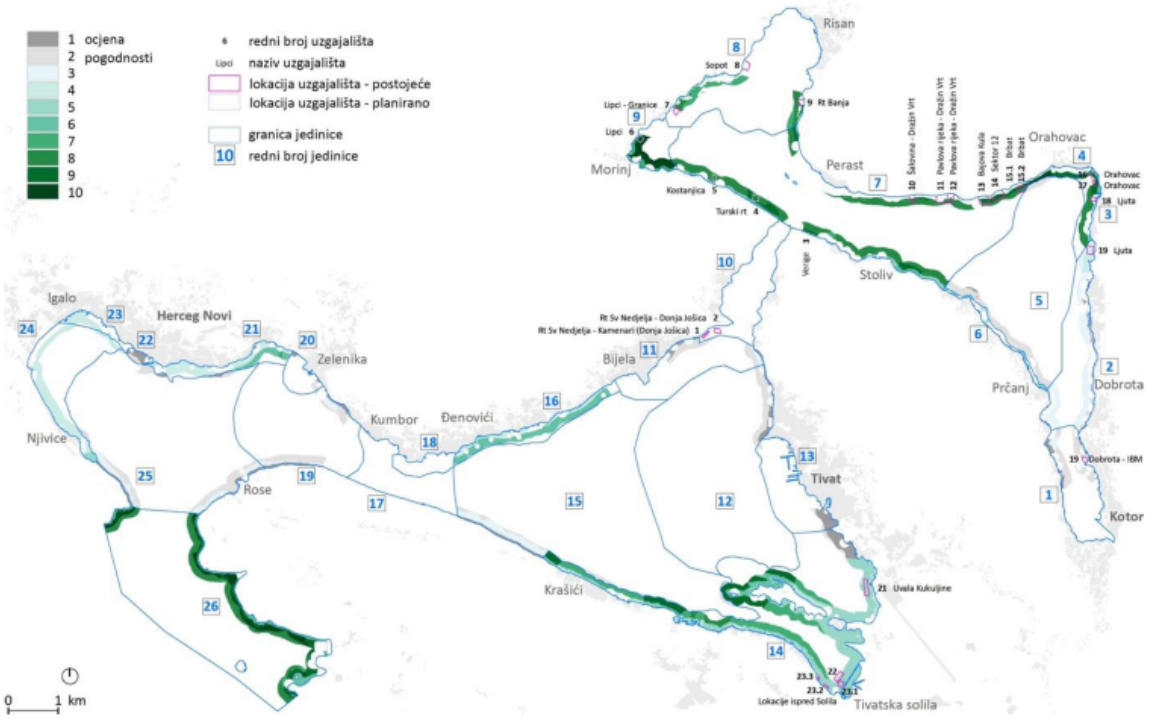


Figure 2.13. Analysis of suitability for mariculture development on the territory of the Boka Bay – shell farming (suitable zones are presented by bold green colour)

– Offshore zone of Montenegro

Offshore zone of Montenegro includes a belt from the entrance to Boka Kotorska to the border with Albania. The total area of the marine aquatorium occupies 6347 km^2 and the total area under the territorial sea occupies around 2098.9 km^2 (of which 89 km^2 belong to the Boka Bay). Studies of the marine ecosystem of the open sea of Montenegro are carried out within numerous international and national projects. Research objectives are different: analysis and spatial distribution of important marine habitats, the level of primary production, eutrophication, assessment of the degree of diversity species, introduction of allochthonous and/or invasive species, assessment of the amount of fishery resources, pollution level, volumes and distribution of waste in the sea, etc.

As a part of the Berne Convention on the Conservation of European Wildlife and Natural Habitats, Montenegro has put together a list of 32 candidate areas for the Emerald ecological network of areas (defined and as areas of special interest for the protection at the European level – ASCIs), which occupy the total of 234.399 ha, of which 12 are located in the coastal zone or at the sea: Skadar Lake, Velika Plaža with Ulcinj Salina, Buljarica, Tivat Salina, Šasko Lake, River Bojana, Knete, Ada Bojana, Kotor-Risan Baz, Orjen, Pecin Plaža, Spas Hill in Budva, Katiči, Donkova and Velja Seka islands and Platamuni. The list of Emerald sites and species (Annexes I and II of the Convention) in Montenegro includes 156 types of habitats in two bio-geographic regions (alpine and Mediterranean) and 20 types of mammals, nine species of amphibians and reptiles, 108 bird species, 13 fish species, eight species of invertebrates and five plant species, including priority species of seagrass *Posidonia oceanica.*

In line with global Aichi goals of the Convention of Biological Diversity (that Montenegro is a signatory of since 2009), 10% of coastal and marine areas should have been protected until 2020.

This especially applies to the areas of special importance for biodiversity and functioning of the ecosystem that need to be preserved through efficient management, to be ecologically representative and networked with the applied targeted protection measures. This percentage means that around 130 km^2 of marine ecosystem should be declared protected marine area in Montenegro. Although Montenegro has not yet declared protected marine areas, the following zones with environmentally most important habitats and species that have a significant potential for protection as natural resources have been identified on the basis of numerous surveys of the marine ecosystem:

- Luštica (from Mamula to the Mačka cape),
- the zone from Trašte cape to Platamuni (with narrow zone for more strict protection from the Žukovac cape to the Kostovia cape),
- wider zone of the Katiči island,
- zone from Volujica cape to Dobre Vode,
- zone from Komina cape to the cape near the Stari Ulcinj island,
- zone of the Valdanos cove to Velika Cove,
- Seka Đeran with south part of the zone in front of Velika Plaža to Bojana estuary.

Of these zones, the priority for the protection is given to the following areas: (i) wider zone of the Katiči Island, (ii) zone of Platamuni to Seka Albaneze to Platamuni cape and (iii) wider zone near the Old Ulcinj island (Figure 2.14.).

Figure 2.14. Zone of existing and planned protected natural resources (source: NSIUOP MNE, 2015)

2.11.1. Quality of marine water

The monitoring programme for the status of ecosystem of the coastal sea of Montenegro is harmonised in terms of programmes and methodology with the requirements of the national legislation: Law on Environment (Official Gazette of the Republic of Montenegro 52/16), Law on Waters (Official Gazette of the Republic of Montenegro 84/18), Regulation on the classification and categorisation of ground and underground waters (Official Gazette of the Republic of Montenegro 84/18), the requirements of relevant EU directives, the Guide of the European Environment Protection Agency (EEA) with respect to transitional, coastal and marine waters (Eurowaternet Technical Guidelines) and the relevant reporting instructions (WISE-SoE Reporting on Transitional, Coastal and Marine Waters), and the requirements of MEDPOL programme that is implemented on the basis of fulfilling the commitments of the Convention on the Protection of

Marine Environment and Coastal Mediterranean – Barcelona Convention and the accompanying Protocol on the Protection of the Mediterranean from pollution from land sources and terrestrial activities (LBS Protocol).

The monitoring programme for the status of the ecosystem of the coastal sea of Montenegro comprises the following complementary sub-programmes:

1. Eutrophication monitoring programme,
2. Monitoring programme for contaminants in biota,
3. Monitoring programme for intake by tributaries,
4. Monitoring programme for intake by effluents,
5. Biodiversity monitoring programme.

Physical and chemical parameters

The eutrophication programme covers the analyses of physical and chemical parameters.

The temperature and salinity at all tested sites have a similar trend in the surveyed period. The **temperature** values range between 4.6 and 22.6 ^{0}C. The lowest value was measured in February at the depth of 0.5 m at the location of Risan, while the highest water temperature was recorded also at the depth of 0.5 m in May at the location of Budva.

The values for **salinity** ranged from 3.5 ‰ in February at the depth of 0.5 m at the location of Dobrota to 40.5 ‰ at several location. Generally, it can be concluded that salinity of surface layers of the bay location, and the measuring location of Ada Bojana, varies of a lot depending on the amount of precipitation and inflow of inland ground waters and very low values of salinity occur in winter months.

The pH value in the studied period ranged in the interval that is characteristic for seawater, from 8 to 8.4 for all locations.

Most of measured values for the parameters for which the criteria for the classification of the environmental status are given were within the limits of good and very good status. Individual measurements exceeded these limits, but the average values for the tested period did not. It can be concluded that according to the classification of the coastal sea with regard to the extent of eutrophication, tested location were at the limit of good and very good status. An exception was the location of Ada Bojana where the average value of total inorganic nitrogen was within the limits of moderately good status. The total inorganic nitrogen is the only parameter whose average values in the surface layer of water is not within the limits of a very good status at any of the monitoring locations.

The quantity of total inorganic nitrogen at tested locations was probably connected with the inflow of land groundwater or precipitation since the measured values in the tested period were in a very high negative correlation with salinity, which means that reduced salinity leads to an increased value of this parameter and that due to the river impact, its average value is the highest at the location of Ada Bojana. On the basis of data, it can be concluded that the values of phytoplankton were generally higher in the bay area compared to the areas outside the bay, which is to be expected bearing in mind that the bay area has a high intake of nutrients and weaker dynamics of water masses. The numbers of microplankton at some location in the bay reached the value of up to 10^5 cells, while the number at most sites was 10^4 cells/l. The value of microplankton and phytoplankton groups: diatoms, dinoflagellates, coccolithophores and silicoflagellates that were

recorded during the survey are mainly characteristic for oligotrophic area, with the exceptions of months and the sites where the number reached up to 10^5 cell/l, which are characteristic for mesotrophic area, while the number in July, September and October on some sites were characteristic for eutrophic areas.

On the basis of data, it can be concluded that the values of phytoplankton were generally higher in the bay area compared to the areas outside the bay, which is to be expected bearing in mind that the intake of nutrients is higher in the bay area and weaker dynamic of water masses. The numbers of microplankton on some sites in the bay reached up to 106 cells. The values of microplankton and phytoplankton groups: diatoms, dinoflagellates, coccolithophores and sillicoflagellates that were recorded during the survey and reached the number up to 10^4 cells/l are mainly characteristic for oligotrophic-mesotrophic area, except for the months and sites when the numbers reached up to 10^5 cells/l, which is characteristic for mesotrophic-eutrophic area, while the number that was recorded in February is characteristic for mesotrophic-eutrophic area (Kitsious and Karydis 2001, 2002).

In moderately warm seas (Adriatic), intensive development of phytoplankton occurs twice a year: spring and autumn maximum (bimodal cycle). The bimodal cycle is characterised by a much higher maximum in the coastal sea compared to the open sea due to a higher concentration of nutrients.

Most species that were dominant (*Bacteriastrum hyalinum, Chaetoceros spp., Leptocylindrus danicus, Proboscia alata, Pseudo-nitzschia spp. and Thalassionema nitzschioides*) are characteristic for the areas rich in nutrients. These species are indicators of the status of ecosystem which can show characteristics of an ecosystem.

Lower numbers and diversity of toxic species from dinoflagellates group were recorded during the survey (genera *Dinophysis, Lingulodinium, Phalacroma, Prorocentrum*), while the potentially toxic diatomea species from the genus *Pseudo-nitzschia* were frequent and numbers reaching up to 104 cells/l. The potentially toxic dinoflagellate *Prorocentrum micans* was often represented. The presence of the species that prefer the areas rich in nutrients and the presence of toxic species, although in small numbers, indicate the changes that cannot be neglected. They indicate the need for monitoring to prevent potential negative consequences for marine ecosystem and human health.

Most species that were dominant (*Chaetoceros affinis, Bacteriastrum hyalinum, Chaetoceros spp., Leptocylindrus danicus, Proboscia alata, Pseudo-nitzschia spp. and Thalassionema nitzschioides*) are characteristic for the areas rich in nutrients. These species are indicators of the status of the ecosystem, which can show characteristics of an ecosystem.

Lower numbers and diversity of toxic species from dinoflagellates group were recorded during the survey (genera *Dinophysis, Gonyaulax, Lingulodinium, Phalacroma, Prorocentrum*), while the potentially toxic diatom species from the genus *Pseudo-nitzschia* were frequent and numbers reaching up to 10^4 cells/l. The potentially toxic dinoflagellate *Prorocentrum micans* was often represented. The presence of the species that prefer the areas rich in nutrients and the presence of toxic species, although in small numbers, indicate the changes that cannot be neglected. They indicate the need for monitoring to prevent potential negative consequences for marine ecosystem and human health.

Based on the analysis of the obtained results, it can be concluded that there is anthropogenic impact on most tested locations because the content of cadmium (Risan Port, IMB Dobrota,

Orahovac and Herceg Novi Port), mercury (Port Milena, Budva Port, Shipyard Bijela, Tivat Port, Porto Montenegro, Risan Port, Kotor Port and IMB Dobrota), copper (Port Milena, Port of Bar, Budva Port, Shipyard Bijela, Tivat Port, Porto Montenegro, Risan Port, Kotor Port, IMB Dobrota, Orahovac and Herceg Novi port), lead (Port Milena, Budva Port, Tivat Port, Porto Montenegro, Kotor Port, IMB Dobrota, Orahovac and Herceg Novi Port) and zinc (Port Milena, Port of Bar, Budva Port, Shipyard Bijela, Tivat Port, Porto Montenegro, Risan Port, Kotor Port, IMB Dobrota, Orahovac and Herceg Novi Port) exceed BAC values that represent the concentrations that are considered close to the natural level of concentrations of metals in shells. However, these are concentration levels at which it can be assumed that there is no or very low risk for the living beings.

The content of lead exceeds both BAC and EC values at the location of the Port of Bar.

By comparing the results obtained for cadmium, mercury and lead with their MAC values that are provided in the Regulation on maximum allowed contamination rated in food (Official Gazette of Montenegro 48/16, 66/19), it can be concluded that their content is far below the value by which health safety of shell for human use is determined, except at the location of the Port of Bar where the lead content is above the MAC value.

Based on the analysis of the obtained results, it can be concluded that only a smaller number of PAHs (fluoranthene, pyrene and benzo(a)anthracene) exceed MED BAC values on a few locations or their value is below the MED BAC values or at the level that represents the natural level of PAHs in shells.

Based on the analysis of the obtained results, it can be concluded that most of tested locations are under the anthropogenic impact since a certain number of PCB congeners exceeds OSPAR BAC and OSPAR EAC values.

- PCB congeners (PCB 101, PCB 138, PCB 153 and PCB 180) on the locations of Port Milena and Herceg Novi Port exceed the BAC values, while PCB 118 exceeds both BAC and EAC values.
- The concentration of PCB congeners (PCB 52, PCB 101, PCB 138, PCB 153 and PCB 180) on the locations of the Port of Bar, Budva Port and the Shipyard Bijela exceed BAC values, while PCB 118 exceeds both BAC and EAC values.
- The concentration of PCB congeners (PCB 52, PCB 138, PCB 153 and PCB 180) on the locations of Tivat Port and Porto Montenegro exceed BAC values, while PCB 101 and PCB 118 exceed both BAC and EAC values.
- PCB congeners PCB 52, PCB 101, PCB 118, PCB 138 and PCB 153 exceed BAC values on the location of the Risan Port.
- The concentration of PCB congeners (PCB 28, PCB 52, PCB 101, PCB 138, PCB 153 and PCB 180) exceed BAC values on the location of the Kotor Port, while PCB 118 exceeds both BAC and EAC values.
- The concentration of PCB congeners (PCB 52, PCB 101, PCB 138 and PCB 153) exceed BAC values on the location of the IMB Dobrota, while PCB 118 exceeds both BAC and EAC values.
- The concentration of PCB congeners PCB 101, PCB 118, PCB 138 and PCB 153 exceed BAC values on the Orahovac location.

Based on the results of the analysis of organic and inorganic contaminants in shells (*ytilus Galloprovincialis*), it can be concluded that a good chemical status was not achieved on the

locations of the port of Herceg Novi, Shipyard Bijela, Porto Montenegro, Tivat Port, Risan Port, IMB Dobrota, Kotor Port, Budva Port, Port Milena, except on the territory of Orahovac which is the reference location.

The results of physical and chemical analysis of wastewater sampled on all main sewerage outlets both in the towns that do not have treatment plants for municipal wasters (Ulcinj, Bar, Sutomore, Petrovac, Risan and Herceg Novi) and in the towns that have treatment plant for municipal water treatment (Budva, Tivat-Kotor) show that the quality of all tested water is outside the requirements provided under the Rulebook on the quality and sanitary-technical conditions for wastewater discharge, manner and procedure of testing wastewater quality and content of the report on determined wastewater quality (Official Gazette of Montenegro 56/19).

An increased content of suspended matter, BOD5, COD, nitrates, nitrites, ammonia, total nitrogen, total phosphorus, TOC and detergents was determined in wastewater in the towns that do not have municipal water treatment plant.

An increased content of total nitrogen (Budva), nitrates and BOD5 (Tivat) was determined in wastewater in the towns that have municipal water treatment plant.

Intake of increased content of nutrients into the marine ecosystem by wastewater that flow into the ecosystem may be one of the causes of eutrophication.

An increased presence of organic pollutants was not determined in any of the tested samples.

As far as biodiversity is concerned, only phytoplankton and zooplankton were analysed in 2021.

Based on the data, it can be concluded that the values of phytoplankton ranged up to 10^4 cells/l. The values of microplankton and phytoplankton groups: diatoms, dinoflagellates, coccolithophore that were determined during the study are mainly characteristic for oligotrophic-mesotrophic areas.

Intensive development of phytoplankton in moderately warm seas (Adriatic) occurs twice a year: spring and autumn maximum (bimodal cycle). The bimodal cycle is characterised by a higher maximum in the coastal sea compared to the open sea due to a higher concentration of nutrients. This report covered the months of July and October, i.e. the summer-autumn aspect and shows a moderate development of phytoplankton.

Most species that were dominant (*Chaetoceros spp., Leptocylindrus danicus, Navicula spp., Proboscia alata, Pseudo-nitzschia spp.* and *Thalassionema nitzschioides*) are characteristic for nutrient-rich areas. All the species are indicators of ecosystem status which can show characteristics of an ecosystem.

Lower numbers and diversity of toxic species from dinoflagellates group were recorded during the survey (genera *Lingulodinium and Prorocentrum*), while the potentially toxic diatom species from the genus *Pseudo-nitzschia* were frequent and numbers reaching up to 10^4 cells/l. The potentially toxic dinoflagellate *Prorocentrum micans* was often present. The presence of the species that prefer the areas rich in nutrients and the presence of toxic species, although still in small numbers, indicate the changes that cannot be neglected. They indicate the need for monitoring to prevent potential negative consequences for marine ecosystem and human health.

The obtained data show obvious negative changes in the marine ecosystem that worsen by years. Consequently, instead of improving of monitoring of marine ecosystem, it is smaller in scope. Namely, monitoring programme for 2021 was implemented only for the first six months, therefore, some programmes were not implemented or were implemented only partly. Based on such data, it is difficult to make any proposal of measures when the main legal obligation of the Agency is not facilitated, and it is the obligation of monitoring the marine ecosystem at the annual level and report to the public on its results.

Certainly, the main "ailment" of the coastal municipalities remains to be the lack of wastewater treatment plants, and the municipalities that have these plants obviously do not treat the water properly which is up to competent inspections to control.

As far as heavy metals and organic pollutants in biota and sediment are concerned, it is necessary to primarily adopt national regulations (rulebooks) on maximum allowed concentrations of these matters in the said matrices, and only then take measures to eliminate or reduce their content.

Sanitary quality of seawater in public bathing areas

The Public Enterprise for Coastal Zone Management has been monitoring for years now the sanitary quality of sweater on public bathing areas during summer tourist season.

The locations that were subject to monitoring in 2021 were the public bathing areas defined by the Atlas of Montenegrin beaches and bathing areas.

The quality of seawater in public bathing areas in 2021 was monitored on a total of 110 locations along the Montenegrin coast – 18 locations in the municipality of Ulcinj, 15 in Bar, 32 in Budva, 9 in Tivat, 15 in Kotor and 21 locations in Herceg Novi for which the accredited laboratory of the Institute for Marine Biology from Kotor was contracted under a public tender.

Sampling was carried out in 15-day intervals during the summer tourist season, in the period between June and October 2021.

The locations with the quality exceeding the prescribed limits during regular measurement were subject of extraordinary and additional sampling and analyses of seawater to determine whether the pollution was long-term or short-term.

Based on the results of assessment of the quality of bathing water, the bathing water is classified as: **excellent, good, satisfactory and poor.**

The results of testing of the quality of sweater indicate that the quality of bathing seawater on the Montenegrin coast in 2021 was mainly excellent (50.0%) and good (39.1%), while the quality of 5.54% of samples was satisfactory and the same percentage (5.45%) poor.

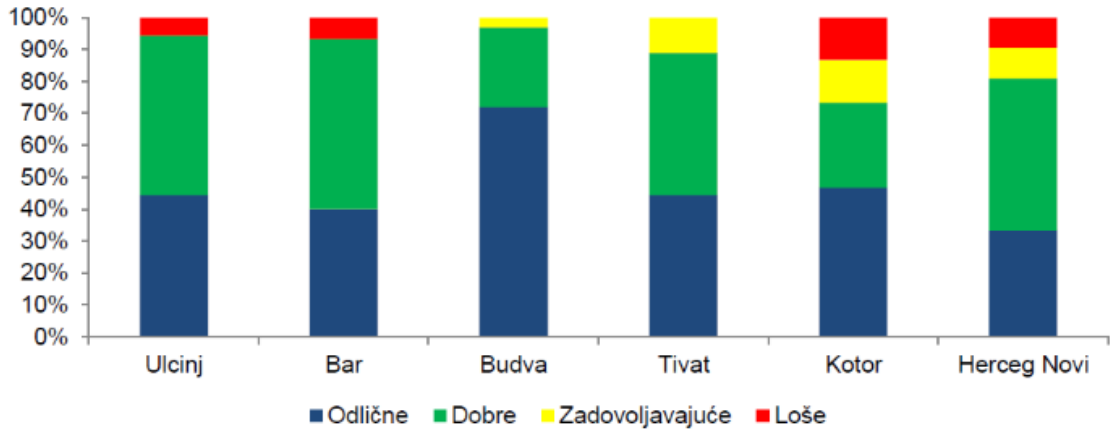


Figure 2.15. Comparative overview of the quality of sweater relative to the total number of samples taken in 2021

2.12. Overview of the existing status of protected natural objects

As far as biodiversity in Montenegro is concerned, the key threatening factors are the loss and degradation of habitats (primarily due to speeding up of urbanisation, development of transport and energy infrastructure), excessive exploitation (illegal hunting, cutting of forests and harvesting of wild fruits), different forms of pollution and climate change.

In the context of Montenegro, biodiversity protection primarily refers to *in situ* protection by establishing protected areas. The analysis of declaration of protected areas shows an upward trend which is expected to continue and achieve the goal defined by NBSAP. A specific contribution to the trend is provided by the establishment of protected areas in the category of nature parks, which currently cover 44.38% of the network of protected areas. The initiative for the establishment of nature parks come from the local level, where this form of protected areas is recognised as a concept that makes a compromise between biodiversity conservation and the local development. Due to this and the increasing anthropogenic pressures, procedures are initiated to establish the parks which were not planned under the previous Spatial Plan.

One of the commitments stemming from the Aichi goals and integrated into the NBSAP is placing minimum 10% of the marine aquatorium under protection. A framework for the first three protected natural areas in the sea of Montenegro: Platamuni[15], Katič[16] and Old Ulcinj island[17] which have been declared nature parks[18] was established under the project "Promoting Protected Area Management through Integrated Marine and Coastal Ecosystems Protection in Coastal Area of Montenegro" (GEF – Global Environment Fund).

The environmental network with corresponding ecological corridors has not been established yet, although activities are ongoing. An inventory of nine key biodiversity areas (KBA) for habitats and

[15] Protection Study for the protected area Platamuni (Environment Protection Agency, 2021)
[16] Protection Study for the protected area Katič (Environment Protection Agency, 2021)
[17] Protection Study for the protected area Old Ulcinj (Environment Protection Agency, 2021)
[18] Decision of declaring the protected area of Nature Park Platamuni (Official Gazette of Montenegro 063/21); Decision of declaring the protected area of Nature Park Katič (Official Gazette of Montenegro 113/21); Decision of declaring the protected area of Nature Park Old Ulcinj (Official Gazette of Montenegro 015/22)

species under the Habitat Directive (Bioč, Maglić, Volujak and a section of the Piva canyon; Cijevna canyon and Ćemovsko Field; Durmitor Komarnica and Pridvorice valleys; Hajla; Komovi and canyon of Mala Rijeka; Ljubišnja and Ćehotina; Morača river canyon; Moračke mountains; Prokletije and Lim valley) was conducted through the project "Establishment of Natura 2000 network in Montenegro" and 33 potential bird areas were identified. Around 35% of land territory of Montenegro have been mapped through project activities for 52 types of habitats (in accordance with the Catalogue of Habitat Types of Montenegro important for the European Union).

It is expected that prerequisites for formal establishment of the ecological network will be created until 2025.

- Areas under national protection

The total area under protected natural areas in Montenegro currently covers 190.030,91 ha or 13.78% of the territory of the country, while this area accounted for 160.655 ha or 7.72% of the territory of Montenegro at the time of adoption of the 2008 SPMNE.

Table 2.7. Overview of protected areas in Montenegro

Type of protected area	Number of protected areas	Size of the protected area (ha)	% of the territory of Montenegro
Strict nature reserve	3	420.00	0.03
National Park	5	100.427,00	7.27
Special nature reserve	1	150.00	0.01
Nature park	9	84.344,32	6.14
Nature monument	56	4.793,54	0.32
Area of outstanding features	2	196.05	0.01
Total	76	190.030,91	13.78

The National Parks (Durmitor, Skadar Lake, Lovćen, Biogradska Gora and Prokletije) covering 100.427,00 ha or 7.27% of the territory of Montenegro have the greatest share in the national network of protected areas. They are followed by Nature Parks (Piva, Dragišnica and Komarnica", Komovi, Orjen, Zeta River, Ulcinj Salina, Platamuni, Katič, Old Ulcinj) with an area of 84.344,32 or 6.14%. The remainder comprises the protected areas in the categories of strict nature reserve, special nature reserve, nature monument and areas of outstanding features.

As far as management is concerned, managers have been appointed for 44 protected areas, while management plans have been adopted for only 10 protected areas (all national parks, strict nature reserves Manastirska Tapija and bleak spawning zone on the Skadar Lake, PP Piva, nature monuments Veliki Gradski Park in Tivat and Lipska Cave).

Table 2.8. Number of protected areas with management plans and appointed managers

Type of protected area	Number of protected areas	Number of protected areas with management plan	Number of protected areas with appointed manager
Strict nature reserve	3	2	3
National Park	5	5	5
Special nature reserve	1	0	1
Nature park	9	1	8
Nature monument	56	2	28
Area of outstanding features	2	0	2
Total	76	10	47

Table 2.9. Nationally protected areas
(extract from the database of the Nature and Environment Protection Agency, 2020)

Name and type	Size of the protected area (ha)	Size of the protection belt (ha)	National protection category	IUCN management category
Strict nature reserves				
Manastirska Tapija	120.00	/	Ia	Ia
Bleak spawning zone on the Skadar Lake	/	/	Ia	Ia
National Parks				
Skadar Lake	40.000,00	/	II	II
Biogradska Gora	5.650,00	14.236,36	II	II
Durmitor	32.519,00	59.524,00	II	II
Lovćen	6.220,00	8.530,00	II	II
Prokletije	16.038,00	/	II	II
Special nature reserves				
Tivat Salina	150.00	/		
Nature Parks				
Piva	32.477,90	8	V	V
Dragišnica and Komarnica	2.994,00	/	III	V
Komovi	21.852,00	/	V	V
Orjen	8.797,20	/		V
Zeta River	11.985,00	/	V	V
Ulcinj Salina	1.477,00	/	II	V
Platamuni	1.087,13	410.20	IV	V

Katič	2.744,93	873.80	IV	V
Old Ulcinj	929.16	337.36	IV	V
Nature monuments				
Arboretum in Grahovo	0.99	/	III	III
Botanical garden Dulovine	0.64	/	III	III
Spas Hill near Budva	131.00	/	III	III
Đalovića Klisura	1.600,00	/	III	III
Gornjepoljski Vir	2.21	/	III	III
Holm oak (*Quercus ilex*) – Bar, on Crni Rt near Sutomore	/	/	III	III
Holm oak (*Quercus ilex*) – Bar, on Crni Rt in Sutomore	/	/	III	III
Holm oak (*Quercus ilex*) – Herceg Novi, on Ilinjica	/	/	III	III
Holm oak (*Quercus ilex*) – Herceg Novi, on Savina	/	/	III	III
Holm oak (*Quercus ilex*) – Ulcinj, below Komina Village	/	/	III	III
Holm oak (*Quercus ilex*) – Ulcinj, in Liman	/	/	III	III
Pubescent oak (*Quercus ilex*) – Ulcinj, in Kruti	/	/	III	III
Pubescent oak (*Quercus ilex*) – Kotor, Donji Orahovac	/	/	/	III
Pubescent oak (*Quercus ilex*) – Podgorica, Urban Municipality Tuzi, in Vranje	/	/	/	III
Pubescent oak (*Quercus ilex*) – Ulcinj, in Zoganje	/	/	/	III
Pubescent oak (*Quercus ilex*) – a group of trees near St. Petka Church	/	/	/	III
Kermes oak (*Quercus coccifera*) – Ulcinj, in front of Jadran Hotel	/	/	/	III
Kermes oak (*Quercus coccifera*), a group of trees - Ulcinj, in Meterize	/	/	/	III
Duboki Do pit in Njeguši	/	/	III	III
A complex of green areas between Forte Mare and Citadela fortresses in Herceg Novi	0.32	/	III	III
Lipska Cave	/	/	III	III
Small Ulcinj beach	1.50	/	III	III

Olive tree - *Olea europaea L. (fam. Oleaceae*) – Budva, Pićanovina in Ivanovići Village	/	/	/	III
Njegoš Park in Cetinje	4.20	/	III	III
Novakovića Cave near Tomaševo	/	/	III	III
13 July Park	3.63	/	III	III
Park of the Boka Hotel	1.20		III	III
Park and the building of the Heritage Museum in Herceg Novi	1.00	/	III	III
Park of the Museum in Topolica	2.00	/	III	III
Park in the yard of the children hospital in Cetinje	0.34	/	/	III
Babatuša Cave	/	/	III	III
Globočica Cave	/	/	III	III
Magara Cave	/	/	III	III
Špilja Cave near Trnovo/Virpazar	/	/	III	III
Bečići Beach	5.00	/	/	III
Buljarica Beach	4.00	/	III	III
Čanj Beach	3.50	/	III	III
Drobni Pijesak Beach	1.00	/	/	III
Jaz Beach	4.00	/	/	III
Lučice Beach	0.90	/	/	III
Mogren Beach	2.00	/	/	III
Pećin Beach	1.50	/	III	III
Petrovac Beach	1.50	/	/	III
Pržno Beach near Tivat	2.00	/	/	III
Sutomore Beach	4.00	/	III	III
Topolica Beach	2.00	/	III	III
Valdanos Beach	3.00	/	III	III
Veliki Pijesak Beach	0.50	/	III	III
Sveti Stefan and Miločer beaches	5.00	/	/	III
Ratac Peninsula with Žutokrljica	30.00	/	III	III
Laurel and oleander stand above Sopot aquifer near Risan	40.00	/	/	III
Slovenska Beach	4.00	/	/	III
Cijevna canyon	2.022,20	/	III	III
Old Ulcinj (island and beach)	2.50	/	III	III

Velika Plaža near Ulcinj	600.00	/	III	III
Large city park Tivat	5.91	/	III	III
Areas of outstanding features				
Trebjesa	159.00	/	V	V
Savinska Dubrava	37.05	/	III	V

– Areas of international importance

Due to their exceptional value and conservation status and based on ratified international conventions, some areas of Montenegro are protected at the international level.

Table 2.10. Internationally protected areas in Montenegro

International protection	**Name of the area**	**Year of declaration**	**Size (ha**
UNESCO – World Heritage List	Natural and cultural-historical area of Kotor	1979	14.600[19]
UNESCO – World Heritage List	National Park Durmitor with Tara River canyon	1980	32.100
MAB – Biosphere reserve	Tara River basin	1976	182.889
List of wetlands of international importance of the Ramsar Convention	Skadar Lake	1995	20.00
List of wetlands of international importance of the Ramsar Convention	Special nature reserve Tivat Salina	2013	150
List of wetlands of international importance of the Ramsar Convention	Nature Park Ulcinj Salina	2019	1.477
Total			**251.216**

A part of the territories of these areas coincides with the nationally protected areas. They do not have specifically defined management structures according to international designations, but they are managed, or their parts are managed through the existing management structures of protected areas.

The protected natural and cultural-historical area of Kotor is managed in accordance with the Management Plan of Kotor, and the Council for Managing the Kotor Areas formed by the Government coordinates protection, conservation and management.

[19] The Law on the Protection of Natural and Cultural-Historical Area of Kotor (Official Gazette of Montenegro 56/13, 13/18 and 67/2019) – boundaries of the natural and cultural-historical area of Kotor covers the total area of approx. 12.000 ha, of which approx. 9.500 ha of land and approx.. 2.500 ha of marine area on the territories of the municipalities of Kotor, Herceg Novi, Tivat and the Old Royal Capital Cetinje. Boundaries of the protected surrounding area cover the total area of approx. 48.049 ha, of which approx. 38.058 ha of land and approx. 9.991 ha of the sea.

The National Park Biogradska Gora is on the UNESCO's Tentative List for the World Heritage List (2010).

In addition to agofloresa, meadows of seagrass *Posidonia oceanica* and *Cymodocea nadosa* stand out in the marine ecosystem. More than 40 species of sponge, 150 species of crustaceans, 340 species of molluscs, more than 400 fish species, three species of sea turtles and four species of dolphins live or occasionally stay in the Montenegrin section of the Adriatic.

Ecological values – the internationally recognised areas include the special flora and fauna reserve Tivat Salina, declared in 2013 for a Ramsar area and the Boka Bay – internal section from the Verige Strait, Kotor and Risan Bay, which have the role of preserving authentic geological, geomorphological, biological and cultural heritage on the UNESCO's List of the world natural and cultural heritage.

2.13. Landscape analysis

The Study of Mapping and Landscape Typology of Montenegro[20] in accordance with the provisions of the European Landscape Convention and the guidelines of the SPMNE.

The Study was prepared in line with the methodology presented in the Manual for Landscaping Planning[21].

Regionalisation of landscapes is the basis for the future detailed elaboration at the level of regional plans for which studies and landscaping plans will be prepared. The landscaping studies can be also elaborated at the local level. Detailed landscaping studies will be elaborated for specific areas of general and public importance.

Excerpts from the Study:

- *Landscape types*

Ten (10) main landscape types have been recognised on the territory of Montenegro (landscape types recognised on the territory of Montenegro, at the national level):

1. urban settlements,
2. flat areas / fields,
3. flats and plateaus,
4. canyons and gorges,
5. river valleys and gorges,
6. lakes,
7. high-mountain type,
8. mountain type,
9. lower mountain type,
10. hilly type.

[20] Mapping and Landscape Typology of Montenegro (Republic Institute for Urban Planning and Design/Planplus – Podgorica, 2015)

[21] Ministry of Sustainable Development and Tourism of Montenegro, LAMP (Land Administration and Management Project), The World Bank (2014): Manual for Landscaping Planning.

– *Landscape character types*

The areas of Montenegro are classified into five regions:

a. landscapes of the coastal region,
b. landscapes of the Skadar basin,
c. landscapes of the karst region,
d. landscapes of canyons and plateaus of the central region,
e. landscapes of mountains and lowland rivers of the northern region.

Based on specific combinations of natural and cultural influences, national and regional landscape types are designated by rather general names that reflect the dominant impact on the landscape character.

At the local level, emphasis is on the identification of lower scale, finer granulation of landscape character types that represent rather local character schemes and provide a stronger contribution to the local spirit of the site.

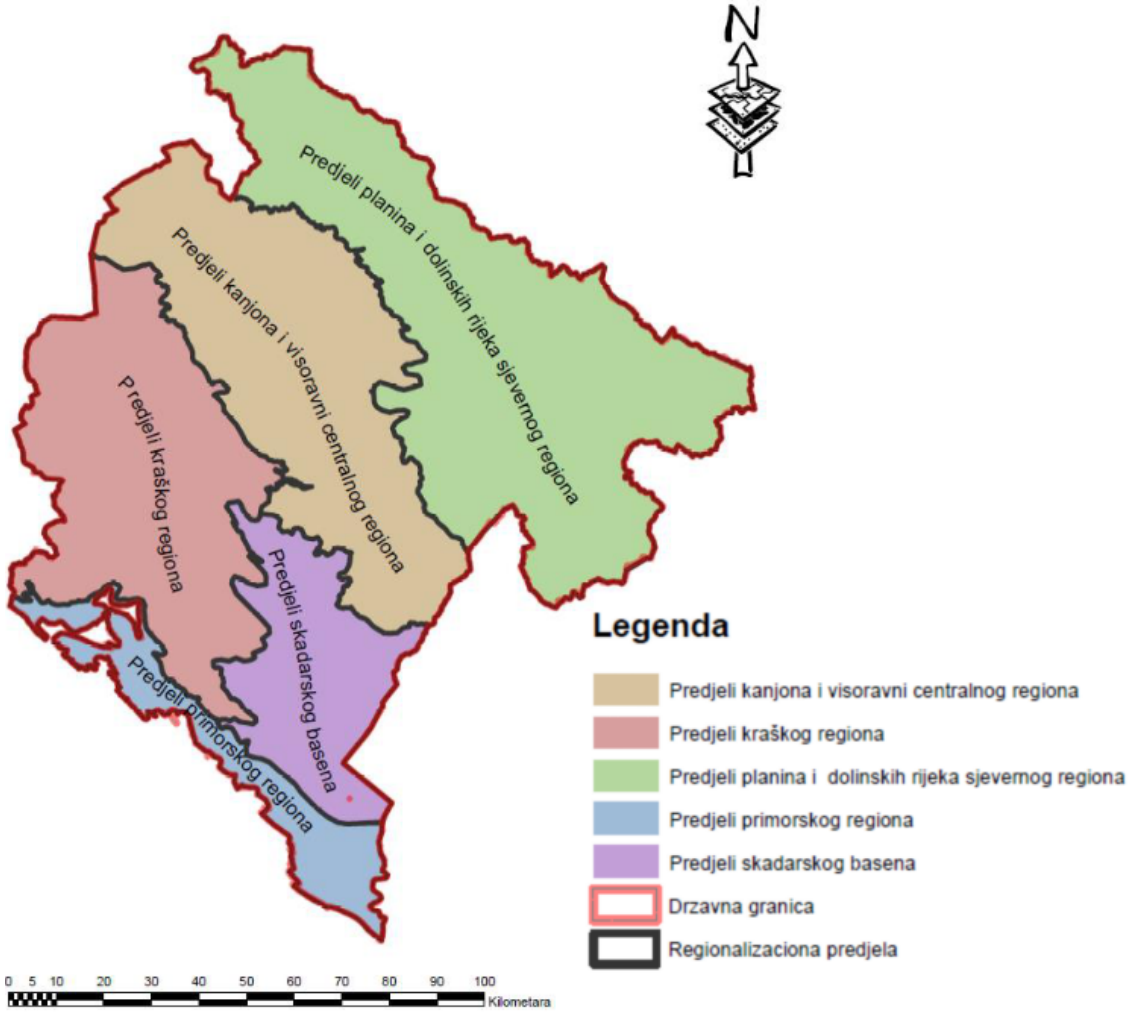


Figure 2.14. Regionalisation of landscapes of Montenegro

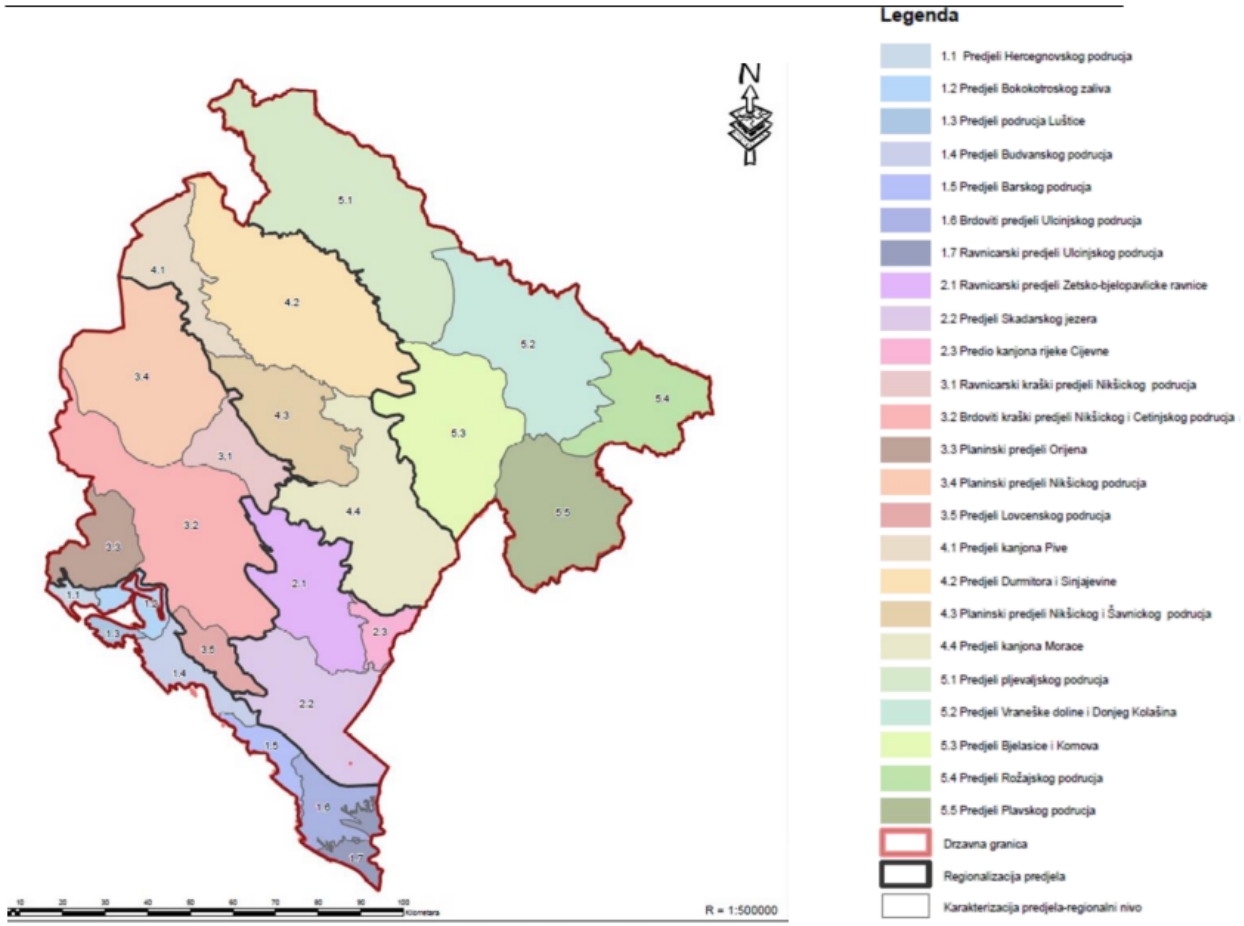


Figure 2.15. Landscape character types – regional level

Analysis of the current situation – landscape status

Urban landscape

The interventions that were planned and implemented in space in recent decades have had a significant impact of the strategic principles of green infrastructure (green infrastructure is a strategically planned of natural semi-natural areas and elements of the urban greenery system that is created to preserve biological diversity and adapt to climate change while improving the quality of life of citizens). Legislation, spatial and urban planning and development strategies for municipalities in Montenegro need to be improved to prevent further devastation of space. Action plans need to be adopted at the level of all municipalities to improve the green infrastructure of towns and to define indicators in order to monitor the changes against the proposed measures.

Agricultural production created uniform field patterns in space which complement a rich landscape image of both coastal and central and northern regions. Terraces with sub-walls on the coast, a regular matrix of cultivated plots on flat land and mountain huts on high mountains constitute unique elements of the cultural landscape. Based on the analysis of socio-economic impact on the transformation and development of rural areas, it can be stated that the intensity of agriculture is not a threatening factor for the landscape structure or for the environmental status. However, rather intensive urbanisation of this area has led to reduction of agricultural areas due to permanent conversion of agricultural land into construction land and abandoning of agriculture.

On the other hand, it is noticeable that the abandoned agricultural areas are overgrown by forest vegetation in successive processes as a result of negligence and non-use over a long period of time. Rural areas in the vicinity of urban zone are threatened by the highest risk of loss of natural and cultural identity. The settlements which are close to urban areas with good infrastructural connections have a great development opportunity. Scattered and hardly accessible villages far from urban areas are in the worst position. They have lower development opportunities in terms of agricultural production but, on the other hand, they are very attractive for tourism. Therefore, special attention should be paid to these areas in the near future.

Informal settlements

The settlements created in an unplanned manner largely affect the degradation of landscape characteristics of space. The pressure on limited spatial potentials, especially in parts closer to city centres which are accessible by transport, increases proportional to the growth in the number of population and (often conflicting) functions. This results in increasingly frequent spatial conflicts which are reflected in distorted environmental characteristics in some spatial segments.

Unlike the economically developed countries where objective indicators of the quality of life in suburban space, such as infrastructure and the existence of various amenities, are by default at the level of urban indicators, this is the main weaknesses in Montenegro.

The main weaknesses of living in suburban areas is the incomplete and underdeveloped infrastructure; a lack of cultural, social, educational, entertainment and sport amenities; distance from towns and weak transport connections; insufficient care for the environment, pollution, negligence, illegal dumpsites, litter, disarranged public areas, contaminated watercourses, odour, noise produced by agricultural machines; construction problems – illegal construction, violation of the appearance of space in environmental terms and permanent loss of the acceptable landscape image. This process takes place in a lot smaller area, owned parcels are extremely small, besides the main structure, several ancillary structures are erected on inappropriately small space without any rules and order, so that outskirts of towns look neither like villages not like towns. They are gaining outlines of a very inarticulate space, without accompanying infrastructure, where efforts have been made in the past decades to introduce a minimum standard of suburban living by elaborating rehabilitation plans.

2.14. Cultural heritage

The cultural heritage of Montenegro comprises the values of all civilisation circles that have pervaded the territory of Montenegro for centuries by meeting of east and the west, which is a culturological advantage that is worth recognising and properly exploiting in multiple ways while fully observing standards of the European Convention and the recommendations in the area of integral and integrated protection of cultural heritage. This primarily concerns the recommendations paying special attention to the categories such as identity and cultural heritage[22], including modern architecture into the “heritage” category, since the current urban development will be the heritage of the future generation[23].

[22] Habitat Agenda (UNHABITAT, 1996) and the European Spatial Development Perspective (ESDP, Potsdam, 1999), CEMAT policy document (strategic document of the European Ministers responsible for spatial planning within the Council of Europe).
[23] Council of Europe – CEMAT, Council of Europe document MAT-12-HF-22

The natural specificities and historical-culturological layers of Montenegro constituted a favourable foundation for creation of settlements, spatially organised in the morphological diversification of the continental block and the coast.

The symbiosis of different civilisation circles, from the Hellenic era, through the Middle Ages, Latin-Venetian west to the Byzantine-Ottoman east, is materialised through the diverse architectural typology in the form of acropolis with suburbs, Roman castrum, medieval market places, monastery complexes, fortifications, sacral and residential forms, which altogether constitutes a uniform value of the cultural landscape of Montenegro.

The territorial dispersion of immovable stock of cultural heritage is heterogeneously represented on the territory of Montenegro. Most of immovable cultural property is found in the municipalities of Kotor (31%) and Cetinje (13%). Boka Kotorska hosts 44.60% of immovable cultural property, and the remaining territory of Montenegro hosts 55.40%. The least cultural property is located in Žabljak (0.23%) and Mojkovac (0.23%), and the municipalities of Andrijevica, Plav, Rožaje, Gusinje and Petnjica may be listed in the register of immovable cultural property in the future period through the elaborated project for enhancement of potential cultural property.

The disastrous earthquake that happened in the coastal part of Montenegro and beyond in 1979 destroyed or serious jeopardised the extremely valuable cultural property, where their concentration is the highest.

According to the available information of the Conservation Administration, “the revalorisation process covered 1.964 cultural monuments – 1.366 of immovable and 598 movable cultural properties. The total of 1.576 revalorisation studies have been submitted, of which 1032 for immovable and 544 for movable cultural properties. The total of 388 revalorisation studies have not been submitted, of which 344 for immovable and 54 for immovable cultural properties. The following four cultural monuments (cultural properties) have been revalorised: Old Town of Bar with the bazaar and the suburb (3 May 2017); Old Town of Ulcinj (25 May 2017); rampart with bastions and the Old Town Budva (28 September 2017) and Sveti Stefan (28 September 2017)”.

2.15. Waste management

As an EU candidate country, Montenegro is obliged to establish a functional integrated waste management system and as assessed by the European Commission, this goal is considered to be one of the priority goals on the accession path.

According to the Waste Management Law (No. 64/11) and the proposed amendments thereto, and according to the Waste Management Law (Official Gazette of Montenegro 64/11 and 39/16), waste means all types of materials that the holder disposed, intends to dispose or is obliged to dispose pursuant to the provisions of the Law. The types of waste are the following:

- municipal waste – waste generated in households (household waste) and the waste generated by performing certain activities which is, due to its nature or composition, similar to the household waste;

“Spatial planning must ensure that the heritage is protected and improved and that modern forms of socio-economic and technological development do not conflict the fundamental cultural layers.”

- commercial waste – waste generated in business entities, institutions and other organisations which are entirely or partly engaged in trade, services, office work, sport, recreation or entertainment, excluding waste from households and industrial waste;
- industrial waste – waste generated in any industry or crafts, and in their locations, whose composition and characteristics differs it from the municipal waste.

Depending on hazardous characteristics that can affect human health and the environment, waste may be:

- non-hazardous – waste that does not jeopardise health or the environment and does not have characteristics of hazardous waste;
- inert – waste that is not susceptible to any physical, chemical or biological modifications;
- hazardous – waste whose origin, composition or concentration of hazardous may cause hazard for the environment and human health.

In accordance with the Law, waste management means reduction in the quantity of generated waste, i.e. its reuse, as well collection, transport, its treatment and disposal. Also, it means management of monitoring of the above procedures and subsequent maintenance of created landfills, including activities of traders and waste intermediates.

As the base for the establishment of waste management system, the Waste Management Law provides for the elaboration of the National Strategy and the National Waste Management Plan to define the planned system and all objectives, measures and activities that need to be achieved and implemented for the purpose of the establishment of the system.

The quantity[24] of municipal waste generated in 2020 and 2021 is calculated at the national level, as presented in table below.

Table 2.11. Quantities of municipal waste generated in Montenegro

	2020			2021		
	Population	**Waste generation (t/year)**	**Waste generation (kg/capita/year)**	**Population**	**Waste generation (t/year)**	**Waste generation (kg/capita/year)**
Urban areas	405.206	216.547	534.41	406.663	221.673	545.10
Rural areas	216.100	80.841	374.09	212.548	80.307	381.57
Tourists	9.607	6.674	694.74	41.559	29.450	708.63
Total	**630.913**	**304.063**	**481.94**	**660.770**	**331.430**	**501.58**

Source: Draft Waste Management Plan of Montenegro, 2023-2028

More than 70% of waste is generated in urban and tourist areas, while ~27% of total municipal waste is generated in rural areas.

[24] https://www.monstat.org/eng/page.php?id=1011&pageid=64

The Capital Podgorica generates ~30% of total waste, followed by Nikšić. In addition, the municipalities of the coastal region of the country (Bar, Budva, Herceg Novi, Kotor, Tivat and Ulcinj) account for 25% of the total generated waste.

Montenegro does not have organised collection of data on waste composition.

In 2020, waste collection service covered more than 87% of the population of Montenegro (0.5% more than in the previous year), while more than 90% of waste was collected. Of the total quantity of generated solid municipal waste, around 287.315,9 tons was collected, or 1.3 kg per capita/day.

The total quantity of collected municipal waste comprises household waste that is collected directly from the producer (population and businesses) by public utility companies (PUC), which accounts for 95.3% of total quantity of collected waste or 273.742,5 tons and are considered economic operators entered into the register of organised systems for waste reception, collection and treatment, as well as all the waste that citizens brought directly to landfills.

The data on collected quantities of municipal waste in Montenegro in 2020 and 2021 are presented in table below.

Table 2.12. Quantities of collected municipal waste in Montenegro, 2020-2021

	2020	**2021**
Municipal waste collected by public utility companies	273.742,5	293.294,3
Municipal waste collected by waste collectors, waste transported to landfills by natural persons and directly exported by source producers	13.573,4	15.609,9
Collected quantities of municipal waste - total	**287.315,9**	**308.904,2**
Quantities of waste from citizens who are not included in the system of public transport of municipal waste	16.764,8	16.803,3
Total	**304.062,7**	**325.707,5**

Source: MONSTAT

Municipalities are responsible for the organisation of the entire process of waste collection and disposal on their territories, including collection of fees for covering all costs. This work is done through public utility companies (PUC) founded by local self-governments.

The waste collection frequency differs between regions and municipalities, i.e. waste is collected once a week to several times a day, which is the case in coastal tourist municipalities during summer season.

The waste collection system that is implemented in Montenegro comprises primarily the collection and disposal of mixed waste on the existing landfills in Podgorica and Bar, and on unregulated landfills and dumpsites distributed throughout the country. Collection and recovery of recyclable waste, green and bulk waste is implemented separately in some municipalities (e.g. Podgorica), but the results of the system are poor.

There are three transfer stations (TS) in Montenegro and are located in Kotor, Herceg Novi and Mojkovac (transfer station in the municipality of Mojkovac has been out of function since June

2022). The main reason for using transfer stations is to reduce costs of waste transport to the treatment-disposal facility.

As far the waste recycling and treatment infrastructure is concerned, Podgorica (6), Herceg Novi, Kotor, Budva and Mojkovac have recycling yards.

In 2020, municipal companies (all unitality companies in Montenegro) collected (primary and secondary selection) 5.596 tons of paper, plastics, metal and glass. Additionally, individual (informal) collectors collected 15.961 tons of paper, cardboard, plastics, glass and metal. During the same year, 21.766 tons of packaging waste was prepared for reuse and recycling.

Montenegro has four waste recycling centres as presented in table below. The regional recycling centre in Podgorica, at the Livade landfill, is a system for preselection and selection of recyclable waste (cardboard, paper, plastics, metal, rubber, etc.). The remaining waste recycling centres are located in Herceg Novi, Žabljak and Kotor. In addition, a regional waste recycling centre is under preparation in Bijelo Polje.

There are five disposal sites for end-of-life vehicles (ELV) - in Podgorica (1), Berane (1) and Nikšić (3).

There is a treatment plant for electrical and electronic waste in Bar, and a treatment facility for hazardous medical waste treatment exist in Podgorica and Berane.

Table 2.13. Waste recycling centres in Montenegro

Name	Location	Type of plant	Designed capacity (t/year)	Status	Treated waste (t/year)		Service areas
					2020	2021	
Recycling centre Podgorica	Livade, Podgorica	Material recovery facility (MRF)	90.000	Partly operational – with lower capacity	14.925	12.977	Podgorica, Plužine, Cetinje, Tuzi, Danilovgrad and Šavnik
Recycling centre Meljine	Meljine, Herceg Novi	Recycling plant and transfer station	15.000	Recycling plant inactive – only TS is operational	-	-	Herceg Novi
Recycling centre Kotor	Kotor	Recycling plant and transfer station	15.000	Operational	15.300	17.245	Budva and Tivat
Composting plan Kotor	Kotor	Composting plant	700 (output)	Operational	786 (output)	816 (output)	Budva and Tivat
Recycling centre Žabljak	Žabljak	Recycling plant and transfer station Žabljak		Inactive	-	-	Žabljak

Montenegro has two sanitary landfills for non-hazardous waste, which are located in Podgorica (Livade) and in Bar (Možura). Besides the two sanitary landfills for municipal waste disposal, almost every town in Montenegro has a dumpsite and these widespread dumpsites put a strong pressure on the environment.

Montenegro has 19 operational unregulated dumpsites, of which two are intended only for disposal of construction waste (Dragalj site in Kotor and Brajići in Budva). Of the remaining 17

unregulated dumpsites, eight are under some form of control, i.e. they are fenced, and the disposed waste is partly levelled. Out of eight unregulated controlled dumpsites, two are designed to have fences and gates, and they were subject to some construction works prior to waste disposal such as preparation of embankments, construction of access road, etc. These two unregulated dumpsites are located in Nikšić (Mislov Do location) and Andrijevica (Sutjeska location).

According to the MESPU, Montenegro has 334 unregulated landfills/dumpsites[25].

The Environment Protection Agency has issued (2021) eight waste treatment permits (four companies), eight waste transit permits (six companies), three companies are entered into the register of hazardous waste exporters (12 hazardous waste export permits) and 13 companies are entered into the register of non-hazardous waste importers (13 non-hazardous waste import permits).

3. IDENTIFICATION OF AREAS WITH A POSSIBILITY OF EXPOSURE TO SIGNIFICANT RISK AND ENVIRONMENTAL CHARACTERISTICS IN THESE AREAS

This part of the Report on the strategic environmental impact assessment will focus on the areas of special interest for assessing the impact of the discussed planning solutions on the areas that will be exposed to a significant impact of the Plan.

For a successful identification of the areas that may be under significant risk during the implementation of the Plan and for the definition of environmental protection objectives, it is very important for the planning solutions to be concise and clear. The identification of the areas exposed to risks is the phase of primary importance for the elaboration of a quality SIA Report and creates a foundation for the definition of the type and magnitude of the impact of the proposed planning solutions, the measures for mitigating negative impacts, all for the purpose of reviewing and choosing the most acceptable solution.

The Spatial Plan of Montenegro as the umbrella document that defines further spatial development certainly uses and analyses the data from sector studies and strategies but should clearly recognise only the problems that are directly related to spatial planning. Many problems in achieving sustainable development are much wider that the problems that can be treated trough the Spatial Plan. In this context, it is necessary to clearly separate spatial planning problems by sectors for the purpose of further elaboration and clearer definition of the criteria for the assessment of negative impacts of the Plan, because their clear definition can also help to consider specific reasons that led to the current situation (which is clearly characterised as unsatisfactory) and thus can propose the solutions for rehabilitation/improvement of the situation by priorities, bearing in mind the planning period (2040). This approach would help to define more clearly the indicators for monitoring the status and the guidelines for further implementation.

The essence of the Spatial Plan of Montenegro is reflected in the guidelines for its further implementation as this is the only way to ensure its implementation while understanding fully that the Spatial Plan includes an element of the strategic development vision. The guidelines defined

[25] MESPU (2021). Report on the implementation of the National Waste Management Plan for 2020 (Annex 6).

by the elaboration based on the data about the existing status of space and the sustainability criteria are the most important part of the Spatial Plan for the purpose of setting, considering and implementing the development objectives. This fact is particularly important given that the existing legal framework and the Law on Spatial Planning and Construction of Structures. It is the fact that amendments to this Law are underway and that completely different spatial planning solutions are expected. We want to point out that if the Spatial Plan is adopted before the new Law is adopted or if the adopted Spatial Plan of Montenegro is not harmonised with the Law whose amendments are well in progress, we may found ourselves in a situation where we have a document with the guidelines for further spatial planning which are not harmonised with the Law, which puts its main purpose into question.

We note that the Draft Spatial Plan includes numerous objectives often without offering specific solutions for achieving them. One of the examples is land policy where the objective is listed with regard to the reform of the system of spatial planning, regulation and use of space to ensure efficient and consistent implementation of strategic commitments and development objectives. This objective is directly linked with the previously stated fact that the reform of the system requires amendments to the existing legal framework which is currently in the implementation phase. As such, it puts the concept of offered planning solutions into question.

This chapter of the SIA will present the identification of the areas that could be at significant risk during the implementation of the Plan, i.e. an overview will be provided for the primary recognised conflicts in space that needs to be addressed through further phases of elaboration of the Spatial Plan in order to maintain its main purpose and function. The identification of recognised conflicts in space will be presented through development areas in line with the methodology of the planning document.

Land policy

A successful achievement of the objectives under the Spatial Plan of Montenegro would require a clear proposal of the policy for legalisation of structures, especially those built in floodplains and the marine zone, zones of sanitary protection of springs and other areas whose use is in conflict with the current use of housing and economic activity.

Use of land area

The Draft SPMNE offers guidelines for the use of water areas, and it is stated that these areas should be used in line with the guidelines provided in the area of water management relating to the use and protection of waters and the protection from waters.

It should be kept in mind that water areas defined in this manner, although it is formally correct and legally defined, have limitations in application due to the current status of the enforcement of the Law on Waters and the secondary legislation. Definition of water areas or water-saturated land cannot be implemented in practice certainly over the next 5 to 10 years due to the procedure of definition of boundaries of the water-saturated land in accordance with the Law.

The graphical part of the Plan transposed the data obtained through the implementation of the Floods Directive, which is very important for spatial management. It should be kept in mind here that the areas which are at risk of floods have been determined on the basis of several criteria, the most important being the number of citizens who can be threatened by floods. The matter of areas that are currently not a part of larger settlements remains open, and through the future

urbanisation they can result in considerable risks for both the population and the property and in reducing natural retention capacity of certain zone, which could lead to an increase of flood waves.

Concept of use of sea surface

The pressures with the largest impact on the marine ecosystem include tourism, due to increasing development of this sector and the pollution impact resulting from disposal of waste into the sea; shipyard (overhauling of yachts), construction of increase of the capacity of existing ports and marinas due to water turbidity, dispersion of sand and dust particles, concreting, and various methods of shore regulation, with a special focus on beach regulation by backfilling. The impact of exploitation of mineral ores is assessed as highly adverse due to a large radius of impact off the living communities of the sea and thus the process of shell farming. Backfilling of the sea (replenishment of beaches), outlets of municipal and industrial waters have shown a rather high vulnerability, primarily due to the quality of farmed organisms, health and safety of consumers and due to potential "suffocation" of farmed organisms by construction on the shore that uses inadequate building material and the water turbidity that can results in closing of gills and prevention of filtration, and in the mortality of shells in the worst-case scenario.

The map below (Figure 3.1.) gives an overview of the status of the marine ecosystem of the Boka Bay, i.e. the proposal of an integrated concept of the protection of the Bay. The map is obtained by entry and overlaying of all relevant existing data on biodiversity, important habitats, level of contamination, areas of spawning of economically important fish species, importance of landscapes, archaeological sites, existing protected areas (Tivat Salina), hydrographic conditions and the areas suitable for shell farming.

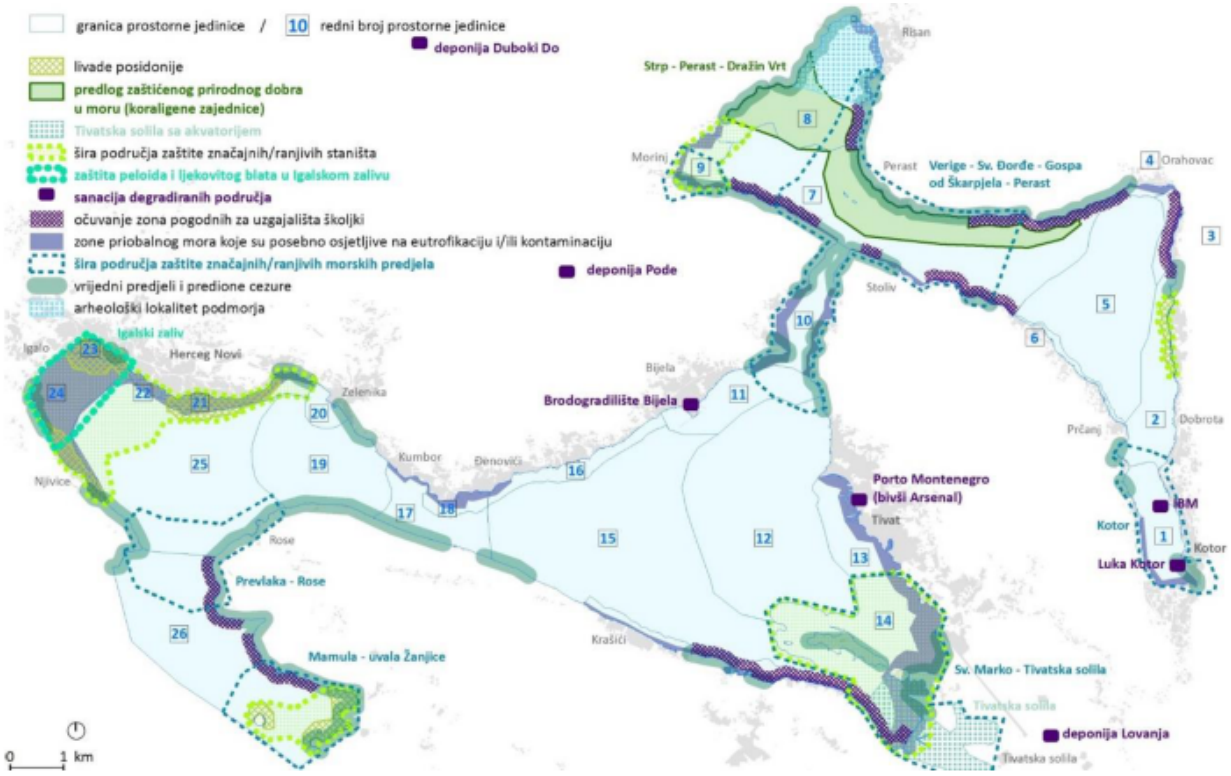


Figure 3.1. Status of the marine ecosystem of the Boka Bay with proposed integrated protection concept (RAC/SPA, MSDT, 2017)

The vulnerability analysis (based on the data of the Programme of monitoring the status of ecosystem of the coastal sea of Montenegro, which was implemented between 2008 and 2011) showed a very high vulnerability of the sea in Boka Kotorska, on some locations in Budva, Petrovac, Sutomore, Bar, Ulcinj and in the open sea. The following stand out as the most vulnerable: the most indented part of the Kotor Bay, the part between the Shipyard in Bijela and port Porto Montenegro, the area around St. Marco Island in the Tivat Bay, a part of the Herceg Novi Bay, from Igalo to Mamula, coastal part on the territory of Budva and Petrovac, and a narrow belt from Valdanos to Bojana estuary. Generally, the narrow belt of the open sea and the Boka Bay are highly vulnerable to pollution caused by potential accidents on the sea (Figure 3.2.).

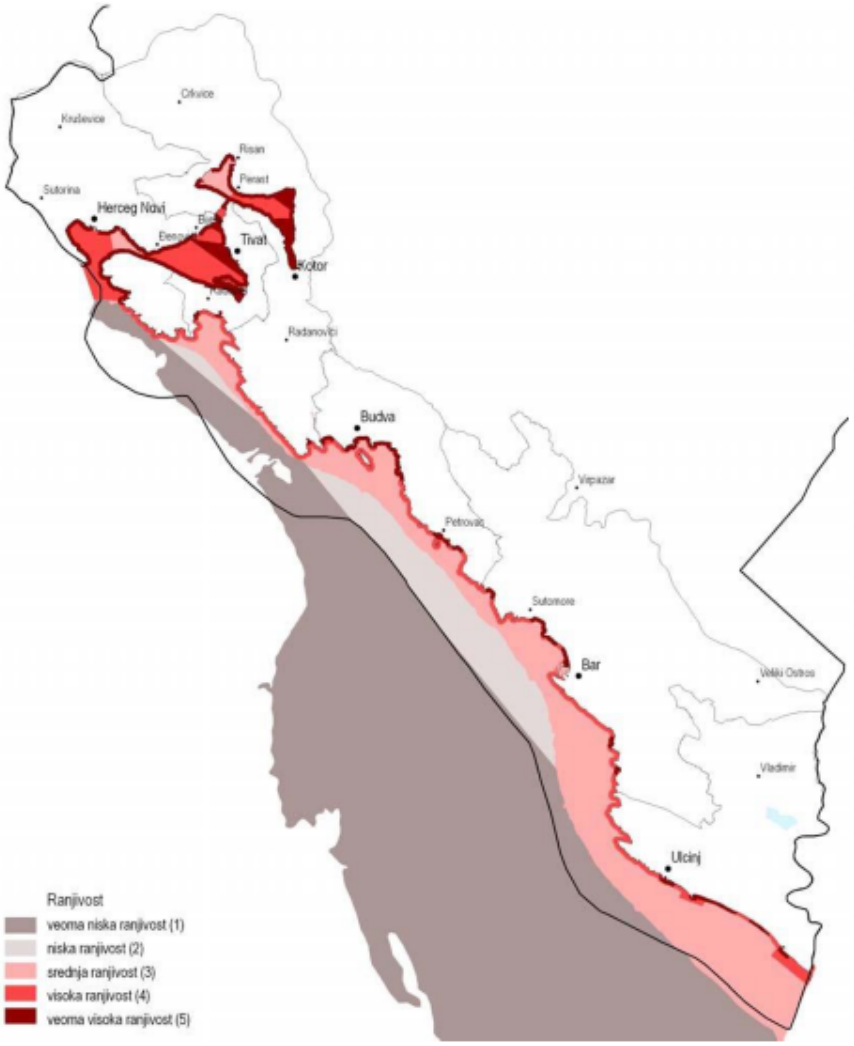


Figure 3.2. Total vulnerability of the marine environment (average value) (source: NSIUOP MNE, 2015)

From the aspect of biocenology potential, it should be pointed out for the open coastal sea of Montenegro the importance of the wider area of Bojana mouth to Šasko Lake and Port Milena as a natural reserve of fish roe, which can be used as the basis for mariculture development, prior to establishing and implementing the programme of artificial reproduction. Migratory routes of some important fish species are also here. The area of Velika Plaža hosts deposits of medicinal

muds and mineral water. Among important bioecological potentials, emphasis should be placed on the deposits and the use of medicinal muds (peloid) in Igalo, Tivat, Bigova and Ulcinj since their essential part is composed of the fossil remains of microscopic algae.

The part of the Draft Plan related to the use of the sea surface mentions further construction and development of new spaces on the shore that will enrich the quantity and quality of bathing areas on the Montenegrin coast. Given the obvious pressures on the marine environment and the coast area, projects of concreting the shore and backfilling of beaches, the question is whether there is truly toom to plan further construction of bathing areas and devastation of the coastal area, so attention should be focused on improving the offer of existing urban zones, including bathing areas. The zones in which further development of bathing areas is planned should be clearly presented to assess the compatibility of space with the construction of the bathing area based on the characteristics of such zones (spatial coverage). Therefore, the previously mentioned vulnerability study should be used as the basis for the definition of clear planning guidelines and solutions so that the remaining free space is used adequately also for other activities whose development is planned in the future.

In line with this, further planning elaboration needs to specify the zones and locations on the shore for further enlargement of the bathing zone while taking into account characteristics of zones and their absorption capacity. It should be expected that the Spatial Plan proposes the areas that could absorb to the minimum extent and through further development of space the increased tourism capacities and thus the possibility to increase the number of bathing areas. Based on the statistical data, the current development level and the realistic assessment of needs for the increase of capacities, the Spatial Plan should provide guidelines as for the part which can be used for the analysis of the potential increase of the capacity, both accommodation and bathing.

In relation to this, special attention should be paid to the existing data that indicate that, depending on the source, the maximum capacity of beaches in Montenegro are estimated at 160.000 – 270.000 visitors at once, which is considerably below the existing and planned accommodation capacities (around 480.000 beds until 2030, considering the strategy proposed within the Sector Study for Tourism, Ratković et al. (2018))[26]. In addition, the Strategic Environmental Impact Assessment for the Special Purpose Spatial Plan for the Coastal Zone draws attention to the conflicts caused by the sizing of tourism capacities on the locations in the beach zones, which are already overloaded and cannot receive additional bathers. It will not be possible to classify the new tourism capacities into 4* and 5* categories or categories with more stars because they will not be able to meet the standards required to ensure the required beach area per bather. According to the MONSTAT data for 2016, the number of beds in the coastal area equalled 158.192, the number of residents in the coastal municipalities equalled 148.683, whereby it is planned to increase the number of beds (≈bathers) to 104.477. Considering that guests who own houses and apartments, as well as “bathers for a day” concentrate on the cost during summer, we get the data showing that >400.000 of bathers will concentrate on the beaches on the coast. According to the data from SPSP CZ MNE, the total area of beaches is 1.615,700 m^2, less than 5 m^2 per bather if divided with the total number of bathers. The fact that some beaches require special standards should not be overlooked, so the available area of beaches will be even smaller. This calculation can be also drawn for specific locations where the standards requiring more than 1.2 m^2 per bather cannot be met.

[26] SUPPORT TO THE IMPLEMENTATION AND MONITORING OF WATER MANAGEMENT IN MONTENEGRO, Eptisa: Baseline Assessment of the Status of Marine Environment, 2020.

According to the Baseline Assessment of the Status of Marine Environment (Eptisa, 2020), the analysis of the BaU scenario (business-as-usual) leads to a conclusion that the existing policy response (if implemented adequately) will be efficient in addressing many pressures, but not sufficient to ensure that negative impacts and risks for human health, biological diversity, ecosystem integrity and/or legitimate use of seawater are minimised or eliminated, which is one of the main objectives of the Law on Protection of the Marine Environment (Official Gazette of Montenegro 73/19). According to the BaU scenario, it is expected that the development of current uses of seawater will result in worsening of the status of the marine environment for several descriptors, primarily for marine litter, biological diversity and the integrity of the sea bottom, but also (to a limited extent) for non-native species, commercial fish species and contaminating substances. It is to be expected that the pressures that cause eutrophication of seawater will be neutralised by improved waste and wastewater management that is required under the applicable legislation, which will lead to the status of the marine environment for descriptor 5 without deterioration or improved. Considering the scope of activities, the importance of pressures and the availability of data, the analysis of the baseline scenario was limited to key uses, including tourism, marine transport, fishery and mariculture, treatment and disposal of waste or wastewater. The year of 2030 is taken as the timeframe for the analysis within the Study.

Development of social activity

The realistic definition of specific educational objectives requires the accurate number of citizens of Montenegro, the number of children by municipality and the number of elementary schools, secondary schools and pre-school institutions that are lacking but are necessary to achieve an adequate education quality level. Clear indicators of the current situation can offer clear guidelines for further elaboration and achievement of objectives. The same principle should be applied to healthcare and social and child protection. The Draft Plan lacks clear data on the number of institutions that are missing in municipalities. The same can be stated for healthcare and the number of primary healthcare centres that are missing in municipalities, and the capacity and the number of healthcare facilities for inpatient treatment. The demographic policy is essentially not in the domain of the SPMNE, but reserving areas in the future development in relation to real trends is certainly directly linked with the Plan.

The concept of the development of energy and power infrastructure

Further development of the energy sector must be perceived through the prism of current and future energy needs, including strategic commitments of the country with respect to these important topics. This is primarily related to the future of the Thermal Power Plant Pljevlja and further activities related to the use of coal and the development of unmanageable renewable energy sources that pose a new challenge in managing the overall system for electricity generation and distribution. The construction of a large number of facilities for the generation of electricity from unmanageable renewable sources such as solar and wind power plants impose a need for additional energy capacities that are manageable and in case of Montenegro, this is the energy generated from hydro potential. A very complex picture of the energy balance, insufficiently explained in the Draft Plan, imposes a clear need for additional manageable energy sources that are necessary for the functioning of the system. The planned energy facilities based on the utilisation of hydro potential have been recognised as clear obvious conflicts in space, contrary to environmental protection objectives. Planning of hydro power plants attract a lot of public attention and cause problems in the implementation of projects mainly due to the lack of a clear development vision. Many of these problems discussed publicly are very realistic and require political decisions based on facts showing what the public interest is, and what will be lost in case of construction. The last in a series of cases is the construction of the Komarnica hydro power

plant and this topic is still open without a clear decision of the state. This is connected to the planning of the hydro power plant Kruševo whose planned position brings new challenges, since there is an obvious conflict between nature protection and energy development. In case of the hydro power plant Kruševo, it is the site that is a part of the Nature Park Dragišnica Komarnica, which is a direct conflict with the need to preserve the values of the protected areas and the provisions of the Law on Nature Protection. We are of the opinion that it is very important to address these conflicts between the current use of areas and the planned development in the Spatial Plan of Montenegro in terms of deliberating an alternative location for planning the facilities that are in direct conflict.

Building on the above, we highlight the facts related to the planned HPP Boka for which we believe that it is completely unacceptable since the implementation of this project implies releasing huge amounts of fresh water into the Risan Bay with preventively protected sites of Sopot and Dražin Vrt in the vicinity (which will be declared permanently protected areas until this procedure of strategic assessment is completed). In addition, this large amount of fresh water from the Bilećko Lake would contribute to a serious distortion of the nature balance of the marine ecosystem of this part of the Bay. Therefore, given that the HPP Boka is in the phase of the conceptual design, we provide an overview of tentative amounts of water that would be released into the sea. The quantities of water that are considered available at average in a year for generating electricity in Montenegro are derived on the basis of the area occupied by the Bilećko Lake on the territory of Montenegro (18% of the territory), but also the volume of the reservoir that is located on our territory (24%), which corresponds to the average annual inflow of 25 m^3/s, i.e. 788.4 x 106 m^3 at average.

We particularly want to draw attention to the amendments to the Law on Spatial Planning and Construction of Structures, specifically to Article 218c. The existing legal solution allows obtaining UTC for the construction of energy facilities that use renewable energy sources under a simplified procedure and without a plan. Although this practice is aimed at promoting renewable energy source and helping the implementation of projects of public interest, this practice can cause problems in spatial management because the lack of a planning document offers an opportunity for a partial consideration of all spatial elements and potential uses of space. Bearing in mind that the Article relates to the possibility of project implementation in the areas without a spatial planning document, its further implementation needs to be reassessed, taking into account that the use of a location needs to be harmonised primarily with the environmental characteristics as the basis for the assessment of potential negative impacts. According to the information available to the author of this document, a significant number of locations have been identified, which are intended for the development of the energy sector and are in direct conflict with nature protection and valuable biodiversity sites.

Further development of renewable energy sources in Montenegro through the Spatial Plan, without an integrated consideration of space that implies a clear analysis of the situation and areas, leads to a direct conflict with valuable areas from the protection aspect. Spatial planning without prior analysis of the covered areas created a foundation for repetition of problems in further elaboration of the planning documents for the project implementation. Insufficiently clear guidelines for the use of some areas leaves room for signing concession contracts first, and only then the conflicts in nature and environment protection are recognised. This is the problem that Montenegro has been facing for years and that needs to change.

At the time of elaboration of the Draft Plan, the Ministry of Ecology, Spatial Planning and Urbanism issued UTC for the construction of several more solar power plants in the territories of the municipalities Nikšić, Cetinje, Bijelo Polje and Pljevlja. The information on the planned status need

to be updated to define their acceptability and to assess impacts within further assessment as the basis for further guidelines. Since it is to be expected that the further elaboration of the SPMNE will clearly define the areas to be considered through lower-level planning documents as potentially acceptable for solar farms and windmills, further elaboration of this document will use natural characteristics of these areas to assess the acceptability for the desired use.

Water management

Starting from the main function of water for protection public health and the fact that water supply has priority over the use of water for other purposes, the problem of protection of sources of drinking water is imposed as the primary obligation of the community with respect to this irreplaceable resource. Especially considering that out of the total population of Montenegro, more than 63% live in urban areas, and public water supply system cover 99% of urban population or around 400.000 citizens of Montenegro. Bearing in mind the vulnerability of urban areas and enormous pressure on space in spring catchment areas, there is a realistic concern that climate change will complicate further the conditions for the protection of water sources.

The available data show that sanitary protection zones are not determined on many water sources in Montenegro, although there are clear legal provisions on the necessity to determine the protection zones. According to the available data of the Water Administration, sanitary protection zones are determined for around 50 of 85 water springs. Beside this, even where the procedure for determination of protection zones is implemented, it is not a rare case that problems are encountered with regards to the lack of data that should help to determine and establish the protection zones. There is also a specific problem with the definition of a wider protection zone for water sources, which coincides with the catchment area of the water source. It is necessary to determine potential water sources for the future needs for drinking water that need to be treated as the existing water sources. It is only then that the spatial limitations can be discussed for the protection of the health of the population due to the use of water for public water supply. This problem needs to be elaborated and a solution needs to be proposed within further elaboration of the Spatial Plan. Spatial planning needs to take into account the existing zones to maintain the quality of waters and avoid future conflicts in space.

The problem of sanitary protection zones which have not been determined for many water sources is obvious in the case of Otilovići reservoir which is used for water supply in Pljevlja. Opening of a new coal mine Maoče is planned in the zone, which is assumed, based on the existing information, to include the area covered by the boundaries of the sanitary protection zone for the water source. Besides being in conflict with the use for the protection of the water source, this zone is in also in conflict with nature protection and the planned protection of upstream Ćehotina, which is in the procedure.

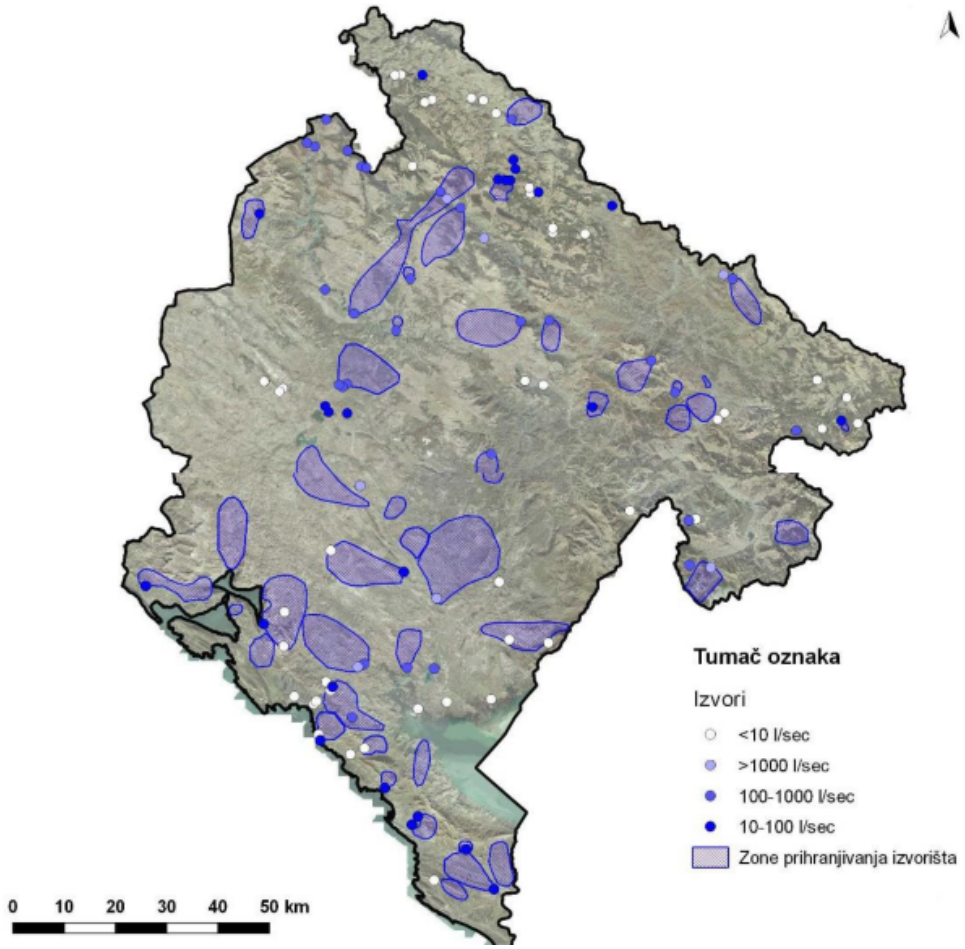


Figure 3.3. Replenishment zones of water sources

Bearing in mind future climate change and its impact on the change in the regime of waters used for public water supply, it will be necessary to define potential water sources to conserve their catchment areas from all pressures made by urbanisation. It should be kept in mind that numerous water sources used for water supply which are found in the vicinity of larger towns or are under pressure of processes of urbanisation, industrialisation, agriculture, road infrastructure, unregulated dumpsites and wastewater.

Spatial planning should certainly pay special attention to the conservation and protection of underground water sources, wellsprings and other natural inflows of fresh water into the Boka Bay.

Special emphasis should also be placed on the lack of data on water regimes on small torrent water courses which pose a serious safety problem in the period of floods. This is particularly prominent in the areas affected by urbanisation, primarily on the Montenegrin coast. These are water course which are mainly under the jurisdiction of local self-governments which, unfortunately, do not conduct organised observations and measurements and management plans for their catchment areas. Due to the lack of data needed for the hydrological analysis, the areas of torrent coastal water courses are not included in the analysis of flood hazards and risks, although the need for their analysis is clearly stated in the preliminary flood risk assessment for the Danube and Adriatic catchment areas.

Mining, industry and hydrocarbon exploration

In the light of the recent developments relating to the prevention of illegal exploitation of sand and gravel from the Morača water course, it is necessary to conduct a comprehensive analysis of the situation with regards to the amount of material exploited and used annually in Montenegro, regardless of the legal status of these activities. Since it is assumed that these quantities are large, that all the material is used in Montenegro, these mineral materials will be deficient on the market. In order to ensure the required amounts of sand and gravel, it is necessary to calculate the quantities required at the national level, compare them with the existing capacity of quarries and determine the missing quantities and potential locations for future quarries.

Bearing in mind the existing concession contract for the Brskovo Mine in Mojkovac and despite the use of areas, it is necessary to recognise the conflict in space that is related to the concession area located in the buffer zone of the National Park Biogradska Gora. We reiterate the previous practice for determination of the concession areas suitable for the development of mining which are in direct conflict with other uses of the areas. The previous practice misleads potential investors and prevents the development of mining projects because conflicts are not addressed in earlier phases of use of areas. These situations require a clear position of the country with respect to development policies for specific locations and prioritisation of uses of areas.

The planned further development of coal exploitation on the territory of the Pljevlja Municipality in the Maoče zone is in direct conflict with nature protection, i.e. the protection of upstream Ćehotina. A study has been prepared for protection purposes and the procedure for declaration of the protected area is ongoing. Besides this, the section of water supply states the conflict concerning the protection of the water source Otilovići that is used for water supply of Pljevlja.

Forestry development

As stated in the section on the analysis of current situation, forests and forestland cover 69.4% of the total land of Montenegro. However, although they represent a dominant spatial component, the Draft SPMNE does not address and does not present adequately forests and forest ecosystems, with all of their specificities and characteristics. Further elaboration of this document will provide more detailed information on forests.

Forestry activities are also presented in a few sentences where it is stated, *inter alia*, that “the structure of growing stock improved in the previous period in the area of forestry, the number of fires increased, as well as illegal cutting and other damage to forests …”, which is not logical and should be mutually excluding. What is essential is that the section on the assessment of natural conditions for development / possibilities for using space, forestry is not mentioned, even though forests and forestland cover almost 70% of the territory of Montenegro. The proposed concept recognises forestry as a development opportunity only in the zone of Rožaje. Forestry is not recognised as important even for the territory of Pljevlja where most of economic forests are located. Minimisation of the importance of forestry can only result in threatening of the spatially most important natural resource of Montenegro. The improvement of the status of forests should be based on multifunctionality, professional criteria and on the principles of forestry profession, which would have to be emphasised more in the document of the SPMNE.

The Forestry Development Strategy recognises lack of staff as one of the main problems in successful management. There is a strong need for skilled, highly educated staff in forestry to manage this resource on the professional grounds and to ensure durability of utilisation while continuously improving the status of forests. Educating professional staff in this area would

certainly contribute to better understanding of problems related to the conservation of the environment that Montenegro is committed to, since it is defined as the ecological state by its Statute. Since the SPMNE is also a development plan, it would be good to also include this, maybe the key segment of forestry development.

Sustainable and multifunctional forest management is the key milestone in both the Forest Law and strategic documents. Excluding some groups of forest functions from the planning document of this level is unacceptable from the perspective of modern forestry and essentially unsustainable and could result in undermining of the system of multifunctional and sustainable management. The sustainable and multipurpose forest management is achieved by adopting and implementing planning documents in accordance with the law, strategic commitments and accepted international commitments, so this segment should have provided a better insight into the strategic framework for forests and forestry. Consideration should be given to the process of amendments to the Forest Law, forestry development strategies, forest management concept and abandoning the concession-based exploitation of forests.

The determination of the forest management system provided in the concept should be redefined, especially in relation to the selective forest management, since any imprecision or inaccuracy defined by this planning document can cause problems in creating lower-level plans and thus in forest management.

Potentials risks and conflicts which are essential for improvement and sustainability of forest resources would need to be considered and addressed more clearly.

Given the conditions in Montenegro, forest functions can be divided into three main groups:

- production,
- ecological (protective), and
- social.

The production functions are expressed through the production of wood and other forest products. The other forest products are considered to be:

- forest regeneration products (forest seed, seedlings of forest trees, cuttings, etc.),
- forest fruits,
- medicinal herbs,
- products for various industrial purposes (resin, humus, needles, cones, etc.).

The ecological and protective functions include a whole set of important aspects. The most important ones are the following:

- favourable impact on mitigation of climate extremes,
- protection from emissions,
- land protection and regeneration,
- water accumulation and treatment,
- production of oxygen,
- biodiversity conservation and improvement, etc.

The social forest functions have been gaining increasing importance in recent decades due to a positive impact of forests on human health and the environment that people use for meeting their needs, and these are:

- recreation and health,
- tourism,
- environmental and landscape,
- education and upbringing, etc.

It is necessary to determine which of these functions should have priority in certain parts of Montenegro.

Although timber is still the most important forest product, the modern concept of forest utilisation insists especially on biodiversity protection and ecological services closely linked with the aforementioned and imply supply services, regulation services, the services of cultural importance and utilisation for scientific purposes.

Besides the need to acknowledge and value all forest functions, modern trends are also related to the expanding of protective belts, mapping of urban forests and improvement of agro-forestry practices as a part of the system of adaptability to climate change and mitigation of population migration and the like. This is also the essence of the most recent EU Forest Strategy, and it would be good to address these segments in the next phases.

All the above indicates that the next stages of elaboration of the SPMNE need to pay more attention to the forestry segment. Attributing more importance to forests and forestry through the highest-level planning and development document will influence the conservation and improvement of the status of this key resource.

Besides this, objectives related to areas under forests and forestland need to be clearly set at the end of the planning period (2040) taking into account the planned infrastructure facilities.

The uniform forestry information system that is mentioned in the Draft Plan should include the component related to the cadastre of burnt areas to minimise the possibility that these areas become construction land.

Hunting

Starting from the data that increasingly show vulnerability of some species due to inadequate hunting policies, the process of the analysis and definition of potential conflicts should pay special attention to the vulnerability of protected areas through inadequate implementation of hunting plans. Buffer/protection zones of national parks and other protected areas need to be defined in the process of adoption of hunting plans as the areas in which hunting is not allowed (non-hunting areas), with minimum width of 2 km to improve the protection of game and other important species and to prevent ever growing illegal hunting. It should be noted that in addition to the existing documents, management plans for bears and wolfs will be elaborated in the next period in accordance with the Hunting Law and EU directives.

Further elaboration of the SPMNE and this document will provide an analysis of applicable hunting plans and clear limitations will be defined based on that.

Marine economy

The section on marine economy and maritime transport mentions planning of new capacities in nautical tourism – marinas on the locations that meet the maritime conditions, the spatial context in terms of the purpose and terrain, environmental protection and the capacity of utility infrastructure. The question is raised as to the locations which are suitable for construction of marinas and further development of nautical infrastructure. Given the existing pressures in the marine environment, is there room for the development of nautical tourism outside the boundaries of the existing capacities. Also, bearing in mind the Tourism Development Strategy until 2025 does not provide data on the missing capacities for nautical tourism, consideration should be given to the data to be used to plan further development and potential construction of marinas.

The Draft SPMNE does not include the solution provided in the Draft Plan with respect to the implementation of the project Virpazar Port. This solution was assessed as unacceptable in the first report on the strategic environmental impact assessment. Although the proposal to construct the Port of Virpazar is excluded, a possibility remains for the opening of a navigation route on the River Bojana which would connect the Skadar Lake and the Adriatic Sea. We highlight the limitations concerning the National Par Skadar Lake that must be taken into account in further planning. The Skadar Lake is a RAMSAR site under international protection and the National Park, so it is completely unacceptable to plan the development of nautical transport, especially without clear guidelines as to the size and number of vessels. The existing legal framework (Maritime Navigation Safety Law, Article 10) allows navigation of motor boats on the Skadar Lake.

Tourism development

Further development of tourism which implies, *inter alia*, expansion of bathing areas and further growth of nautical tourism is in direct conflict with the protection of the marine environment and the coastal zone. Further urbanisation of the coast, backfilling and concreting of beaches in Boka Kotorska will generally result in the reduced quality of tourism offer due to visibly degraded and overloaded space. Bearing in mind the data on pressures in the marine environment of the very sensitive Boka Bay, the question arises regarding further increase of nautical tourism, especially cruise ships, and further construction of marinas.

National parks are very attractive areas for the development of tourism and increasing number of visitors turn to active type of holidays and spending time in nature. On the one hand, the increase in the number of guests and the interest for national parks increases direct and indirect tourism-related revenues, while on the other hand, it created pressures on environmental segments which could result in serious degradation of space. In the process of planning tourism development in protected areas, valid data should be used to analyse the pressures on environmental segments and if turns out to be necessary, consideration should be given to limiting the number of visitors per unit of time.

Tourism development in protected natural property brings a risk of further urbanisation and construction of tourism capacities that affect absorption and regenerative capacities of the natural environment of the protected area. This requires additional education and presentation of sustainable forms of tourism and use of space, as well as a strict enforcement of the Nature Protection Law and the Law on National Parks.

The section of the Draft Plan that addresses tourism development provides an overview of only protected areas which are under the highest levels of protection, although the areas under nature parks should be equally developed and promoted, which leads to relieving of space through

redistribution of the number of tourists, which ultimately results in smaller pressures on the environment of protected natural areas.

Transport infrastructure

The Draft Spatial Plan provides a high-quality analysis of the future highway route, whereby one of the proposed solutions includes a part of the National Park Skadar Lake.

It is stated that if compliance with the Nature Protection Law and the Draft SPSP for the NP Skadar Lake is considered, it can be concluded that the option via the Skadar Lake is not compliant with these documents. The exclusion list E&S of the European Bank for Reconstruction and Development (EBRD E&S policy, Annex 1) states that the Bank will not finance the "activities that are prohibited by the legislation of the host country or by international conventions on the protection of biodiversity resources or cultural heritage".

Key limitations of options from this perspective:

Option	Biodiversity-habitats	Biodiversity-species	Landscape
Across the Skadar Lake	Passing through NATURA 2000 (EU HD Annex I): - permanent loss of habitats, - temporary loss of habitats (access roads, operating areas), - fragmentation of habitats, - risk of degradation of water habitats, - risk of accidents and contamination of lake water.	- Effect of barriers affecting fauna, - Impact on migration routes, - Disturbances due to noise and vibrations.	- Essential change of highly sensitive and nationally valuable landscape (type – lake landscape in the lake's aquatorium), - Cumulative harmful impact on the functional and visual properties of the landscape of the Skadar Lake combined with the existing visual negative impact resulting from the regional road and railway passing across the Skadar Lake, - Negative visual impact for the users of landscape routes and lookouts in this area.
Land	- No physical passage across the land or water territory of the NP Skadar Lake, - Avoiding direct impacts on biodiversity and living natural resources, - No threats for conservation objectives and the integrity of the NP Skadar Lake.		Avoids completely the NP Skadar Lake by passing of the section around Rijeka Crnojevića at the far western periphery of the park, through the 2.5 km long tunnel. - No impact on highly sensitive and nationally valuable landscapes in the Park. - No visual impact on the users of landscape routes and lookouts within the tourist area of Rijeka Crnojevića.

Characteristics of options from the perspective of environmental protection and conservation (ecological and social criteria):

Option	Total length of the passage (km)	Length of the passage in zone I	Length of the passage in zone II	Length of the passage in zone III
Across the Skadar Lake	18.4		3	15.4
Land	-	-	-	-

Based on the aforementioned, it can be concluded that the land option has advantage if the parameter of comparison relating to the environmental aspect has the highest weight. It should be added in the conclusion that it is not only the matter of environmental aspect, but the fact that other options are not possible considering the relevant legal framework.

Within next stages of the elaboration of the Spatial Plan it is necessary to decide on the corridor of the road for fast motor transport, FAST road. Based on the comparison by criteria of execution and maintenance costs (which are further translated into economic costs), costs of benefits for users (travel time, costs of vehicles, costs of environmental protection, costs of traffic accidents), the results of the IPF5 Study show that the initial route from the applicable SP is the most favourable, i.e. the route across the Boka Bay via Verige bridge and does not bypass Paštrovići. However, it is clear that this proposal is not acceptable according to the UNESCO spatial protection criteria and the studies and analyses elaborated to date.

The section of the Draft Spatial Plan on the development of air transport mentions the possibility to develop new airports at the locations of Ulcinj, Bar, Berane, Nikšić, Pljevlja and Žabljak. Bearing in mind spatial capacities of Montenegro and distances between locations, but without prior analysis of characteristics of these locations planned for construction of airports, a clear conclusion is made that the respective locations needs to be reassessed.

This is linked to the consideration of the position of the airport planned in Ulcinj, in the vicinity of Ulcinj Salina, which is protected by the national legislation as the Nature Park which is an internationally important bird site IBA. It should be kept in mind that the Ulcinj Salina is represented with more than 30% in the closing benchmarks for the negotiation Chapter 27 Environment. The construction of the airport in Ulcinj is planned in the hinterland of Velika Plaža for which the scientific findings over the past decades, especially the findings under the project for mapping NATURA 2000 sites, showed that it is outstanding areas from the perspective of the presence of species and habitats that are unique for the territory of our country and are rare in the region and beyond. There is a clear conclusion that the planned airport is in conflict with other uses of areas and the question is raised with respect to its usefulness, bearing in mind distances from the existing airports. Consequently, further elaboration of impact assessment for the proposed solutions will consider in more detail the impacts of this proposal and assess the justification of the proposed solution.

The construction of planned roads (Bar-Boljare highway, Adriatic-Ionian motorway) will make access to the Ulcinj Riviera easier and quicker so the idea of construction of airports should be abandoned, since large areas under habitats that deserve the highest level of protection and a strong commitment of the country in the EU accession process, which strives to protect and conserve such habitats, would otherwise be destroyed.

Waste management

More than 70% of municipal waste is generated in urban and tourist areas, while ~27% of the total municipal waste is generated in rural areas. The Capital Podgorica generates ~30% of total waste, followed by Nikšić. In addition, municipalities in the coastal region of the country (Bar, Budva, Herceg Novi, Kotor, Tivat and Ulcinj) account for 25% of the total waste generation.

The waste collection system which is implemented in Montenegro comprise primarily collection and disposal of mixed waste on the existing landfills in Podgorica and Bar, and on unregulated landfills and dumpsites distributed throughout the country, so these widely distributed dumpsites make a great pressure on the environment.

The analysis of the current status of waste management shows that Montenegro has a significant potential for improving waste collection and management, preventing and managing waste prevention, better use of resources, developing new markets and creating new jobs while minimising harmful environmental impact of waste.

The following should also be noted:

- ✓ there are considerable imprecisions with respect of waste generation in the country since there is no monitoring system,
- ✓ no data on waste composition,
- ✓ no reliable data on real quantities of recovery of recyclable materials by formal or informal sector.

Rehabilitation of unregulated dumpsites is a very important task for the next period. It is estimated that Montenegro has more than 330 unregulated dumpsites where different quantities and types of waste are disposed. Disposal of waste on these dumpsites needs to stop and then they should be rehabilitated in accordance with legislation.

Special attention should certainly be paid to special types of waste. Within the meaning of the Waste Management Law, special types of waste means waste from electrical and electronic products, end-of-life vehicles, waste tyres, waste batteries and accumulators, waste oils, waste packaging, construction waste, asbestos-containing waste, PCB waste, sewerage sludge, medical and veterinary waste. For each of these types of waste, the Law clearly provides obligations and responsibilities of those who handle the waste. The Waste Management Law provides the obligation of at least 70% of non-hazardous construction waste to be prepared for reuse and recycling. This type of waste is still not treated properly on the territory of Montenegro and its generation at inadequately selected locations has a negative impact on the visual appearance of the landscape.

Industrial waste includes all types of waste generated in production processes in industry and crafts and differs from municipal waste by its composition and characteristics. It can be hazardous and non-hazardous. The largest quantities of industry waste are generated in the sector of ores and stone extraction and in the electricity supply sector. Most of these types of waste (more than 95%) is non-hazardous by nature.

Medical waste is all the waste generated in medical facilities and medical research centres or laboratories in the process of provision of medical services (prevention, diagnostics, treatment and research in the area of humane and veterinary medicine). The largest share of hazardous medical waste generated in public healthcare facilities is infectious waste (80%) followed by sharp

objects (8%), chemical waste (5%), pathological waste (3%) and pharmaceutical waste (except cytostatic with the packaging contaminated by cytostatic (2%). The Government of Montenegro adopted the study of concession for medical waste management in Montenegro, which foresees construction of eight medical waste treatment plants. After the waste management system was put in place in healthcare institutions, it was established that the quantity of medical waste that healthcare institutions hand over to the concessionaire Ekomedika LLC for treatment was much smaller that the designed quantity and that the total generated quantity could be treated in the centres in Podgorica and Berane. For the time being, there is no need to build other treatment centres.

Under the Waste Management Law, veterinary waste means the waste generated by providing veterinary services and by scientific research and experiments on animals. Byproducts of animal origin are whole bodies or parts of animals, products of animal origin and other products of animals not intended for human food, including egg cells, embryos and semen that does not meet the prescribed veterinary requirements. Two feasibility studies were prepared under the World Bank MIDAS project within which the quantities of byproducts were estimated. These two estimations produced different results. According to the first study, the quantity was 18 – 21000 tons/year, and around 6000 tons/year according to the second study. It is difficult to estimate the quantity of byproducts generated in Montenegro, bearing in mind that it is still not classified into categories in all facilities, there is no accurate records of animal deaths in households, local utility services do not keep records of disposed dead animals, there is still the tradition of slaughtering of animals in households for own needs, etc. In accordance with the Law on Veterinary Medicine (Official Gazette of Montenegro 30/12, 48/15, 52/16), the Government of Montenegro adopted a five-year Management Plan for Byproducts of Animal Origin that are not intended for human use (Conclusion of the Government of Montenegro 07-3317 dated 28 June 2018). Montenegro needs to build a facility for treatment of byproducts with the capacity of 10.000 tons/year, i.e. 30 t/day. A location in Nikšić is currently being considered for the construction of the byproduct treatment facility.

Under the Waste Management Law, sewerage sludge is waste generated in the process of municipal wastewater treatment in treatment plants. In accordance with the Law, treated sludge can be used in agriculture, on green areas and in parks, for land recultivation, including afforestation of bare land, as overlays on landfills, for special purpose soil (based on waste management plans and spatial planning regulations), for recovering energy by incineration and/or co-incineration and for rehabilitation of unregulated dumpsites and other similar areas that need to be put in use. Sewerage sludge is exported from Montenegro.

Establishment of small composting plants to treat green waste could provide a solution for this type of waste in some areas.

Large unregulated dumpsites have been rehabilitated in Montenegro in recent years, such as:

- Čarkovo Polje in the municipality of Žabljak (end of 2017),
- Vrtijeljka in the municipality of Cetinje (in June 2018),
- Vasove Vode in the municipality of Berane (end of October 2018),
- Zauglina in the municipality of Šavnik (end of October 2018),
- Komorača on the territory of the municipality of Plav (end of 2019).

Rehabilitation of a dumpsite for municipal waste started on the territory of the municipality of Mojkovac in 2023.

Industrial Waste Management and Clean Up Project (IWMCP) was launched in the previous period with a view to strengthening institutional capacity for regulation and industrial and hazardous waste management. Rehabilitation that was carried out included coal and ash landfill Maljevac, Pljevlja, flotation tailing pond Gradac, Pljevlja, Shipyard Bijela, Herceg Novi, and technical documents are prepared for the rehabilitation of red mud basin of the Aluminium Factory Podgorica and the solid waste landfill of the Aluminium Factory Podgorica.

Nature and environment protection

The process of mapping of Emerald first and then Natura 2000 sites recognised habitat types of special interest for nature protection, which currently do not enjoy protection and thus are under various anthropogenic pressures. Other initiatives recognised important bird habitats (IBA) and plant habitats (IPA), many of which are also not covered by the existing system of protection. Emerald areas are nominated under the Berne Convention and Montenegro is committed to design a mechanism for their protection. According to the Action Plan for meeting closing benchmarks in Chapter 27 Environment and Climate Change[27], the Spatial Plan of Montenegro must treat them adequately in terms of protection guidelines and avoiding conflicts between planning and the need to protect them.

As far as the efficiency of management system is concerned, management structures and management plans are not put in place for a large number of protected areas, so protection is often declarative, only on paper. This problem is especially clear for nature monuments. On the other hand, protected areas for which management structures are put in place face a lack of professional and financial capacity for the full implementation of activities provided in management plans. Management plans often neglect the ecosystem approach and do not include an integrated concept of ecosystem services. A significant shortcoming for most protected areas are inconsistent data on boundaries, protection zones and their size (digital verification and corrections are needed), incomplete and scarce information on biodiversity, as well as the incompatibility of previously implemented procedures for declaration of protected natural areas with the newly prescribed categories of protection[28].

The national legislation provides protection for 307 plant species, 111 fungi species and 430 animal species. The criteria (which are not methodologically defined in the process of establishment of the List) on the basis of which the species are protected do not necessarily reflect the extent to which they are rare and threatened in Montenegro.

For the purpose of adequate assessment of the magnitude of impact of the solutions planned under the SP, as one of the main indicators of choice of the proposed variant solutions and potential proposal of a new one, indicators of the status of biodiversity, habitats and species will form the basis. The indicators that will be considered as the basis for assessing potential negative impacts will be the following:

- number of species protected by the Nature Protection Law of Montenegro, whose populations are reduced through the implementation of the SPMNE,
- the percentage of reduced populations of species protected by the Nature Protection Law of Montenegro,

[27] Government of Montenegro, Ministry of Ecology, Spatial Planning and Urbanisms (February 2021).
[28] Enforcement of the provisions of Art. 114 and 115 of the Nature Protection Law (Official Gazette of Montenegro 054/16)

- number of species of international importance whose populations are reduced through the implementation of the SPMNE,
- the percentage of reduction of populations of species of international importance through the implementation of the SPMNE,
- the number of plant species that need to be added to the list of protected species due to the implementation of the SPMNE,
- number of species whose IUCN vulnerability category was changed due to the implementation of the SPMNE,
- number of habitats of international importance whose areas are devastated due to the implementation of the SPMNE,
- areas of habitats of international importance (habitats on the list of the Habitat Directive) which are devastated.

It is not clear how these indicators will be monitored if there are no input, initial data prior to the implementation of the activities planned under the SPMNE until 2040. Further elaboration of this document will include a detailed analysis of indicators for monitoring the status and proposing solutions.

Given the rich biodiversity and natural, conserved areas, it is clear that in addition to national parks, many other areas will be proposed to be a part of the ecological network of protected areas NATURA 2000, which will exceed considerably the minimum of 17%. The Draft Plan should clearly indicate that the country will accept all proposals from experts verified by the EU, or the proposals will be limited to a certain percentage.

Conflicts of sectoral development areas targeting nature protection are addressed for each sector in the corresponding chapters.

In order to properly set the indicators of the status of biodiversity, habitats and species, the study GUIDELINES FOR BIODIVERSITY MAINSTREAMING INTO SPATIAL PLANNING was prepared within GEF 7 project *Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Protection of Biodiversity Hot-Spots,* which collected and analysed available data on the distribution of species and habitats in Montenegro for the purpose of mapping, with separately mapped forest habitats of the national importance. The guidelines defined in the study for highly important biodiversity areas, both at the national and international levels, and as such require special attention in the planning process are presented below. The study presents the defined conflicts in relation to the planned uses of space and the activities in the energy and transport sectors, with the note that more precise conflicts relative to other sector objectives will be defined through the process of public participation.

Objective of biodiversity distribution mapping

The objective of mapping of biodiversity distribution is to identify the areas of special conservation importance since they include important habitat types and species, which should be subject to protection and conservation. The presence of important biodiversity elements is the key to spatial planning, as a potential loss or degradation of such elements could have a number of environmental, social, economic and legal consequences.

Methodology of mapping and identification of areas of conservation importance

The available spatial data on the distribution of species and habitats in Montenegro are collected for mapping, and forest habitats of the national importance are mapped separately. The main source of data was the Natura 2000 database for species and habitats which was created as a product of several projects implemented by the Environment Protection Agency since 2017. In addition, recent literature was used, as well as personal databases held by researchers who were involved in this process. The mapping process covered the land of Montenegro.

As far as habitats are concerned, available data on the distribution of all 85 types of NATURA 2000 habitats that occur on the territory of Montenegro were analysed. The areas absolutely dominated by habitats of excellent and good representation were selected in the delineation process, and habitats of significant representation are intermittently covered if they are found in a mosaic with good and excellent habitats, but do not cover large areas. As far as species are concerned, distribution of 629 species from all taxa categories were mapped, including environmentally important ones (due to their special function in the ecosystem or characterise the ecosystem),endemic and protected under the national or the international legislation (under EU Habitat Directive and Bird and Berne conventions), and their status on the IUCN Red List of globally threatened species was also taken into account. Known animal habitats which represent reproduction centres, feeding zones, the most important migratory corridors, endemism centres which are crucial for their survival were also mapped.

The overlaying of these spatial data resulted in the identification of some areas that stand out by their conservation importance in terms of the presence, rarity, vulnerability status, endemism and the conservation status of habitats and species that were subject to mapping. The delineation of areas was based on the ecosystem approach and coincided with natural boundaries.

Results of analyses of spatial data on biodiversity distribution

The overlaying of spatial data for mapping of habitats and species resulted in the identification of two categories of areas that need to be subject to special measures in the spatial planning process.

A – Areas of outstanding conservation importance

These areas include the areas that meet at least two of the criteria below:

A1: they are dominated by Natura 2000 types of habitats of excellent and good representation.
A2: rare sites with some of Natura 2000 types of habitats.
A3: habitats of outstanding importance for the survival of rare, threatened and endemic species.
A4: the area includes more than 20 species which are important for the national and international conservation, except for rare, threatened and endemic species.

The total of 61 such areas were identified.

Degradation and change of use of these areas would threaten considerably the important species and habitats, potentially leading to their disappearance on the territory of Montenegro. In some cases, this would contribute significantly to vulnerability of some habitats and species at the global

level as well (such cases are explicitly mentioned in the document *Guidelines of Biodiversity Mainstreaming into Spatial Planning*).

Umbrella guidelines for these areas: leave the areas in their original form with the existing uses of space aimed at sustainable practices. Routes within the corridor and the locations of planned infrastructure projects are to be modified relative to the position of these areas.

Interventions in space should be limited to the existing development level with a possibility to reconstruct and extend the existing structures according to the use of land, in accordance with strict environmental criteria and with a commitment to implement expert surveys. Buffer zones are to be planned for smaller sites.

Encourage sustainable forms of the use of space, such as extensive agriculture and sustainable tourism and implement measures such as the removal of invasive species.

B – Conserved areas of rich biodiversity

These areas are identified if they met the following two criteria:

> B1: they are dominated by Natura 2000 habitats of excellent and good representativeness, with the presence of habitats of significant representativeness, if they are in a mosaic with good and excellent habitats.
> B2: areas with minimum 20 species important for conservation.

The total of 35 such areas were identified.

Umbrella guidelines for these areas: Maintain landscape integrity. Planning of infrastructure should avoid fragmentation and loss of connections that these areas provide.

Encourage revitalisation and sustainable forms of the use of space such as extensive agriculture and sustainable tourism and implement measures such as removal of invasive species.

It is important to emphasise that the existing data on biodiversity distribution are incomplete since the recent surveys cover around 50% of the territory of Montenegro. Therefore, it is to be expected that areas which are valuable from biodiversity perspective can be identified in the rest of Montenegro, subject to the availability of new data. Until then, apply general guidelines provided in the document *Guidelines of Biodiversity Mainstreaming into Spatial Planning*.

Also, some of the identified areas are already parts of the existing protected areas or are included in the projections of protected areas.

Identification of conflicts relative to the SPMNE

As for infrastructure projects planned by the implementation of the SPMNE until 2040, several cases have been identified in these areas where the implementation of the SPMNE can impose a significant and permanent threat to biodiversity.

Area: Ada and Bojana delta are the biodiversity centre. Sixteen types of habitats under the Habitat Directive were registered in this zone, of which two types are priority for protection. Habitats are of dominantly excellent and good representativeness, and those connected to

coastal dunes are very rare in Montenegro (found only on Velika Plaža) and require strict protection.

More than 50 protected species are present, including nine nationally protected plant species, including the sea spurge (*Euphorbia paralias*) which has the status of globally threatened species. As far as animal species are concerned, sub-species of steppe mouse and blind mole are of special conservation importance and their individuals are found only in the hinterland of Velika Plaža, and their disappearance would result in the disappearance of the species in the phase of neo-speciation globally. This area accommodates the most important colony of the European bee-eater (*Merops apiaster*) in Montenegro with more than 400 pairs that nest in the sandy ground. The areas is located in one of the most important migratory corridors for birds and that is why it should be treated as the area of international importance for birds.

Identified conflict: These species and habitats will be exposed to a significant risk due to the construction of airport in Štoj, which would contribute considerably to vulnerability of these species and sub-species globally (even their extinction) and thus violation of international agreements. From the nature protection aspect, it is recommended to completely exclude this airport from planning.

Area: Anamalsko Field and Šasko Lake – This area accommodated 11 types of habitats from the Habitat Directive, and they are of excellent and good representativeness, which are in a mosaic with arable land. Mediterranean occasional puddles are the most important habitat, a rare habitat in Montenegro which is registered on several sites in this area. The Mediterranean occasional puddles are threatened in the entire Mediterranean. This habitat is mentioned in the Directive as priority for protection and special efforts need to be invested in its management and conservation.

The area is of outstanding importance for amphibians and accommodated the most important reproductive colony of bat *Rhinolophus hipposideros* on the south of Montenegro, with at least 10 more bat species for which the area of Šasko Lake is an outstanding feeding zone; it is the habitat of the Balkan endemic western broad-toothed field mouse (*Apodemus epimelas*) and important fish species such as twaite shad (*Alosa fallax*), eel (*Anguilla anguilla*), Adriatic dwarf goby (*Knipowitschia panizzae*), ray-finned fish (*Scardinius knezevici*) and other. The area is located in one of the most important migratory corridors for birds and that is why it should be treated as an area of international importance.

Identified conflict: The planned road corridor for fast motor transport towards Albania currently passes through this area. This types of infrastructural endeavour in the area would cause degradation of the habitat not only due to direct loss of space, but due to reduced quality of present species as a result of noise, vibration and light contamination. Consequently, it is recommended to plan the corridor of this road further north to avoid degradation and fragmentation of habitats within this area in a way to follow the route of the existing road that links Montenegro with Albania via the Sukobin border crossing.

Area: Spilica (Old Bar) – It is the habitat of the locally endemic plant *Asperula Baldacci*. This species, whose total global areal is limited to Spilica, is evaluated as critically threatened (CR) according to the IUCN categorisation.

Identified conflict: The planned corridor of the fast road passes near this area. It is recommended to move the corridor south from the planned position, sufficiently away from this site, to prevent

the potential loss of the species *Asperula Baldacci* or to avoid its extinction due to any type of works, which will ensure maintaining of the integrity of the area.

Area: Dragalj – This area accommodates the most representative stands of east Mediterranean dry grasslands in Montenegro and will most likely become a part of Natura 2000 network after it is formally established.

Identified conflict: Construction of a solar power plant is planned under the Plan in this area. Given the said conservation value, it is recommended that this area is excluded from all infrastructure projects. Consequently, it is recommended that the location of the solar power plant is entirely relocated outside the boundaries of this area.

Area: Komarnica catchment area – The area is important due to high endemism.

Identified conflict: Construction of planned hydro power plant would result in the loss of the habitat of endemic species.

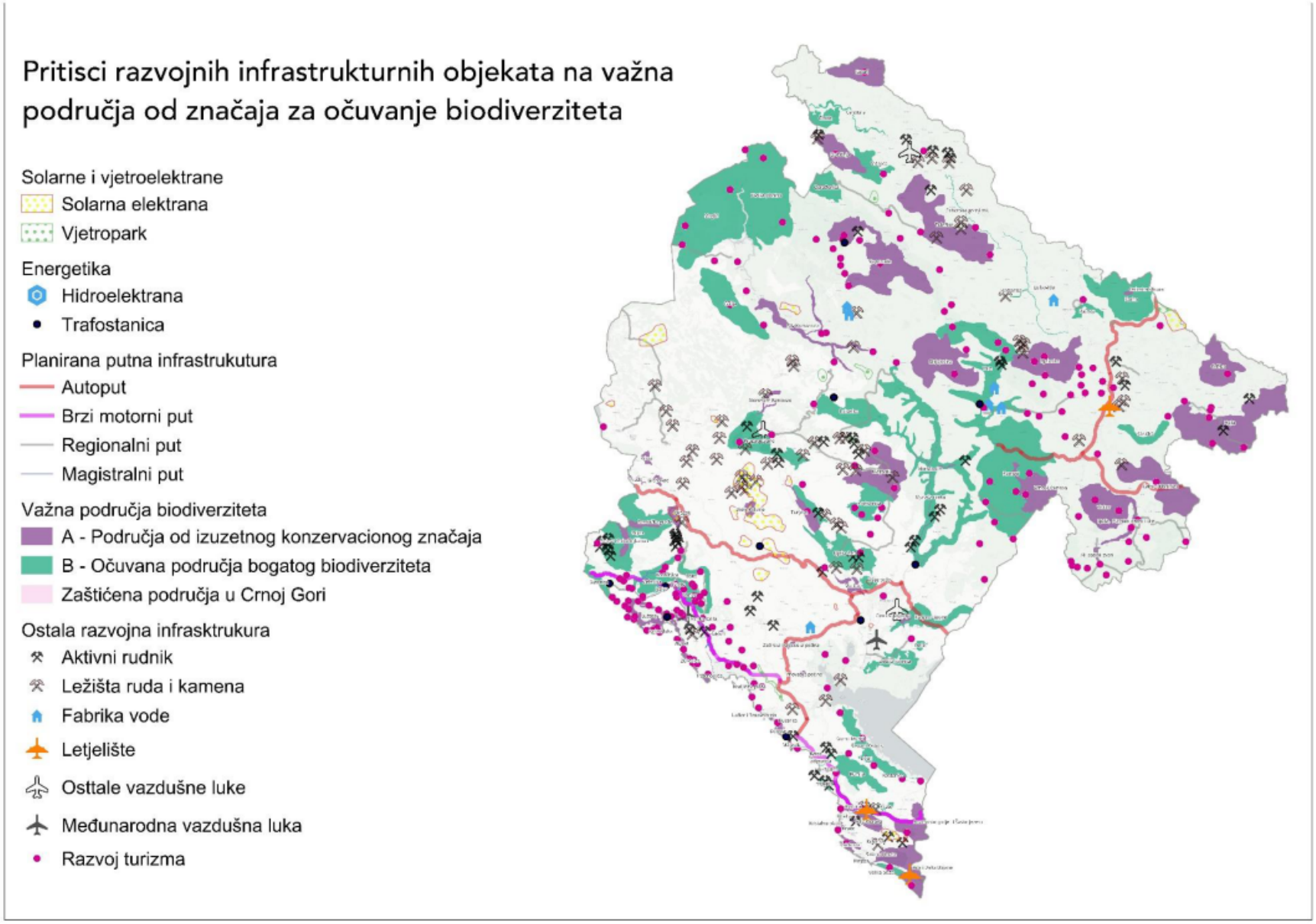
General guidelines: introduce an obligation to assess the zero status, a relative biodiversity monitoring and implement conservation measures in line with that, which can also be *ex situ.*

Identified conflicts relative to the highway corridor in the areas of Komovi and Čakor and low mountains where it can affect the quality of habitats, water network and migratory corridors for large mammals. In the northern part, between Petnjica and Boljare, the planned corridor of the highway directly intersects the migratory corridor of bear between the identified biodiversity areas of Korita and Grižica.

In this context, recommendations are for this corridor and the route of the highway follows the existing roads as much as possible to avoid further devastation of these areas and to develop green corridors (natural and artificial) that allow free movement between different habitats while reducing fragmentation.

The same recommendations also apply to other planned transport infrastructure.

Distribution of segregated areas A and B, together with the nationally protected areas, and planned infrastructure corridors are presented on the map below.


Pritisci razvojnih infrastrukturnih objekata na važna područja od značaja za očuvanje biodiverziteta
Solarne i vjetroelektrane
Solarna elektrana
Vjetropark
Energetika
Hidroelektrana
Trafostanica
Planirana putna infrastrukutura
Autoput
Brzi motorni put
Regionalni put
Magistralni put
Važna područja biodiverziteta
A - Područja od izuzetnog konzervacionog značaja
B - Očuvana područja bogatog biodiverziteta
Zaštićena područja u Crnoj Gori
Ostala razvojna infrasktrukura
Aktivni rudnik
Ležišta ruda i kamena
Fabrika vode
Letjelište
Osttale vazdušne luke
Međunarodna vazdušna luka
Razvoj turizma

Landscapes

In the process of designing new structure and the reconstruction of the existing one, it was noted that compliance with typology and the elements of authentic architecture, uncontrolled construction and disregard for legislation had been neglected for years. The consequence of newly designed construction and poor rehabilitation of traditional architecture is devastation and impoverishment of landscapes and cultural heritage. Modern needs and new technologies impose transposition of local building patterns as the principle based on tradition, which means reinterpretation and not imitation while preserving environmental quality. Old houses, which are examples of traditional construction, individually or in groups, create artistically and historically valuable environment. Old structures are mainly purchased for their location. The structures are given new functions followed by their adaptation. The structures are extended, upgraded, expanded. Instead of choosing the functions in line with limitations of the structure, the process is reverse leading from the existing function and capacity towards reconstruction and renewal, and ultimately results in aggressive interventions on structures and in space.

Also, new structures and groups of structures relying on the existing civil engineering heritage distort the appearance of rural landscapes. Materialisation, artistic and architectural expression in recent decades does not follow the principle of integration into the surrounding and thus the space loses its uniqueness and landscape value.

"*The problem occurs in the procedure of interventions which by default include inevitable changes in sizes while neglecting entirely the local architecture in all of its aspects. This results in the buildings that do not communicate and are not in balance with space, but their aggressive relationship with the environment mainly expresses pretensions to impose themselves as a new (quasi) architectural models intended for tourism".*[29]

The expansion of construction in recent decades and the creation of modern but urbanistically unregulated tourist settlements in the area of former villages affects uncontrollably the loss of identity of space and cultural heritage. Inadequate treatment of these settlements, de-popularisation and deterioration, but also careless integration into new settlement structure were a motif to determine them in this paper in terms of types and space and highlight the importance of their responsible and planned treatment in the future.[30]

4. EXISTING ENVIRONMENTAL ISSUES IN THE AREA COVERED BY THE PLAN

The aim of this part of the Strategic Impact Assessment Report will be to provide a description and explanation as to how the pre-existing environmental issues can affect the Plan or how the Plan will affect them, i.e. whether there is a possibility that the Plan will increase, decrease or in any other way affect the existing environmental issues.

The issues of endangering and protecting the environmental segment, especially in relation to the necessity of rational use and protection of space in the elaboration of the Spatial Plan with this

[29] Vuksanović D, Popović S, (2009): Architectural Atlas of Montenegro; Ministry of Tourism and Environment, Ministry of Economic Development, GTZ-German Technical Cooperation, Podgorica.
[30] Čurović Ž. and Popović S. (2014) Typological classification of settlements in the rural hinterland of the bay of Boka Kotorska, Agriculture & Forestry, Vol. 60 Issue 4: 275-289, Podgorica.

Strategic Assessment Report, must be considered in line with development activities. At the level of the Spatial Plan as an umbrella strategic document, the definition of development activities in the ecologically proclaimed country must be based on the principles of environmental protection, taking into account potential negative impacts of planned activities.

The Spatial Plan of Montenegro, as an umbrella document that defines further spatial development, certainly uses and analyses data from sector studies and strategies, but it should clearly recognize and specifically consider the issue in a way that is directly linked to spatial planning in relation to the existing status. Many problems in achieving sustainable development based on sectoral goals are much broader than the issues that can be address through the Plan, which should be clearly recognized and defined. In this sense, the further development of the Plan required clear identification of issues by sector, which are in the domain of spatial planning, because their clear definition can also help in understanding the specific reasons that have led to the current situation (which is clearly characterized as unsatisfactory), and thus create a basis on which solutions will be considered and solutions proposed for rehabilitation/improvement of the status by priority, keeping in mind the planning period (2040). This approach is necessary in order to define more clearly the criteria for an adequate assessment of the magnitude of potential negative impacts, the primary guidelines for further implementation of the Plan at lower hierarchical levels, as well as indicators for monitoring the status.

In relation to the above, this document devoted special attention to considering the issue of existing conflicts in space that have led to significant problems in relation to certain segments of the environment (Chapter 3), and the issue of defining adequate measures, guidelines and recommendations for eliminating conflicts, and as a basis for choosing the most favourable planning solution. The general analysis of the current situation on the territory of the entire country, taking into account all sectoral pressures identified a set of the problems that are recognised as characteristics of the CONTINUED TREND scenario, as expected - a scenario of intensive development, insufficient control and protection of space.

Based on the above, the following key problems have been recognised:

- unbalanced regional development,
- uncontrolled and spontaneous development of settlements, intensive urbanisation with uncontrolled expansion of construction areas, both in urban areas and in suburbs and rural areas,
- unsolved problem of poor urban organisation of urban centres of municipalities with a possibility for further deepening of conflicts in space, especially in relation to conflicts with valuable and protected areas,
- permanent depletion of natural resources, without sufficient control of spatial protection and considerable devastation of valuable areas, important biodiversity sites, partly devastation of existing protected areas,
- negative areal/landscape pressure and loss of identity of space,
- uncontrolled demographic pressures on key centres in the country,
- abandoning of villages, especially the demographically threatened areas,
- high energy dependence,
- non-selective change of use of agricultural and forestland into construction land, use of non-renewable natural resources, especially in protected zones,
- pressure, especially seasonal, on the infrastructural capacity, in the excess of the existing capacity,

- uncontrolled contamination of water sources and marine areas and inadequate exploitation of resources of the marine ecosystem,
- uncontrolled waste disposal on land and at the sea, without a regulated waste and wastewater management system,
- insufficient and unsystematic transport connections within the country and with the region,
- underdeveloped energy sector with strong pressure on non-renewable sources,
- low economic performance of the areas with considerable resources,
- lack of regional and trans-regional connections.

In accordance with the Law on Strategic Environmental Impact Assessment, this part of the document will pay special attention to the areas that are particularly important for the environment, such as habitats of wild flora and fauna from the aspect of their conservation, specially protected areas, national parks or marine zone. Considering the fact that the analysis of the current situation, and the scenario A discussed in the Plan, indicates a significant threat to the space, and thus to the valuable biodiversity sites (protected areas, Emerald habitats, Natura 2000 habitats, internationally important habitats...), further elaboration of this part of the Report will clearly define the issues that can be solved through the proposed planning solutions or have an impact as such on the selection of the final planned solution. Based on the above and identified issues, it is important to note that the considered scenario A cannot be taken as one of the possible development scenarios, which is emphasised by the editor of this Report through the concept phase of the Plan.

Legal amendments

It is important to note that the level of elaboration of the Spatial Plan of Montenegro implies an overview of the space of the entire country, taking into account all sectoral resources, challenges and development goals, and defining the spatial vision of the strategic development and guidelines for its further detailed elaboration at lower hierarchical planning levels to ensure its implementation.

That is why the guidelines for further elaboration represent the most important part of the Spatial Plan for the implementation of development goals. This fact is especially important considering the existing legal framework and the Law on Spatial Planning and Construction of Structures. The fact that amendments to the said Law are underway, and that completely different spatial planning solutions are expected, draws attention to caution to avoid inconsistencies in these key documents. Namely, if the Spatial Plan is adopted before the adoption of the new Law, i.e. if the adopted Spatial Plan of Montenegro is not harmonised with the Law that should standardise new solutions with respect to the way of organisation of development planning (planning levels in the planning system), we may end up in a situation where we get a document with inconsistent guidelines for its further elaboration and implementation.

We note that the Draft Spatial Plan contains many goals, but without clearly considered proposals for specific solutions to achieve them. An example is the land policy that mentions the goal of the reform of the spatial planning system, organisation and use of space to ensure efficient and consistent implementation of strategic commitments and development goals. This goal is directly related to the previously stated fact that the reform of the system requires a change in the existing legal framework, which is currently in the implementation phase. This in itself calls into question the concept of the offered planning solutions.

In order for the concept of the offered planning solutions to be evaluated as acceptable, it is necessary to ensure compliance with one of the basic objectives of the strategic assessment, which is the protection of natural values.

Nature protection ensures the supply of ecosystem services which the life and activities of the population directly or indirectly depend on, as well as economic sectors based on the use of natural resources such as agriculture, forestry, tourism, energy. Increasing the scope and efficiency of biodiversity protection is generally recognised as the most effective mechanism that synergistically achieves benefits for both nature and humans, especially in the context of climate change.

Nature protection contributes to achieving the goals of sectoral policies, at least 10 Sustainable Development Goals (SDGs), nationally determined contributions in the context of the UN Framework Convention on Climate Change, as well as the goals of many other multilateral agreements that Montenegro has committed to implementing. Nature protection also contributes to the resilience of ecosystems and society to climate change.

Nature protection commitments of Montenegro

International policies set increasingly ambitious nature protection goals, with which Montenegro, which has committed itself to this by signing, needs to harmonize national policies. In relation to key nature protection policies - the EU Biodiversity Strategy until 2030, and the newly adopted Kunming-Montreal Global framework for biodiversity adopted within the framework of the Convention on Biological Diversity, and Montenegro should achieve the following by 2030:

- protect legally at least 30% of land and 30% of marine areas,
- strictly protect at least one third, i.e. 10% of land and 10% of marine areas, including all remaining primary and old forests,
- integrate ecological corridors as a part of the Trans-European network of natural areas to prevent genetic isolation and allow biodiversity adaptation to climate change.

Other key objectives under the EU Biodiversity Strategy until 2030, which Montenegro needs to achieve, are the following:

- ensure efficient management of protected areas, define clear objectives and conservation measures and ensure adequate monitoring,
- large areas of degraded ecosystems and the ecosystems that store carbon should be restored,
- trends and the conservation status of habitats and species should be without worsening, and at least 30% of them should have a favourable conservation status or at least show a positive trend,
- the overall use and risks of chemicals pesticides should be reduced by 50%,
- restore high diversity landscape features at minimum 10% of agricultural land,
- at least 25% oof agricultural land must be used for ecological agriculture,
- improve the quality, quantity and resilience of forests,
- marine resources must be used sustainably,
- regeneration of freshwater ecosystems and natural functions of rivers.

Based on the existing data on the distribution of biodiversity and protected areas, and their analysis, certain spatial units are identified, which should be the subject of special measures and

guidelines in the processes of any form of use and purpose of space that are regulated through this Plan.

Guided by the above, the authors of this Report encountered a problem during the elaboration of the document, due to the lack of clearly defined criteria for the selection of the scenarios considered by the concept, and thus the lack of adequate criteria for the selection and elaboration of the proposed scenario of intensive development. Considering that in order to achieve the stated goals, one of the basic criteria for the selection of planning solutions is the assessment of the compatibility of the planned solutions with the existing protected areas, valuable biodiversity sites (Emeral, Natura 2000, internationally important habitats...), but also with future protected areas. For the benefit of the above, the activity of the GEF 7 project "Biodiversity Mainstreaming ... which includes the provision of data on the presence of valuable biodiversity sites, will clearly present their distribution in the territory of Montenegro.

Therefore, it can be said that this document currently (Draft SPMNE, October 2023) cannot give a precise assessment of the negative impacts of the planned solutions on biodiversity, and thus cannot ensure compatibility with the protection goals. As the mentioned data will include a clear presentation of the spatial distribution of valuable species and habitats (GIS cartographic presentation), after obtaining them, the author will give clear inputs to the authors of the Plan and define protection measures. According to the preliminary analysis, it can be expected that the proposed planning solutions provided by the Draft Planning Document will be corrected in the areas that will be evaluated as incompatible with the principles of protection. Also, expecting that comments, suggestions and remarks will be received during the public debate both on the planning document and on the Strategic Assessment Report in question, we also expect to receive specific views of the national system in relation to a couple of key projects recognised as conflicting with the value of the space it covers, which are in the planning or adoption stages. This primarily refers to the future status of the further consideration of the HPP project on the Komarnica River, the Verige Bridge, the military training ground on Mountain Sinjajevina, as well as the route of the highway, which is considered as one of the variant solutions for part of the National Park Skadar Lake.

Bearing in mind all of the above, as well as the obligation of the author of the Strategic Assessment Report to convey all the requests of the public during the public debate process, it is important to note that this version of the Report will be modified and cannot be considered final.

5. GENERAL AND SPECIFIC ENVIRONMENT PROTECTION OBJECTIVES

The objective of elaborating a Strategic Environmental Impact Assessment is, first of all, to ensure that environmental protection issues, including human health, are fully taken into account during the elaboration, in order to ensure sustainable development by ensuring public participation. The strategic objectives of environmental protection represent the factors of preserving the ecological integrity of the space, i.e. the rational use of natural resources and environmental protection.

In the case of the Spatial Plan of Montenegro, it is clear that the main objective of the Strategic Environmental Impact Assessment is the evaluation of the proposed planning solutions and ensuring their real implementation in order to ensure the protection of the environment in the broadest terms, which includes protection of space and landscape characteristics, protection of

nature and biodiversity, water, agricultural land, forests, air, as well as ensuring the quality of life and health of people.

The objectives formulated at the international and EU level are often incorporated in and determined by national laws, strategies, programs or plans and complement the authentic national objectives. Respecting the objectives that are clearly defined in the relevant legal and strategic documents, and relying on the objectives of the planning document, the main objectives of this document will be defined and considered in relation to the areas of development considered by the Plan. It is important to choose the issues that are dealt with in the Plan, and which are important for certain areas and will be analysed in detail through further elaboration of the Plan. It is important to understand that it is necessary to identify and define the objectives that are relevant to the Plan. As such, they should be the definition of the direction of change, especially in relation to the choice of the most favourable solution from the environmental aspect.

5.1. General environment protection objectives

General environment protection objectives - preservation of the quality of the environment, as well as the preservation and improvement of natural values, special features of space and cultural and historical heritage of Montenegro, are defined in the Spatial Plan of Montenegro and the National Strategy of Sustainable Development of Montenegro.

The general objectives of environmental protection stem from the general objectives of environmental protection defined by the Law on Environment (Official Gazette of Montenegro 052/16), such as the preservation and protection of human health, the integrity, diversity and quality of ecosystems, the gene pool of animals and plant species, soil fertility, natural beauty and spatial values, cultural heritage and man-made property.

The objectives relate to the provision of conditions for limited, reasonable and sustainable management of living and non-living nature, preservation of the ecological stability of nature, quantity and quality of natural resources and prevention of hazards and risks to the environment. The general objectives of environmental protection, which are given in the National Strategy of Sustainable Development, are important for the implementation of the Plan, with the following objectives being particularly important:

- a balanced and fair economic development that can be maintained over a longer period of time;
- careful management and conservation (to the highest extent possible) of non-renewable resources;
- rational/sustainable use of energy and natural resources (water, soil, forests, etc.),
- minimising waste, efficient prevention and control of pollution and minimising environmental risks;
- application of the precautionary principle, i.e. the requirement to maintain a natural balance in the circumstances of the lack of reliable information on a specific issue;
- application of the principle of ecological compensation – if negative impacts on the physical characteristics of an area with high biodiversity values or natural landscape biodiversity cannot be avoided, a balance should be achieved through protection and conservation measures;
- respect for ecological integrity – protection should be provided for the ecological processes that the survival of species depends on, and the habitats which their survival depends on;

- ensuring restoration and recreation/regeneration – where possible, biodiversity and diversity of natural landscapes should be restored and/or recreated, including measures for rehabilitation and reintroduction of threatened species;
- selection of the best technologies available and the best practical examples for environmental protection;
- application of the principle of careful decisions on the basis of the best possible available information;
- a transparent implementation of the strategic environmental impact assessment procedure will ensure that all stakeholders (central and local governments, non-governmental organisation, private/business sector, professional organisations, trade unions) are informed about any potential environmental impact of planned activities and use of spaces, and the measures and recommendations for further actions within the implementation of the Plan for the purpose of the best possible protection of natural and cultural property and the environment of the space covered by the Plan;
- ensure involvement of all stakeholders in decision-making processes related to the key environmental matters linked to the project while building a dialogue and trust and developing social capital; protect the cultural identity of the area.

5.2. Specific environmental objectives

Spatial plans play an important role in the protection of the environment and space. In order to achieve general objectives, plans must be harmonised with laws and regulations related to environmental protection.

The specific objectives of environmental protection represent the elaborated general objectives and are defined on the basis of perceived issues and requirements for environmental protection in the area covered by the Plan. Specific objectives are used to verify environmental impacts.

Bearing in mind the coverage of the Spatial Plan, the planned uses of the areas, the status of the environment in the planning area and the previously defined general objectives, an overview of the defined specific objectives, as well as indicators for their monitoring, is provided below.

Environmental segment covered by the SIA	General objectives of the SIA	Specific objectives of the SIA	Indicators
AIR AND CLIMATE CHANGE	Protection of air quality and reducing impacts on climate change	Protection of air quality	Frequency of exceedances of daily values of CO_2, NO_2, PM_{10} and O_3 that exceed the limit (number of days in a year with exceedance of daily limit value).
			Consumption of ozone-depleting particles (tons of ODP).
		Reducing impacts on climate change	Annual air temperature and precipitation (normalised standard deviation relative to the period 1961-1990 and normalised standard deviation of logarithm annual precipitation for the territory of Montenegro).
			Emissions of acidifying gases (NO_x, NH_3, SO_2 in kt/year).
			Emission of greenhouse gas (CO_2, N_2O, CH_4, SF_6, HFC, PFC, in Gg CO_{2eq}/year and Gg/year).
WATER	Protection and sustainable use of water resources	Protection and sustainable use of water resources	Water exploitation index (WEI in %)
			Water loss in the network (%)
			Total amount of water in reservoirs (Mm^3/year)
			Biological oxygen demand in ground waters (BOD_5 in mg O_2/l)
			Emission of pollutants from point sources of pollution into water bodies (kg/year)
			Contaminated/untreated wastewater (%)

Environmental segment covered by the SIA	General objectives of the SIA	Specific objectives of the SIA	Indicators
			Number of public sewerage wastewater treatment plants (whether every municipality has a water treatment system).
			Quality of discharged water.
			Population connected to the public sewerage system (%).
			Population connected to the public water supply system (%).
SOIL AND FORESTS	Land protection and sustainable use	Protection and sustainable use of agricultural and forest land	Change of land use (%)
			Increase/reduction of the area under forestland (%)
			Forest management and consumption from forests (%)
			Management of contaminated sites (number of sites expressed numerically, a share expressed in %, costs of rehabilitation and remediation in EUR)
			Number of sites and land threatened by erosion (ha)
SEA	Conservation and protection of marine environment	Conservation and protection of marine environment	Meeting the requirements of the Marine Strategy Framework Directive (MSFD) (%)
			Implementation of the marine environment monitoring programme (%)
			Implementation of measures for good status of the marine environment (GES) (%)

Environmental segment covered by the SIA	General objectives of the SIA	Specific objectives of the SIA	Indicators
NATURAL VALUES, NATURAL RESOURCES AND LANDSCAPES	Protection and sustainable use of natural values, resources and landscapes	Protection of biodiversity, geodiversity and natural property	Threatened and protected species (% of threat and protection)
			Change of areas of protected regions (%)
		Landscape protection	Management of contaminated and degraded locations
		Rational use of non-renewable energy sources	Increasing the share of RES in the energy balance (%)
		Rational use of areas for RES	Size of land under RES
WASTE MANAGEMENT	Improving waste management	Improving waste management system	Total quantity of generated waste (t/year)
			Generation of all types of waste (t/year)
			Quantity of separated, reused and disposed waste (t/year)
			Cross-border transport by type of waste (t/year)
			Number of unregulated unsanitary dumpsites
			Number of sanitary regional landfills
			Quality of drinking water (%)
			Quality of sea bathing water (%)
			Percentage of population exposed to increased air pollution (%)
			Exposure of population impacts of energy and mining development projects

Environmental segment covered by the SIA	General objectives of the SIA	Specific objectives of the SIA	Indicators
SOCIO-ECONOMIC ASPECTS	Protection of health of the population, strengthening institutional capacity to manage the environment, protection of cultural heritage	Protection and improvement of health of the population Institutional development and investment in the protection of the environment Protection of cultural heritage and conservation of historical and archaeological sites	Total noise indicator (dB)
			Sources of non-ionising radiation of special interest (strength of electric field E(V/m); strength of magnetic field H (A/m); density of magnetic flux B (μT); density of power of equivalent flat wave – Sekv (W/m^2)
			Exposure of population to natural hazards (%)
			Investments and current expenditure (%)
			Development and improvement of environmental management system
			Number and territorial distribution of measuring points for monitoring of the environment
			Success in the implementation of legislation and strategies
			Number and importance of immovable cultural heritage that can be affected by planning solutions

6. IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT, INCLUDING FACTOTS SUCH AS BIOLOGICAL DIVERSITY, POPULATION, FAUNA, FLORA, LAND, WATER, AIT, CLIMATE FACTORS AFFECTING CLIMATE CHANGE, MATERIAL RESOURCES, CULTURAL HERITAGE, INCLUDING ARCHITECTURAL ANND ARCHAEOLOGICAL HERITAGE, LANDSCAPE AND RELATIONSHIPS BETWEEN THESE FACTORS

The consequences of adapting the natural environment to the needs of the social community are most often unexpected due to the existence of a very sensitive balance of all environmental elements. The retroactive technogenic influence on original initiators in the ecosystem can lead to new conditions and unfavourable effects on the environment and on humans. Accordingly, the obligation to define all possible impacts in relation to all segments of the environment of the covered area is always set as a priority.

The impacts of the Spatial Plan of Montenegro are analysed in relation to sources of influence - impacts - effects and consequences. Sources of influence that will have an effect on the quality of the environment of the area encompassed are the planning solutions of the Plan in question, both in a negative and a positive sense. By evaluating planning solutions, it is possible to evaluate the impact of the Plan on the environment and give an assessment of the effects in space and the environment. Here, we particularly highlight the issue of evaluating the very impacts of planning solutions in relation to the level of elaboration of the planning document, as well as the lack of knowledge of the specific locations to which the planned projects refer, which is especially related to biodiversity (micro-locations of important species can sometimes be measured by tens of m^2). This Chapter provides a textual overview of the impact of the Plan on individual segments of the environment and an evaluation of individual impacts in Table 6.1.

6.1. Impacts on air quality

At the strategic level of assessment, when we exclude specific impacts that are limited by legislation or are considered at the level of environmental impact assessment, the SPMNE has a potentially positive and negative impact on air quality.

The most significant negative effects on the air exist in areas where pollution from mining, thermal energy, other industrial plants, traffic and individual combustion plants are superimposed.

Although individual impacts may exist within the ELV (emission limit values), their collective effect may have a significant impact on air quality (primarily), as well as on the health of the population and other elements of the environment (secondary).

A particularly unfavourable (critical) period is related to certain meteorological conditions, i.e. during specific directions of air currents (depending on the specific location), but also at low temperatures, high air pressure, during temperature inversion, which are the characteristics of the winter period.

In urban areas, the most significant negative effects occur when emissions from traffic and individual combustion plants (and heating plants in some areas) are superimposed. Greenhouse gases are released in all processes of conversion of fossil fuels into energy (thermal power plants, heating plants, traffic).

The planned development of mining activities can have negative impacts on air quality. Mines are characterized by long-term air pollution due to the operation of a large number of extraction and transport machines, and due to increased air pollution with dust (containing toxins). Air pollution from mine dust makes breathing difficult for people and can lead to many other health problems. Emission of greenhouse gases to a lesser extent, primarily methane, is also associated with mines.

Gasification can contribute to the reduction of greenhouse gas emissions from the energy sector and the industrial sector (in the case of replacing the use of existing fossil fuels and the use of gas). The gas distribution system is designed for the gasification of all cities and larger settlements in the territory of Montenegro. Compared to other fossil fuels, natural gas has the lowest carbon content. Therefore, the gas used for energy generation can be considered as an alternative fuel that will reduce the emission of greenhouse gases.

The previous development of the traffic infrastructure has influenced the increase in air pollution, partly due to inadequate traffic management.

Using the planned traffic infrastructure and increasing the number of vehicles will increase the amount of harmful exhaust pollutants and greenhouse gases, which negatively affects air quality. Greater participation of electric transport systems will reduce greenhouse gas emissions, which will have a positive effect on air quality.

This SPMNE envisages the implementation of highways, expressways and main roads in order to relieve traffic. Traffic relief will reduce the level of air pollution in urban areas, but it will lead to the deterioration of this segment of the environment in areas where the aforementioned traffic infrastructure is being built, and where there was no such conflict in space before.

Development of railway infrastructure in accordance with the Traffic Development Strategy 2019-2035 and Railway Development Strategy for the period 2017 - 2027 (Ministry of Transport and Maritime Affairs, 2017) will lead to positive effects on the air, primarily due to increased transport without the share of fossil fuels. The planned implementation of the secondary railway network (Pljevlja - Bijelo Polje – Berane - Peć (alternative Mateševo - Peć) and Nikšić – Trebinje - Čapljina) will further contribute to what has been said.

The increase in water traffic, along with the reconstruction of existing ports and the construction of new ports, will have a negative impact on the air quality (impacts are caused by the burning of fossil fuels in vessel engines: SO_2, NO_x, CO_2, PM_{10}) of the environment.

The increase in air traffic, along with the reconstruction of existing and the construction of new airports (Berane, Nikšić, Pljevlja, Žabljak, Bar and Ulcinj) will also have a negative impact on air quality.

The implementation of the planned traffic and railway network, as well as the ports and airports, will cause negative impacts on the air in a limited area during the construction of these facilities.

The SPMNE predicts an increase in the share of RES in the total energy generation, which is directly reflected in the improvement of air quality.

Positive effects for reducing the population's exposure to polluted air are achieved by the reconstruction of the TPP, the use of RES and by providing district heating system for settlements.

As a result of the technological process of burning coal in TTPs, significant amounts of ash, soot, suspended particles, then gas emissions (NO_x, CO and SO_2), GHG emissions (CO_2, CFC and CH_4) are created, all of which together greatly affect the chemical composition air and results in acidity of the atmosphere. Air pollution from TPPs affects human health through lung tissue irritation (difficulty breathing or asthma), and can cause various types of cancer, vascular, cardiovascular and cerebral diseases.

The planned hydro power plants do not have a significant impact on the air during the exploitation phase. A long-term, indirect and moderate negative impact of the creation of new water bodies on the microclimate is expected (increase in air humidity, increase in the number of days with fog, increase in wind speed and lowering the air temperature) in a limited area, the importance of which depends on the size and position of the reservoir.

The development of wind power plants and solar power plants will not have a significant impact on the air, except during the construction phase. The functioning of wind power plants and solar power plants will have a long-term, indirect, regional and positive impact of reducing the emission of pollutants into the air through the use of renewable energy sources.

A positive impact on the reduction of greenhouse gas emissions caused by inadequate handling of municipal waste is achieved by establishing a sustainable waste management system, collecting landfill gas, which eliminates the emission of methane into the air, creating prerequisites for generating energy from waste in waste treatment plants, closing and rehabilitation of existing dumpsites, expanding the scope of waste collection up to the maximum limit (100%), etc.

6.2. Impacts on Ambiental noise

The implementation of the SPMNE will have both positive and negative impacts on noise. From the level of the Strategic Environmental Impact Assessment of the SPMNE, we point out that spatial planning at lower levels of planning documentation can significantly influence the reduction of negative noise impacts. Also, it is important to point out that at the level of urban units, acceptable noise levels can be influenced by increasing green areas.

As far as assessments at this level of planning documentation is concerned, we estimate that the planned development of mining activities may have negative effects on noise levels in the areas near the mine. As a result of mining and the establishment of the accompanying industry, there will be negative effects of noise due to the equipment and machines used for mining activities.

Gasification will locally contribute to the increase in noise levels due to construction works, while there will be no noise disturbance during the process of operation.

The previous development of the traffic infrastructure has influenced the increase in the noise level in the vicinity of the roads, partly due to inadequate traffic management.

The SPMNE envisages the implementation of highways, expressways and main roads in order to relieve traffic. Traffic relief will affect the reduction of noise levels in urban areas, but will lead to increased noise levels in areas where the aforementioned traffic infrastructure is being built, and where there was no such conflict in space before.

The development of railway infrastructure in accordance with the Traffic Development Strategy 2019-2035, and Railway Development Strategy for the period 2017 - 2027 (Ministry of Transport and Maritime Affairs, 2017) will lead to negative noise impacts in the vicinity of the railway

infrastructure, due to the increased frequency of traffic. The planned implementation of the secondary railway network (Pljevlja - Bijelo Polje – Berane - Peć (alternative Mateševo - Peć) and Nikšić – Trebinje - Čapljina) will additionally contribute to the aforementioned.

The increase in air and water traffic, along with the reconstruction of existing and the construction of new airports (Berane, Nikšić, Pljevlja, Žabljak, Bar and Ulcinj) and ports will have a negative impact on the noise of the environment.

The acceptability of the aforementioned traffic infrastructure projects, and thus their pressure on noise levels in the environment, will generally depend on their distance from residential buildings, the type of traffic infrastructure and its traffic load, and the prescribed noise protection measures that will be applied.

The SPMNE foresees an increase in the share of RES in the total energy generation, which is directly reflected in the reduction of the noise level (here there is a collision due to the noise generated by the operation of wind farms).

The development of wind farms and solar power plants will not have a significant impact on the air, except during the construction phase. The development of wind farms will lead to an increase in noise in its environment due to the operation of the turbines. Turbines emit two basic types of sound:

- aerodynamic sound, from blades moving through the air, and
- mechanical sound, from transmitter, generator and auxiliary engines.

The total noise is the sum of aerodynamic and mechanical sound and there are significant negative effects in the vicinity of wind farms. The development of solar power plants will contribute to an increase in noise during the phase of site preparation and construction.

6.3. Land impacts

Spatial planning is a process that arranges and regulates the use of land in a certain territory in order to achieve the desired goals in connection with urban development, environmental protection, preservation of natural resources and improvement of the quality of life of the inhabitants. The influence of spatial planning on land is significant and can have numerous positive effects, but also potentially great challenges. Professional and high-quality spatial planning enables the organisation of the territory in a way that ensures that different uses of land (e.g. residential zones, industrial zones, agricultural land, protected zones) are set up in suitable areas. This prevents chaotic and uncontrolled development, reduces excessive fragmentation and improves the efficiency of land use.

The Spatial Plan of Montenegro provides strategic development directions and guidelines for rational and sustainable use of land, protection of agricultural land, as well as recommendations for improving the quality of land through the rehabilitation of ecological hot spots and illegal dumpsites. The planning solutions of the largest number of addressed sectors do not have significant negative impacts on the land (Tables 6.1 and 6.2). In terms of negative impacts, the energy, mining and transport sectors stand out. In addition, this Report recognises many conflicts in space that are in connection with the impact on the land, whether it is about permanent occupation or the deterioration of quality through the implementation of infrastructural projects.
Further urbanisation leading to permanent occupation of land, continuation of the trend of lack of adequate municipal infrastructure for wastewater channelling, disposal and treatment, depositing

waste on unsanitary dumpsites, as well as cutting forests, are the main factors that have an extremely negative impact on the land.

Further economic development, which includes the development of the energy sector through the increased use of renewable energy sources, primarily solar power plants and wind farms, has a negative impact on the land by reducing free green areas overgrown with vegetation. It is particularly important to point out here the importance of introducing restrictions regarding the purpose and quality of land for the construction of renewable energy sources, especially solar power plants through spatial planning documents. Facilities for the generation of electricity from renewable sources should not be built in protective forestland as well as agricultural land of categories I, II, III and IV.

The mining sector, for whose needs the exploitation of mineral resources that are directly connected to the land is carried out, is particularly challenging and implies major negative consequences both for surface occupation and the quality of the land. Construction of traffic corridors by occupying space distorts the natural balance by occupying significant free areas, while the quality of the land in the zone of major roads is usually degraded by the presence of heavy metals and other hazardous substances.

The quality of land is good in most parts of Montenegro. In particular, certain results of land quality tests should be taken into account, where certain parameters deviate from the maximum allowed concentrations as a consequence of the natural geological composition. We also emphasize the fact that the legal framework governing the area of land quality is outdated and requires amendments.

6.4. Water impacts

The Spatial Plan of Montenegro provides solutions that include improvements related to water management, the conservation of the quality of underground water and groundwater, as well as improvements related to the water supply network of settlements and the municipal infrastructure for wastewater discharge and treatment.

Water is a basic resource that enables the survival of people and ecosystems. Spatial planning plays an important role in the conservation and management of water resources in urban and rural areas. The impacts of spatial planning on water are diverse and important for sustainable use of these precious resources.

Spatial planning documentation is an important tool for identification and protection of key water areas, such as rivers, lakes, wetlands and underground water from the harmful effects of urban development or industrial expansion. Preservation of the ecosystem helps to maintain the water balance and biodiversity. In addition, spatial planning plays a significant role in the prevention and reduction of flood risks. Adequate space management reduces direct and indirect pollution of water courses by controlling the locations of industrial plants and agricultural activities, as well as by planning municipal infrastructure. Spatial planning can encourage the integration of sustainable technologies for water management, such as renewable energy sources to power water treatment plants, the use of rainwater in urban areas or the use of water collection and recycling system.

The sectors that, through the impact assessment of the Spatial Plan of Montenegro, have been recognized as having the greatest impact on water are the mining, energy and transport sectors, as well as, to a lesser extent, the tourism sector.

The development of the energy sector can have a significant impact on water resources, both positive and negative. This is especially true for energy sources that use water as part of their production process, as well as for those that can cause water pollution or ecosystem degradation. Although hydropower plants have a positive effect on the reduction of greenhouse gas emissions, on the other hand, the construction of hydropower plants has a negative effect on changes in the regime of rivers and consequently in a freshwater ecosystem. The proposed HPP Boka has been assessed as high-risk for seawater quality with a serious threat to endanger marine biodiversity, given the amount of fresh water that would be discharged into the sea in the event of its construction. The construction of a hydro power plant on the Komarnica River, through the existing planning documents, was assessed as a project that would have a permanent impact on the river regime and would contribute to the transformation of the river ecosystem into a lake ecosystem.

Renewable energy sources, such as solar power plants and wind farms, usually have a lower impact on water resources compared to traditional energy sources. However, these sources are also needed to be planned carefully in order to minimise the impact on water and ecosystems, for example by avoiding the installation of solar power plants in sensitive and particularly valuable aquatic habitats.

The mining sector has a significant impact on water resources, both during the process of mining ore materials, and after the closure of the mine. These impacts often pose challenges for the conservation of water quality and the protection of ecosystems. During the process of mining and ore processing, different chemicals are used to extract metals or minerals. These chemicals, together with ore residues, can reach groundwater and underground water, leading to pollution. Uncontrolled disposal of wastewater or leakage of harmful substances can cause serious consequences for the quality of water and habitats. In addition, production processes in mining require large amounts of water, which affects the local distribution of available resources.

The further development of mining foreseen in the Spatial Plan certainly poses a great challenge when it comes to the protection and conservation of the quality of groundwater and underground water. Some issues, such as the opening of the Brskovo Mine, are still open (negative impact on the rivers Tara and Rudnica). The continuation of the operation of the Pljevlja Thermal Power Plant implies the expansion of the existing coal mines, which entails negative impacts on water, especially in the part related to the opening of the Maoče Mine. In that case, the bed of the Maočnica River would be displaced, and the newly formed mine could threaten the Otilovići reservoir, which is used for water supply in Pljevlja, and whose sanitary protection zones have not been determined. In addition, a conflict with the planned protection of upstream Ćehotina River was also recognised.

The transport sector can have various impacts on water resources, both direct and indirect. These impacts can relate to water surfaces, water quality and water-related ecosystems.

Construction and maintenance of roads and highways can cause soil erosion, especially in hilly areas. Erosion can lead to increased sedimentation in river courses, which can negatively affect water quality and riverine and lacustrine habitats. The construction of bridges, embankments and other infrastructure in the vicinity of surface streams can affect the natural regime of rivers and river banks, which can lead to changes in the speed of water flow, erosion of river banks and changes in the hydrological cycle in aquatic ecosystems.

The planning solutions envisage the construction of new traffic corridors, which certainly has a negative impact on all segments of the environment. Particularly negative impacts on waters and the marine environment have been recognized as a result of the development of water transport.

Related to this is the development of nautical tourism which contributes to a significant increase in pressure on the marine environment and seawater quality, especially in the Bay of Kotor. The increase in the number of tourists puts a direct pressure on water resources, bearing in mind the significant increase in the amount of water needed for water supply, associated with increased amounts of wastewater. Further development of tourism without adequate municipal infrastructure, both in the southern and central and northern regions, can pose a serious threat to the regime and quality of groundwater and underground water.

6.5. Impacts on biodiversity and protected areas

Changes in nature caused by human activity for the purpose of exploitation in the sense of providing living conditions, recently most often for the purpose of creating as much profit as possible and rapid economic development, have negative consequences for biodiversity. In this sense, negative impacts are reflected on species and their habitats (certain locations), but often larger surfaces (areas) are threatened, so it is not uncommon for negative impacts to be reflected on protected areas as well. The Spatial Plan of Montenegro until 2040 has planned irreversible changes in certain areas that, whether they happen faster or slower, will change the appearance of entire areas, to such an extent that nature can neither be restored, nor recovered, nor even come close to returning to its natural status it had before the intervention. Therefore, the projects whose implementation is planned through the respective SPMNE will have exclusively negative impacts on biodiversity and individual protected areas, to a greater or lesser extent. Certainly, prior to the adoption of planning documents and obtaining consent for the implementation of planned operations, recent knowledge about flora and fauna is necessary, since the presence of NATURA 2000 species or habitats, and species of national importance (rare, endemic and threatened) are candidates for target locations and areas of importance for the conservation and protection of natural values and the entire biodiversity, i.e. their exclusion from the planned projects that may damage or threaten natural features and biodiversity.

HOUSING AND LAND POLICY related to the growth of existing or the creation of new cities and their development undoubtedly have a negative impact, often irreversible consequences for nature and biodiversity. In this regard, it is necessary to opt for the model of development of cities (settlements) that will have lower negative consequences, depending on the specifics of the natural environment that will be under pressure. The compact model of urban development implies the planning of cities in such a way that they occupy as small an area as possible, so the impact is locally intense, but spatially limited (on the other hand, the consequence is a greater concentration of people and buildings in such cities). In this way, large areas under natural vegetation that are located between high-density settlements are preserved, but due to the high concentration of population on a relatively small area, local deterioration of the environment can often occur (e.g. increase in noise and other types of pollution). Considerably wider areas are covered by extensive urbanisation, which implies the formation of urban settlements with a low population density. In this way, the expansion of cities destroys significantly larger areas under natural vegetation, which implies a greater degree of fragmentation of natural habitats and the spread of foreign species that can become invasive at some point. Expansion of settlements and economy development, except outside the existing boundaries, includes free surfaces that exist within the built-up areas, which can serve the planned purpose. Therefore, a careless approach in planning within urban or other settlements, when it comes to occupying free areas, can have a negative impact on biodiversity, so one should be very careful in these cases.

It is common knowledge that the growth of existing or the creation of new cities (expansion of settlements, construction of infrastructure, industrial development or other purposes) occurs as a result of encroachment of natural areas in their surroundings, which leads to the destruction or

alteration of natural habitats, which become construction land through conversion (it is not rare that fertile and high-quality agricultural land is destroyed, or forests are cut down). In these cases, there is destruction or fragmentation of natural ecosystems and disruption or changes in processes in them, and often foreign species are introduced, and accordingly it is considered that urbanisation represents an increasing threat to biodiversity. Urbanisation can lead to the disappearance of native species, i.e. to the so-called biotic homogenisation - in these cases, species that live in a narrow range of certain values of ecological factors disappear, and species that are adapted to the specific conditions of the urban environment, that tolerate a wide range of ecological conditions and often have a wide distribution, are favoured, as well as foreign species that sometimes become invasive. The formation of new settlements and the occupation of free areas under autochthonous vegetation is often preceded by the complete removal of autochthonous vegetation and the topsoil, which has a negative impact on the composition and structure of fauna, i.e. on faunal diversity. Newly formed areas that are asphalted, concreted, paved or other impermeable surfaces are used, they are “inhospitable” for many plant and animal species.

Urbanisation leads to destruction of natural habitats and the formation of new types of urban habitats, specific biodiversity. Until recently, the opinion that a small number of species of plants and animals that can survive in such conditions are present in cities is increasingly being abandoned due to the knowledge brought to us by modern research, which has shown that a high degree of biodiversity is present in these environments, as well as that very diverse habitats can be found in cities, and that sometimes this number is greater than the one that occurs in the areas surrounding the city. Quite often, these habitats are also disturbed, which happens due to their occupation, using construction machinery, trampling, carrying out horticultural works, applying herbicides, and in other ways. This also causes disturbance of habitats and biodiversity is reduced in cities, which largely depends on the area that is under pressure - there are frequently cases of the complete destruction of entire living communities during the execution of certain construction works, because the entire topsoil is removed from a large area, which results in the reduction of biodiversity and heterogeneity of habitats. In this context, the problem is the lack of accurate information regarding the wealth of biodiversity and habitats that are found in the cities of Montenegro, so accelerated urban development can lead to the loss of valuable natural stands and species (local action plans for biodiversity most often do not contain precise data on flora and fauna, i.e. protected and rare species).

MINING, INDUSTRY AND EXPLORATION OF HYDROCARBONS, which is presented in the SPMNE until 2040 through the exploitation of technical and building stone, coal, metallic mineral resources and research and production of hydrocarbons, have the greatest negative impact on the nature of Montenegro. Namely, it is common knowledge that the mentioned areas have huge negative impacts on the biodiversity and natural features of the area. According to the plan, development and growth in the production of mineral resources, such as coal, lead and zinc ore, bauxite and production of non-metals, building materials, decorative and building stone will continue in Montenegro. Also, the Plan states that there is an idea that every city in Montenegro has the production of technical and building stone (quarry), which is one of the biggest negative impacts on space and all segments of the environment that will be permanently degraded, and Montenegro does not have the revitalisation of recultivation practice in place.

Planned interventions, whether it is the opening of new mines or the continuation of work on existing ones, have a large negative impact on biodiversity because they lead to large and irreversible changes in the natural environment in such a way that the entire biodiversity is permanently destroyed, and the natural appearance of the area is changes and can never be restored to its original appearance, because the area that will be destroyed during the exploitation

of technical and building stone, coal, mineral resources will not be restored by any type of revitalization. In order to minimise the negative impact of exploitation of mineral resources, it is necessary to carry out detailed research on the biodiversity of the respective area to determine the so-called zero status, which implies the identification of habitats and species aimed at determining the presence of nationally and internationally important species (if their presence is determined, it is recommended to choose the position for exploitation that, on the one hand, meets the engineering needs, while on the other hand, occupies the space that has the lowest biological value). The implementation of these projects must obligate the project holder to implement all activities in accordance with the principles of sustainable development and in accordance with all applicable legal norms.

The SPMNE states that Montenegro must continue to develop the oil and gas exploration sector with a view of becoming an oil and gas producing country. In addition to places where oil and gas exploitation is carried out (sea), from the aspect of spatial planning and impact on all segments of the environment and biodiversity, this industry entails the installation of other facilities on land, which is in contradiction with the principles of tourism development and the protection of marine biodiversity and marine habitats, i.e. the declaration on the ecological state.

It is extremely important to point out that due to the huge number of conflict situations related to the previously granted rights and concessions for geological research and exploitation of the natural resources of Montenegro (biodiversity, extremely rich nature, landscape, archaeological sites, sunset and impact on protected areas, etc.), it is necessary to REASSESS them, and not to respect them, as stated in one of the development objectives.

From the aspect of mining and the negative impact with immense consequences on the natural features of the area, biodiversity, protected species, water, air, but also on people's health, an evident, extremely negative impact was recognized, which would affect not only the protected area of the NP Biogradska Gora, but also the River Tara, which is a part of the UNESCO natural heritage, in the event of the opening of the surface mine and the exploitation of the mineral ores in the area of Brskovo in Mojkovac.

TRANSPORT DEVELOPMENT CORRIDORS, i.e. the development of road traffic and infrastructure improvement are planned for the whole of Montenegro. A significant percentage of the mentioned routes or roads already exist, but their reconstruction and expansion of the network are planned, which is very important for the development of Montenegro. The implementation of such projects has a great impact on biodiversity, so that in the initial stages of planning and preparation of projects and the selection of the road route requires the involvement of a large number of biologists from several specialist fields due to the fact that Montenegro has a rich endemic flora and fauna, but also unsystematized data (there are no Red Lists or Red Books), and these interventions lead to destruction and/or fragmentation of habitats of plants, animals and fungi, destruction/reduction of species populations, disruption of ecosystems, permanent loss of habitats and species (irreversible processes) and the like (all regions in Montenegro).

THE CONCEPT OF THE PURPOSE OF THE SEA provided an overview of the sea as a great potential and resource that needs to be carefully and gradually exploited. Until 2040, numerous activities are planned and the implementation of a large number of activities that must be designed in cooperation with a larger number of marine biologists who will contribute to minimising the impact on marine biodiversity from the aspect of knowledge of various professions. Negative impacts on biodiversity are reflected through the development of fisheries, the construction of fishing ports, places for overhauling fishing boats, the higher presence of cruise ships, etc. in the area of Boka Kotorska, from Petrovac towards Budva and Ulcinj.

THE CONCEPT OF ENERGY AND ELECTRICAL INFRASTRUCTURE DEVELOPMENT contains a description of energy projects that have great importance for the development of Montenegro, but also a great negative impact on biodiversity: the construction of hydro power plants (HPP Perućica, HPP Komarnica, HPP Boka, HPP Kruševo), installation of wind and photovoltaic power plants (SPP Briska Gora, SPP Velje Brdo, SPP Slano, SPP Vilusi – Dragalj, SPP Velestovo; WF Brajići, WF Gvozd, WF Biočki Stan, WF Bijela, WF Korita), construction of new air lines (all regions in Montenegro). Submergence of watercourses leads to enormous changes - the appearance of the space, the landscape, changes to the composition and structure of biocenosis, biodiversity and geodiversity is destroyed, the protected, rare and endangered species of plants, animals and fungi disappear. The Montenegrin coast is small, so research projects related to oil and gas have a particularly high negative impact on marine biodiversity, where the impacts would significantly increase and expand in the case of exploitation (strategic determination). Project implementation in the field of energy lead to permanent changes in space, disruption and changes in appearance and of landscape, destruction and/or fragmentation of plant, animal and fungi habitats, destruction/reduction of species populations, disruption of ecosystems, permanent loss of habitats and species (irreversible processes), and similar (all regions in Montenegro).

For all locations where the installation of solar power plants is planned, it is necessary to determine the so-called zero status of biodiversity so that a picture of the importance of the relevant locations and areas can be obtained on the basis of detailed and precise data, with the aim of preserving and protecting the most valuable natural values. According to the recommendations of the International Union for Conservation of Nature (IUCN), the implementation of such projects is not justified in areas of high biodiversity, including protected areas and areas of preserved nature. The development of renewable energy sources that is not compatible with the preservation of protected areas or areas of preserved natural appearance should be avoided because the negative impacts cannot be mitigated to the extent that there are no harmful consequences. This also applies to the areas that are not protected, but which are important for the conservation of biodiversity in the protected area (for example, when the development of a project affects endangered populations living in a protected area).

In order for avoidance to be effective, risks to biodiversity must be identified early, which means that all activities for risk prediction and prevention of negative impacts must be undertaken in the project planning stages. Therefore, for the installation of solar panels, it is necessary to take care of choosing a location that should not be located in areas of high risk for important habitats and types of biodiversity. Adequate design in accordance with the natural characteristics of the location is also very important, it is necessary to take into account the location of the infrastructure and the time period of the project activities, which must be favourable for biodiversity (disturbance of animals). Measures taken to reduce the duration, intensity and/or extent of negative impacts that cannot be fully avoided can be identified during early planning, and when developing design alternatives to be considered.

The installation of solar panels leads to changes in the natural values of the area in a way that reduces them to a significant degree due to the fact that the necessary components of the solar system: panels, batteries, inverters, conductors and supporting systems occupy natural habitats that are degraded or destroyed in this way. Also, if the solar power plants are densely placed, the fragmentation of the habitat is greater, and thus the negative effects on the composition and structures of the communities of plant and animal species. In order to protect the vegetation and prevent the unnecessary destruction of the plant resources of the area in question, it is necessary to limit the clearing of vegetation and the movement of construction machines, mechanisation and means of transport exclusively to the area determined by the technical documentation. Reduce

the cutting of forests and other existing vegetation to a minimum so as not to initiate soil erosion processes. In order to protect the fauna and to minimise its disturbance, use technically sound construction machinery with the lowest possible emission of harmful combustion products, noise and vibrations. Rough physical works (vegetation removal, soil levelling, road construction) should be performed during the period when the birds are not nesting. When building transmission lines, install bird warnings in sensitive places. Limit emissions and pollutants (noise, erosion, waste) during the implementation and operation of the project; perform constant controls during the development and operation of the project in order to implement the foreseen protection measures; define and implement appropriate actions to mitigate the impact on biodiversity, including conservation goals (implementation of conservation and other protection measures); revegetation of the area with autochthonous plant species.

The conflicting situation in planning and construction of hydropower facilities is recognized on the rivers Komarnica (Nature Park Dragišnica and Komarnica) and Piva (Piva Nature Park), which are protected under national legislation, and which would suffer immense irreversible negative impacts on biodiversity due to the construction of hydropower plants or reservoirs, landscape. According to the Nature Protection Law of Montenegro (Article 24), a nature park is a large natural or partly cultivated area of land and/or sea, which is characterised by a high level of biological diversity and/or geological values with significant landscape, cultural and historical values and ecological features of national and international importance. It is forbidden to undertake actions, activities and services that endanger the features, values and role of the park.

WATER MANAGEMENT - significant impacts that lead to disruption of ecosystems and impacts to the habitats and types of water courses and coast are recognised through the activities related to the regulation of watercourses (Bojana, Zeta, Lim, Tara and Ćehotina), but also the dedicated exploitation of river sediments (exploitation of river sediments includes commercial exploitation). Also, evident negative impacts on watercourses will be manifested through the implementation of part of the development goals and spatial planning priorities related to hydrometeorological hazards, which foresee activities on smaller watercourses that will be arranged in a way that enables the construction of small hydro power plants (whereby the names of the watercourses that would be included in the planned operations have been omitted).

FORESTRY, an area for which the presented concept at first sight is encouraging in terms of biodiversity conservation, because it is based on sustainable forestry, through the improvement of forests, and what is very important, without the announcement of concessions. However, in the special objectives part, it is stated "... rational exploitation of forests and forestland as a natural resource", whereby the areas and locations where the forest will be exploited, and to what extent, are not specified, which can be a basis for abuse. Forest exploitation entails major impacts on biodiversity, which is manifested through changes in space, disruption of the appearance and change of the landscape, destruction and/or fragmentation of plant, animal and fungi habitats, destruction/reduction of species populations, disruption of ecosystems, permanent loss of habitats and species (irreversible processes), and similar (all regions in Montenegro).

Within the field of HUNTING, improvement is planned in terms of taking measures to develop, preserve and improve the general status of the indigenous populations of chamois, roe deer, hares, bears, grouse, partridges, eagles, falcons and other animals. Types of chamois, bears, roe deer, grouse, eagles and falcons are protected under the law and may not be treated as hunting game.
MARITIME ECONOMY, i.e. all types of traffic on the water will have significant negative impacts on biodiversity and the environment because a significant increase in the frequency of traffic is planned, which means more vessels, more pollution, more pressure on habitats and marine

species, which are particularly sensitive to all types of pollution (e.g. sea flowers, NATURA 2000 species) and animal disturbance. Particularly large and negative impacts will be manifested in case of incident situations, i.e. oil spills (collision, failure of the vessel, natural disasters, and the like). The part on marine traffic does not provide specific locations, so it is to be expected that the impact can occur along the entire coast. The impact will occur through the development of a network of variable cross docking terminals for the purpose of the distribution of goods by sea; construction of a site for accepting oil and oil derivatives, especially for the needs of deposits in Montenegro; construction of new marinas/docks for cruise ships and passenger ships of the new generation, for their overhaul and vessel maintenance. Recognized negative impacts are also evident in the section on the lake traffic - activities are planned within the NP Skadar Lake, the development of the port in Virpazar for goods and passenger traffic, whereby it is planned to build more piers along the coast of the Skadar Lake for the purpose of movement of goods, road and tourist transport, but also river traffic: Bojana River, Porto Milena - canal (south of the Saline) - Bojana River - Skadar Lake; the Tara River, by increasing the number of places for the construction of rafts.

TOURISM DEVELOPMENT, for the coastal region, from Ulcinj to Herceg Novi, envisages the construction of new accommodation capacities (high-category mixed-use resorts, higher, high- and luxury-category hotels, villas and high-category private accommodation...) and roads, which creates new pressures on space and the environment. This will have a major impact on the habitats that used to occupy large areas but have been significantly reduced and are becoming increasingly rare due to the expansion of tourism and other types of activities. First of all, this refers to maquis, which has already been placed under protection in some countries due to its great vulnerability and great importance for the conservation of biodiversity.

TRANSPORT INFRASTRUCTURE DEVELOPMENT CONCEPT - this part contains specific activities related to the construction of new and reconstruction of existing roads. Along the proposed routes, the construction of new or expansion of existing roads will have a negative impact on biodiversity, i.e. species and their habitats. In this context, it is necessary to carefully plan routes that, if they pass through Emerald or NATURA 2000 areas or areas where NATURA 2000 or species protected under national legislation are registered, should be relocated. The positive aspect refers to the relocation of the section of the highway that was planned over the Skadar Lake, and the complete bypassing of the protected area. Pressures and impacts on biodiversity will be manifested through the implementation of projects presented through the secondary network, that is, the construction of railway infrastructure on the following sections: Pljevlja-Prijepolje (alternative Pljevlja-Ravna Rijeka); Bijelo Polje - Berane - Peć (alternative Mateševo-Peć); Nikšić-Trebinje-connection to Corridor V, as well as during the implementation of the priority plan for the development of the railway network, which entails the relocation of a section of the Nikšić-Podgorica railway, the section that passes through Duklja. In the area of air traffic development, it is planned to build new airports in Ulcinj, Berane, Nikšić.

The biggest pressure on unique habitats and species of national and international importance would be caused by the construction of the airport in Ulcinj, which is planned in the hinterland of Velika Plaža. This area, through recent scientific knowledge gained in previous decades, and especially knowledge gained through the NATURA 2000 habitat mapping project, has proven to be extremely significant from the aspect of the presence of species and habitats that are unique to the area of our country, that are rare in the region and beyond. Due to the close proximity of the airports that are in operation, and the construction of the planned roads (Bar-Boljare highway, Adriatic-Ionian highway) will make reaching the Ulcinj Riviera easier and faster, so the idea of building an airport should be rejected, because otherwise large areas under habitats that deserve

the highest level of protection would be destroyed and impose a great responsibility on the country that is in the EU accession process to maintain and preserve such habitats.

An extremely negative impact on nature can occur due to unplanned and uncontrolled disposal of WASTE. Waste management is manifested through the selection of locations where any type of waste will be deposited or treated, which must not be positioned in the vicinity of protected areas or the areas that are part of the EMERALD network or the future NATURA 2000 network. When choosing locations for landfills, it is necessary to strictly take into account the choice of locations in accordance with the preservation of the most important species and habitats on own territory.

The field of DEFENSE AND SECURITY OF THE COUNTRY, through the presentation of planned activities and objectives, will also have negative consequences for the natural features and biodiversity of the areas within which they will be implemented. Namely, the SPMNE is planning to select a suitable location for training grounds and shooting ranges for shooting with different types of weapons. The conflict situation with the Mountain Sinjajevina has shown that the territory of Montenegro is a mosaic of areas with exceptional natural features and that it is too small to allow itself the “luxury” in the sense of scarifying any of the potentially suitable areas (such as the Mountain Sinjajevina) for carrying out military drills and shooting with different types of weapons, which would cause a large negative impact on biodiversity and habitats, but also an impact on the lives of people who traditionally go to mountain huts (*katuns*) in the summer. The implementation of drills in locations outside Montenegro is imposed as a solution to this problem.

6.5.1. Impacts on forests

As stated in the section on the Analysis of the Existing Situation section, forests and forestland occupy 69.4% of the total continental area of Montenegro and make the dominant spatial component. Since it is a planning document of the highest level, designations of the Spatial Plan of Montenegro (SPMNE) concerning forests are of exceptional importance and affect the entire environment. This applies both to chapters dealing with forests and to other provisions, especially to planned infrastructure facilities.

The Draft SPMNE provides the basic definition of forestry development and sustainable forest management with the aim of improving and sustainable multifunctional management (economic and protective role). It is also stated that the development of forestry in the coming period should be based on multifunctionality, professional criteria, and principles of the forestry profession, in order to emphasize the general beneficial functions of forests and ecological balance in the area, i.e. on the principle of sustainable development - ensuring the continuity of production and income. This view of forestry development can have a positive impact on forest ecosystems. This vision of the development of forests and forestry **mainly corresponds** to the objectives defined in the National Forestry Policy, which provide that the existing condition of forests should be improved so that the protective, ecological, social and economic functions of forests are balanced, and sustainability ensured.

One of the main objectives of the SPMNE is a balanced regional development. Bearing in mind all forest products (wood, medicinal plants, forest fruits, mushrooms, etc.), grazing possibilities, importance for beekeeping, as well as numerous protective and social functions of forests (ecotourism), forests and forestry should be recognised by the definition of development opportunities, especially in the north of Montenegro. In the section defining the development opportunities of individual municipalities, the Draft SPMNE recognises forestry only in Rožaje.

The absence of the forestry sector in the definition of development opportunities can have negative consequences for forest ecosystems as well, since elaboration of lower-level planning documents would give priority to other activities (agriculture, mining, etc.) for the purpose of better use of development opportunities. As far as forestry and related activities are concerned, the foreseen development would certainly have to be based on the sustainable use of resources. Incentives and modalities for the development of forestry and the wood industry must be supported by measures to keep timber harvesting within sustainable frameworks in order to keep under control the growing pressures generated by economic growth.

Elaboration of forest planning documents – Forestry Information System

Sustainable and multipurpose forest management is achieved by adopting and implementing planning documents in accordance with the law. A planning approach based on professional principles with strict implementation of the plan and efficient monitoring are the basic prerequisites for successful management aimed at ensuring the sustainability of the use of all forest functions.

The Spatial Plan of Montenegro defines general and specific principles and objectives of spatial development, and specific objectives for areas and sectors in the field of spatial development based on sustainable development. As emphasized by the SPMNE, the elaboration of all planning documents for forests and forestland in the territory of Montenegro (forest development plans, management programs, management plans for privately owned forests, as well as management plans and annual management programs for national parks), is one of the basic prerequisites of sustainable management. These plans should be harmonized with planning documents of a higher level as well as with planning documents of other sectors related to forests and forestland.

The significance of conducting the Second National Forest Inventory, setting up of an integral and integrated forest and forestry information system (IS) - the concept of the so-called “precise forestry” based on the application of GIS technology, remote detection as well as the application of other modern inventory and monitoring technologies are also recognised as the basis for monitoring changes in forest ecosystems. All this would have positive effects on forests and forestry.

Improvement of the status of forests

The positive impact on forests is most clearly defined by the determination to improve the existing status of forests where: the coppice origin dominates (especially in private ownership); unfavourable structure and mix; significant share of bare forestland; considerable presence of karst; partly thinned canopy to the pronounced degradation of stands and habitats; the fragmentation of property in the private sector and the increasingly threatened status of forest health by biotic and abiotic risk factors at the national level. The improvement of the situation should be ensured by intensifying measures and activities primarily of a silviculture nature or of a steady and moderate use.

Certification of the sustainability of forests and forest products according to international standards - FSC and PEFC, implementation of Natura 2000 in forests and on forestland is recommended as confirmation of sustainable management.

Remediation, reconstruction and conversion of devastated and coppice forests along with improving the openness of forests are the basic measures provided under the SPMNE. In the planning period, it is expected that 1.800 km of forest roads will be built and reconstructed. This would directly contribute to the implementation of forest tending and exploitation measures and

would create the preconditions for more efficient fire protection and thus the protection of biodiversity, improvement and protection of areas, forests and forestland.

Impact of climate change on forest ecosystems

The loss of biological diversity and climate change are interconnected and interact, they are an equal threat to life on our planet, so these two issues need to be urgently solved together.

Due to the negative effects of climate change, adaptive forest management takes on a different and more intense significance when planning sustainable forest management. Adaptive forest management in the practice of forest management planning, at the pan-European level, is guided by the principles of close-to-nature management (CNS), which can also be recommended in Montenegro. Close-to-nature forest management is a new concept accepted in the EU Forest Strategy for 2030, the aim of which is to improve resistance to climate change and develop principles of multifunctionality of forests. This concept is based on the principles of conservation of natural habitats, promotion of autochthonous tree species as well as non-native species adapted to habitats, promotion of natural forest regeneration, selective management and support for structural heterogeneity of stands, promotion of mixed stands and genetic diversity, avoidance of intensive management operations and support to landscape heterogeneity.

Apart from this, at the EU level, much attention is paid to the management of urban and peri-urban forests. This segment is partially covered in the attached Draft SPMNE. The SPMNE should take into account the stated EU strategic determinations in order to lay a more comprehensive basis for future sector development strategies that will have to be coordinated with the adopted SPMNE. Due to the above, it would be good to clearly indicate other negative impacts so that they are necessarily recognized in strategic documents and lower-level plans, such as:

Forest fires destroy significant areas under the forest every year. Fires are especially frequent on the coast and in the area of Krš, during the summer months, where they destroy not only wood mass, but also the bedding and humus in the scarce soil layer, and the soil is washed away by water erosion.

Illegal logging and excessive logging are a consequence of economic conditions and the absence of an adequate reaction to prevent these activities.

Deforestation is the reason that considerable areas under the forest disappear permanently, mainly due to the construction of roads, power lines, weekend and tourist facilities, facilities for using solar and wind energy, construction of water reservoirs, ski trails, surface mines, etc.

Disposal of waste in the forest, next to the roads and near settlements is a problem that is increasingly frequent and has a negative impact on the condition of the forests.

Drying of forests as a progressive phenomenon is nowadays the biggest issue in forestry, and in many countries it is also an environmental problem. The most important causes of forest destabilisation are climatic excesses, phytopathogenic fungi and insects, direct anthropogenic influences that contribute to water, air and soil pollution. All these causes usually act simultaneously and cause stress and drying of forest trees.

Potential risks and conflicts that are of key importance for the improvement and sustainability of forest resources must be clearly analysed and dealt with.

One of the objectives listed for the development of the energy sector is the encouragement of the use of renewable energy sources from hydro potential, sun and wind energy, biomass while avoiding conflicts with other uses in space and environmental protection. It is clear that all interventions necessary for the establishment of these systems and accompanying infrastructure in the area of forests and forestland would have significant negative consequences for these ecosystems.

If the planned road infrastructure, surface mines, ski tracks, etc. were to be implemented in the areas of forests and forestland, they would be permanently lost.

Taking into account the potential infrastructural facilities in the areas that are now designated as forests and forestland, it would be good to provide a framework of the areas under forests and forestland at the end of the planning period (2040) and the sustainability of the planned concept should be considered from this aspect.

On the other hand, potential conflicts between commercial forestry and future national, regional and nature parks located in the zone of commercial forests should be emphasised and must be taken into account in the detailed elaboration of economic sustainability and the definition of boundaries of protected areas. Increasing the area under protected areas - the EU Biodiversity Strategy until 2030 proposed the general objective of protecting at least 30% of EU land under an efficient management regime, of which 10% of EU land should be placed under strict legal protection. In particular, all primary and old forests “will have to be strictly protected”. Accordingly, possible options for revising the boundaries of existing and potential protected nature areas should be considered.

6.5.2. Impact on marine biodiversity

The positive impact of the implementation of the SPMNE until 2040 is reflected in the planning of additional protected areas in the sea; proposal for the protection of the Kotor-Risan Bay (as a protected area of category VI under the Nature Protection Law) and part of the Bay of Tivat as an area of high biodiversity and fish reproduction area. The relocation of fish farming from the area of the Bay of Kotor to the open sea is a positive example of improving the status of the marine ecosystem despite the intense negative impact of cage fish farming on the marine ecosystem. In order to reduce the impact of fish farming on the marine ecosystem, analyses must be conducted in accordance with the Environmental Quality Standards for the aquaculture sector, the principles of defining zones for aquaculture (Allocated Zones for Aquaculture), principles of defining zones of impact (Allowable Zone of Effect) and indicators of sustainable development of aquaculture in the GFCM region (InDam).

The impact of fish farming on the environment is mostly reflected in the decomposition of organic matter that sinks through the water column and is dissolved in seawater or settles on the bottom. The greatest impact occurs from fish faeces and shellfish pseudofaeces, where the impact of shellfish is negligible. Shellfish feed by filtering water and are true biological filters of the water in which they are grown. However, due to the fact that oysters are consumed fresh, it is extremely important that the water quality at the shellfish farm be first-class.

If there is intensive feeding of fish due to the large biomass of fish per cage, there may be increased decomposition of organic matter and high consumption of oxygen, which leads to an anaerobic condition at the bottom and accumulation of bacterial flora. In this case, rare organisms are found under the cage, mostly bacteria, which are adapted to such living conditions.

Under the cage there are also numerous carcasses of shells and fouling organisms that will fall off the nets, net lines and buoys over time and create a substrate for the settlement of the larvae of certain sedentary organisms. Due to fish farming technology, there is also a significant amount of solid waste under the sea surface (nets for cultivation, ropes, chains, concrete anchorages, fishing tools). Therefore, it is necessary to plan the relocation of cage fish farming from the area of the Bay of Kotor to the open sea of the Montenegrin coast and to protect shellfish farming in Boka within the defined farming zones.

The impacts of the implementation of the SPMNE until 2040 on the marine biodiversity of the narrow coastal area and inland marine waters result from several main planning interventions. Planned infrastructural measures (construction of port infrastructure for passenger and cargo maritime traffic; construction of operational parts of the coast, as well as a significant number of municipal, tourist and fishing berths) will consequently lead to negative impacts in parts of the seabed, which will lead to the loss of part of marine habitats of infralittoral small sand with more or less silt, significant changes in habitat conditions, mortality of a certain number of benthic species (sessile and vagile benthic organisms), as well as changes in the composition of communities. As a result of infrastructure works and deepening of the bottom, there will be a change in the morphology and bathymetry of the coastal zone, which may locally cause a change in the hydrodynamics of water masses. Concreting will lead to permanent loss of part of the habitat, its functionality and possibility of use. Increasing the use of the coastal area and the sea in the coastal (and contact) zone will produce a negative impact on already damaged coastal ecosystems, i.e. biocenoses.

The impacts in the mentioned area will be manifested as increased disturbance of species, possible intersecting of corridors of marine mammals and turtles, increased risk of introducing non-native and invasive species, increased introduction of biocidal and anti-fouling agents into the marine environment and increased possible oil and fuel pollution (accidental situations). There will be an increase in the level of underwater noise, which has a negative effect on marine mammals, and may lead to avoidance and even abandonment of the habitat. Additional night lighting of ports, marinas, new piers as well as the lighting of the ships can cause an increase in light pollution, which will have a negative effect on the coastal ecosystem and on species that depend on natural light regimes.

Apart from the intensification of traffic and the burden on the coastal area due to the new construction, a significant impact will also be represented by the planned increase in the number of berths for the purpose of intensive development of nautical tourism. In addition to the significant impact on the sea and the marine environment, the consequent increase in the number of temporary and permanent residents in nautical tourism ports, as well as the number of visitors from ships (especially cruise ships) will lead to an increase in the amount of all types of waste and wastewater, and thus solid waste in the sea.

Negative impacts are also possible due to potential pollution with wastewater from ships, as well as the discharge of ballast water, which can be a vector for the spread of invasive species.

The planned exploration and potential production of oil and gas will have a high negative impact on marine biodiversity, especially on fish and marine mammals. Since the impact is negative, its extent varies depending on the exposure of marine species to the source of airguns, and the consequences can be mortality of early development stages of fish, disturbance of balance, increase in embryonic mortality, lethal or sublethal physiological effects, reduction of larval growth, damage to brain cells and the inability to escape from predators, partial or complete termination of spawning, which consequently leads to a significant decrease in fish biomass in the following

calendar years. Also, due to the influence of noise, there is an increase in stress hormones, which causes different patterns of behaviour in order to overcome danger. It is necessary to plan and conduct research in the periods of the year when the impact on the populations of marine species is the least, in accordance with the recommendations of the profession, to minimise this impact.

The development of coastal agriculture can lead to negative consequences in the form of washing off of nutrient salts (phosphates, nitrates and nitrites) from the soil, which leads to the massive reproduction of algae and in turn to the appearance of sea blooms. Excessive reproduction of phytoplankton can negatively affect the underwater life due to the decrease in the amount of oxygen in the bottom layers, as a result of decomposition.

In order to reduce the impact of planned interventions, it is necessary to strictly respect the principle of coastal setback, i.e. prevent or minimize any type of construction on the coast and in its immediate vicinity, in order to reduce any additional pressure on the sea, which is the most important resource of Montenegro.

When planning the implementation of proposed planning interventions in lower-level plans, it is mandatory to use detailed data on marine biodiversity that are summarized in the documents prepared within the framework of the GEF Adriatic Project “Implementation of the Ecosystem Approach in the Adriatic Sea through Marine Spatial Planning” (UNEP/MAP-PAP/RAC and MESPU (2021), “The status and pressures on the marine environment of Montenegro” (UNEP/MAP-PAP/RAC and MEPU (2021), “The marine vulnerability assessment of the Bay of Kotor: Methodological Guidelines” (Bataković et al., 2017), as well as data on the mapping of marine habitats within the Natura 2000 network of protected areas of the European Union, which represents the largest network of protected areas in the world and aims to ensure the survival the most valuable species and habitats of Europe.

6.6. Landscape impacts

The plan contains principles, specific objectives and binding measures and guidelines for the development of areas with special reference to the development of urban and rural areas. The emphasis is placed on the importance of protecting and linking ecological, landscape and cultural values.

Applying new standards for sustainable urban development (New Urban Agenda - NUA - UN Conference on Housing and Sustainable Urban Development - Habitat III- 2016) should provide functional cities with an adequately designed network of roads, pedestrian streets and public spaces, bicycle routes, green areas, commercial use of the ground floor of buildings and conditions for encouraging local initiatives.

The plan includes proposed indicators of sustainable urban development for monitoring the implementation of the aforementioned measures. The main objective for the protection of sea and coastal areas mostly refers to favourable spatial planning solutions (strategic), architectural and landscape solutions on land and sea. These areas are to be protected from uncontrolled individual construction and intensive tourist development and to recognise the potential for a different development that is complementary to tourist development.
The development objectives for cultural heritage according to the SPMNE until 2040 are aimed at the systematic improvement of the integrated protection of natural and cultural heritage, where one of the obligations is the protection of the cultural landscape. The implementation of this objective is defined through a measure that mandates the protection of the cultural landscape and

the environment (recognition and demarcation of the cultural landscape according to the principle of preserving the special ambient characteristics of the built space and landscape).

A reference to the necessity of protecting landscape characteristics and space is given through individual sectoral development activities.

As far as agriculture is concerned, it is stated that in addition to the economic contribution, agriculture plays an irreplaceable role in the preservation and development of rural areas, the development of rural and agrotourism tourism, as well as the ecological role in protection against erosion, overgrowth, preservation of typical landscapes, and contribution to the preservation of cultural and natural heritage.

Specific development goals in the area of protection and sustainable use of forests and forestry development identify fire prevention, biodiversity protection, improvement and protection of areas, landscape diversity, improvement of forest ecosystem services, reconstruction and optimal construction of forest roads, removal of litter and other municipal waste from forests and forestland as important measures.

In the part related to the development of the energy sector, one of the goals is to encourage the use of renewable energy sources from hydro potential, solar and wind energy, biomass, while avoiding conflicts with other uses in space and environmental protection. (Here it would be necessary to complement and especially emphasise the avoidance of visual impact on the landscape characteristics of the area, especially with regard to extremely valuable natural and cultural landscapes/landscapes).

Potentially greatest landscape impact risk can be produced by the following:

1. construction of infrastructure facilities (roads, energy facilities and the line),
2. uncontrolled development of tourism capacities,
3. conversion of forest and agricultural land into construction land,
4. construction of landfills,
5. industrial facilities,
6. exploitation of raw materials,
7. inadequate construction of residential and business facilities, especially in urban areas.

These impacts can be mitigated by stricter observance of the given measures for the preservation and protection of landscapes and areas during the preparation of lower-level planning documentation, but also through the control and monitoring of the elaboration of project documents, through obtaining the necessary approvals, audit and inspection supervision prescribed by law.

6.7. Impacts on cultural heritage

Cultural property - immovable, movable, property that enjoys prior protection, as an enhanced part of cultural heritage, represent creations of material and spiritual culture of general interest, and enjoy special protection under the law.
The Spatial Plan of Montenegro sets the objective of planning systemic protection as well as remediation of the consequences of negative impacts of previous periods, which would ensure the preservation of identity and the active inclusion of cultural heritage in the strategy of responsible, balanced, sustainable development of Montenegro.

Identifying, evaluating and determining the significance (in relation to the intensity) of potential impacts that could occur through the implementation of the Plan are steps in recognising activities that affect the cultural and natural heritage of Montenegro.

The general objective of establishing a value protection system set by the Spatial Plan, in addition to the preparation of comprehensive documentation on cultural heritage, the protection and improvement of underwater archaeological sites and the cultural landscape, the protection and integration of traditional (profane) architecture, the definition of the boundaries of cultural property and their protected environment, presupposes the analysis and control of illegal construction through the creation of rehabilitation programs and the strengthening of the institutional protection system.

The specific objective set by the Plan is to preserve the exceptional universal value of the natural, cultural and historical area of Kotor, which also includes its protected environment (buffer zone).

The need to define a protected ambient unit and the contact zone of the urban city centres - historical urban centres and suburbs of medieval genesis: Herceg Novi, Risan, Perast, Kotor, Budva, Sveti Stefan and Ulcinj was also highlighted, including other significant cultural heritage along the coastal belt, their spatial surroundings, including the sea.

The Spatial Plan assumes that cultural heritage protection regimes can be subordinated to activities aimed at defence, navigation safety, protection and rescue, all in accordance with special regulations. Other maritime activities, primarily those involving the use of the sea area for economic purposes, if they take place on the site of the protected underwater heritage or in its surroundings, should be harmonised with the established protection regimes and conservation guidelines issued by the competent state authorities.

Mariculture development activities in the area of the Boka Bay (shellfish farming) and the open sea (fish farming) imply analyses of the suitability of sites while restricting - excluding valuable natural areas (coral communities, communities of Posidonia meadows), underwater archaeological sites, with the obligation to prepare a study in accordance with the Environmental Quality Standards for the aquaculture sector.

All activities that can damage the cultural, social, economic, research, educational and other importance of underwater archaeological sites (construction of buildings, dredging of the seabed, anchoring, fishing with deep trawl nets, shellfish/fish farms), then activities that would damage the seabed - deepening waterways and aquatorium areas, locations of valuable/more vulnerable types of habitats) must be subject to a ban, considering the possible consequences of degradation.

According to the Tourism Development Strategy of Montenegro until 2025, bearing in mind natural, economic and socio-cultural characteristics, the key tourist zones are divided into three regions - coastal, central and northern, and further on by zones and sub-zones where the locations of significant cultural and historical or regional features are identified. The development of tourism in the sense of uncontrolled expansion of accommodation capacities, increase in the amount of waste, can have a negative impact on the cultural heritage if the protection and improvement measures set by the Plan are not applied. This also applies to the suspension, limitation and ban of construction in specific locations in Boka, between historical settlements or with the aim of maintaining the historical character of the place and the harmony between areas and buildings.

The development of the maritime industry in terms of increasing the capacity of nautical tourism ports has been defined by specific development goals of the Plan, while taking into account coastal environmental protection measures. In order to minimise the negative environmental impact, the Plan assumes the gradual introduction of rules (insufficiently defined) for an increased number of vessels, especially large ships and yachts and access only to vessels with a built-in holding tank. However, the necessity of starting local maritime traffic both in the water area of the Bay of Kotor and in the water area of the entire Boka Kotorska, which would serve to relieve land traffic, may to a certain extent have a negative impact on the cultural heritage of Boka if it is not strictly regulated.

The issue of the high-speed road through the Veriga Strait is explained in the Plan, but for now no adequate solution has been offered. Other alternatives that do not have a negative impact on the visual characteristics and integrity of the protected area and would relieve the connection between the bay and improve the overall transport network of Boka Kotorska are still being explored.

The Plan proposed a concept for the development of railway transport, and one of the priorities is the relocation of a section of the Nikšić-Podgorica route that passes through Duklja. Considering the significance of this archaeological site, simply bypassing the location is not enough - it is necessary to carry out a site rehabilitation study, which refers to all locations that represent cultural heritage and which were degraded in the past by installing infrastructural elements (powerline on Leandar).

As far as the energy and power infrastructure is concerned, the strategic determination of the Plan is the construction of new infrastructure for the generation, transmission and distribution of energy. One of the proposed hydro power plants is the HPP Boka with a planned generation of 670 GWh but has a negative impact on the Boka aquatorium and thus on the natural and cultural heritage due to the discharge of a large amount of fresh water into the bay.

6.8. Impacts on the population and human health

The needs of the population are complex and diverse. Adequate spatial planning has the task of ensuring housing with supporting infrastructure, unhindered movement and performance of economic activities, but also other needs of the population such as health protection, cultural and social facilities, a healthy environment and the preserved beauty of the area, which attracts residents to choose this place to live in, especially in coastal municipalities.

Demographic projections of the population show that the natural movement of the population of the largest number of municipalities is negative, the Northern region is particularly at risk with a high negative rate in almost all municipalities. The migration balance of the largest number of municipalities (except Podgorica and Danilovgrad and the municipalities of the Coastal Region) is negative, so it is realistic to expect that only after 2025 internal migrations in Montenegro will begin to slow down, so that after 2035 they will be minimised, which would affect the reduction of the rate of population decline in the Northern Region and other depopulation municipalities in Montenegro.

One of the main goals of the SPMNE is a balanced regional development and encouragement for the development of all local communities, based on their own development potential, addressing thresholds and limitations of development; mitigation of existing regional inequalities in economic and social development. This Plan also proposes general strategic objectives that will solve

current problems and provides a new model of housing policy for solving the needs of all categories of the population.

The selected Sustainable Development Scenario foresees balanced development, with careful construction of coastal infrastructure, development of the northern part of the country based on the principles of eco-tourism development, conservation of natural and cultural values, solving traffic problems, improving municipal infrastructure by expanding and modernising hydrotechnical, power and electronic communication infrastructure, stopping excessive expansion of construction areas and excessive construction. As a result, all this can have a positive impact on the local population and on other people who visit Montenegro.

Monitoring the development of demographically threatened areas and implementing activities and measures to stop negative demographic trends is highlighted as a particularly important aspect, which coincides with national strategies and plans concerning regional development. This consequently has a positive effect on the system and network of the settlement and the implementation of the polycentric model in the functioning of the settlement.

Also, activities related to improving the energy efficiency of final consumption and waste management are rated as an extremely positive impact, and activities related to agriculture, forestry, social activities and water management are rated as moderately positive. For some of the areas, it was not possible to give an assessment due to insufficiently presented information related to the level of elaboration of the planning document.

The mining sector is rated as moderately to extremely negative for the population and people's health, although from the economic aspect it can contribute to better economic growth and an increase in the gross national product.

As far as the negative impact on human health is concerned, this is mainly the synergistic effect of several factors, such as:

- traffic jams that lead to air pollution, greenhouse gas emissions and negative impact on people's health due to exposure to pollution;
- the development of industry and the use of fossil fuels, primarily coal through the continued operation of the Thermal Power Plant, affects the emission of pollutants, reducing the overall quality of the environment, which directly affects people's health;
- excessive noise in the main tourist season, from traffic, music from nightclubs, loudspeakers from boats, etc.;
- the overbuilding of the area without enough urban greenery, which contributes to greater air pollution, the creation of “heat islands” in the urban environment and, under the influence of heat waves, lead to an increased risk of heatstroke, sunstroke, etc.;
- the large concentration of bathers on the beaches of the coastal area, the uncontrolled discharge of wastewater into the marine recipient leads to a faster spread of infectious diseases;
- high temperatures and human carelessness lead to forest fires and air pollution, but also threats to people's lives and safety.

The electronic communication infrastructure is presented through a development concept that should be achieved through several goals, among which is the construction of new and reconstruction of the existing network of base stations with optical access in order to build mobile communications of higher technological level, i.e. 5G and 6G mobile networks. These mobile

networks require several times the density of base stations compared to 3G and 4G networks. Care should be taken when it comes to the locations where high-tech base stations will be placed, because despite the fact that there is no unified attitude regarding the harmfulness of RF-EMZ to living beings, there is certainly concern about the effects they can have on the living world (people and animals), given that it is not a small source of radiation. In this context, it is obvious that there will be an increase in the amount of waste that needs to be properly handled, collected, deposited and treated (recycled), so due to the possible impacts on all segments of the environment, a clear plan and vision of the country is needed with respect to this problem.

6.9. Impact on climate change

The concept of climate change is nowadays identified as one of the most significant environmental issues of the 21st century and, as such, is the subject of numerous debates. As the issue of climate change is not easy to define within the framework of only one field, this topic, as well as the issues of environmental protection, permeate all areas of human activity today, from the socio-political sphere and the economy to culture, spatial planning, urbanism and architecture.

Climate change should be considered in advance in order to take appropriate measures applicable to the built environment and urban forms. The process of adaptation implies predicting the effects of climate change and taking appropriate actions with the aim of preventing and reducing as much as possible the negative consequences that they can entail. Timely reaction in the present will provide savings in the future. Adaptation strategies are necessary at all levels of administration and management - from local through national to the international level.

However, a complete understanding of the significance of this phenomenon is not possible without understanding the essence of both approaches - preventing and adapting to climate change. Misinterpretations and insufficient knowledge of these terms can lead to a worsening of a certain situation. This can be most easily explained on the example of the idea of promoting a higher built-up density of individual settlements as a measure to improve its energy efficiency. Although the higher density of built-up areas enables the reduction of harmful gas emissions, primarily due to lower use of means of transport, can also lead to the creation of lakes of warm air - urban heat islands, which cause an increase in the temperature of the environment.

Sensitivity to climate change varies significantly depending on the type of settlement, while in some cases it can change even within the same settlement. Location, urban structure, the dominant type of buildings within the built structure, as well as the socio-economic context and overall institutional capacity for mitigation and adaptation to the consequences of climate change are key factors that determine the sensitivity and degree of adaptability of populated areas and wider urban regions.

If we take into account the large and still growing percentage of the population that lives in cities, as well as the fact that this part of the population has a disproportionate share in the use of resources (natural and social), it can be said that cities and their inhabitants have a key role in the changes of the global environment.

Bearing in mind the fact that climate change in cities is mostly linked to an increase in the concentration of carbon dioxide, it is necessary to start from the biggest causes - in addition to traffic and industry, it is certainly the existing housing stock. Built objects have a relatively long lifespan, and therefore all activities undertaken today will have a significant impact on the environment in the future. As the largest part of human private, social, business and cultural life takes place in buildings (up to 90% of the time during the day is spent in buildings), the built urban

environment represents the primary challenge in the fight to mitigate the consequences caused by climate change and improvement of energy efficiency in the building sector is imposed as one of the most effective measures.

The impact of the Plan on the climate can be perceived from several aspects:

- through the impact of specific activities on the contribution to climate change/greenhouse gas emissions;
- through the impact of specific activities on adapting to climate change;
- through missed chances to arrive at low-carbon development solutions with the planning document.

The Paris Agreement is a comprehensive, legally binding document aimed at "holding the increase in the global average temperature to well below 2 ^{0}C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 ^{0}C". A key element of the Paris Agreement implies a quantified obligation of all members of the UN Framework Convention to reduce emissions.

Montenegro ratified the Paris Agreement on 11 October 2017 and strengthened its path to EU membership by confirming the commitment to fight against the negative impact of climate change together with other signatory countries.

This obligation was assumed by 197 signatory countries of the Convention, of which 169 countries have already completed the procedure of ratification of the Agreement defining the obligations for all member states of the Convention for the period after 2020 and are based on the Intended Nationally Determined Contributions to the reduction of greenhouse gas emissions (INDC).

The calculation of greenhouse gas emissions includes several categories: energy consumption, industrial processes, agriculture, forestry, land use and changes in land use, and waste management. In Montenegro, the greenhouse gas emissions are estimated at the national level without disaggregating the data to the local level. However, both at the national, global and local level, the key role is played by energy consumption - that is, the burning of fossil fuels in all sectors, including housing, industry and transport. The forestry sector is also important because forests are the main sink of greenhouse gases. In the agricultural sector, emissions from animal husbandry are key, so global trends dictate changes in nutrition and the reduction of livestock farming.

Climate changes have highlighted new values that are becoming significant for determining the priorities of spatial development, and which composed a predominantly marginal planning framework until the new knowledge was acquired. Spatial planning has the greatest capacity to steer the process of adaptation to climate change, and with the goal of transformation towards a climate-smart world through sectoral and territorial integrated strategies and current and future actions.

New strategies of climate-proof planning of sustainable and durable spatial development are necessary in order to invest in the prevention of the harmful consequences of climate change and the large costs of their remediation. Extreme events in the last decade indicate a wide range of sensitivity and vulnerability of space and the need to increase its resistance and endurance. These findings influence the creation of awareness of the necessary actions in the domain of adaptation to climate change, but they still do not reach priority positions in the process of spatial planning.

The key areas of climate-resilient planning and action are the following:

a) **planning of green and undeveloped areas** - which encourage air circulation and cooling, networking of habitats and ecological corridors, reduction of thermal consequences in settlements, as well as protection against flooding with the possibility of water sinking;
b) **city planning** aimed at: new ecologically responsible construction technologies; regulated waste management and storm water drainage; protected drinking water distribution system; horizontal and vertical greening and the formation of green areas and networks; or towards the formation of blue spaces and flows whereby the water effect would also be used for cooling;
c) **management of natural disasters** - application of appropriate flood protection measures and more effective mapping of threatened floodplains;
d) **establishing clear land use rules** and construction conditions in endangered zones by integrating climate change scenarios into the process of hazard evaluation and risk management;
e) **water management** - because spatial planning considers numerous and different aspects of water in the space, such as flood protection, conservation of protected water areas, as well as the infrastructure network of supply and drainage.

Planning and implementation of actions within the aforementioned mentioned key areas of climate-resilient planning primarily depends on the improvement of the knowledge base and its availability to regional and local administrations and all actors of the spatial planning process. The availability of the overview of risk zones and other adapted data and indicators that have already integrated data on climate change is a key prerequisite for adequate consideration at different levels.

Plans for infrastructure development must be coordinated with information on environmental sensitivity and the expected impacts of erosion (torrent flows), climate change (sea level rise, extreme weather events - windstorms, fires) and earthquakes. Further elaboration of existing information on vulnerability to natural hazards, definition of prevention, mitigation and adaptation measures is needed. In addition, the sustainability of the infrastructure should be improved through the application of instruments for the prevention, control and remediation of the impact of natural hazards.

One of the general objectives of the development of the Plan is defined as “Reducing the risk of disasters and protection against natural disasters”. In addition to economic foundations, Montenegro's climate resilience must be built in the field of infrastructure and adequate response to natural disasters, the intensity and frequency of which are multiplying under the influence of climate change. All coastal and northern municipalities are sensitive to heat and cold waves, which can be accompanied by severe drought and forest fires on the one hand, and heavy rainfall and frost on the other. Therefore, the planning of urban greenery with mandatory irrigation is extremely important, as is the sustainable management and restoration of forests.

Green areas have a significant impact on reducing the impact of climate change and it is necessary to preserve, improve and plan them as a unique system of green areas. The Plan provides guidelines to plan construction areas in such a way as to ensure adequate green areas. Lower-level planning solutions should strictly adhere to this principle.

It is also necessary to plan protection against floods caused by heavy rains, especially bearing in mind torrential watercourses in the Adriatic and Danube basins. Accidental situations caused by natural disasters should be taken into account in the planned regulation of watercourses.

In addition to several specific guidelines related to energy efficiency (in all sectors of consumption and especially in the transport sector through the improvement of public transport including rail transport, promotion of energy-efficient and low-emission vehicles, integration of EE criteria in traffic infrastructure projects), the Plan proposes urban zones in such a way that energy consumption is minimised. Also, the Plan promotes the construction of new renewable energy sources, which can ultimately contribute to the reduction of CO_2 emissions and dependence on electricity produced from coal.

The Plan also envisages the introduction of new technologies affecting the power infrastructure, electromobility and hydrogen in the transport sector, heating in the building sector and intensive industry, which would certainly contribute to the fight against climate change.

Increasing the state-owned housing stock, i.e. owned by local self-government units - the formation of a national housing stock can have a negative impact on air quality and an increase in greenhouse gas emissions. In this regard, it is necessary that all new residential buildings meet the strictest criteria of energy characteristics provided for these types of buildings.

The construction of new airports and the increase in the share of air traffic will contribute to a higher frequency of traffic due to the increased number of passengers and tourists, and therefore to an increase in exhaust gases and deterioration of air quality. The Plan envisages new airports in Berane, Nikšić, Pljevlja, Žabljak, Bar and Ulcinj, which would decentralise air traffic and make it available in all regions of Montenegro and in turn result in less congestion on transit roads and local roads, less traffic congestion and lower emissions of harmful gases. In this regard, the Airports of Montenegro should continue to implement the guidelines and policies defined by the Airport Carbon Accreditation Body[31] to achieve carbon neutrality by 2050. The implementation of the environmental management system of the Airport of Montenegro, which is based on the principles of sustainable development and the requirements of the international standard ISO 14001:2004, should be one of the priorities of future operations.

As far as the mining sector is concerned, it certainly represents a major source of negative impacts on climate change, both at the local and global level, so all policies and strategies should be planned to overcome the state's dependence on fossil fuels and ores, which will be the subject of the National Energy and Climate Plan, which is currently being drafted.

In the end, we should not forget that adapting to climate change, especially in the case of the coastal part of Montenegro, is extremely important since tourism is the main economic activity and relies on the basic offer of “sun and sea”. Therefore, additional elaboration of the Plan's development objectives related to the blue economy is needed.

As far as the tourism sector is concerned, it should be emphasized that there is a two-way interaction between climate change and global tourism. Nature-based tourism, especially along the coast and in winter destinations, is sensitive to weather and climate change. On the other hand, tourists' perceptions and responses to climate change have yet to be fully understood (and are receiving much attention and is intensively studied in developing countries that are potentially sensitive to climate change, yet economically dependent on tourism.

Tourism contributes to climate change through greenhouse gas emissions, while climate change affects tourism in several ways (UNWTO 2008):

[31] https://www.airportcarbonaccreditation.org

- directly, weather changes that result, for example, in severe weather conditions or less snow in winter destinations;
- indirectly, through reduced aesthetics of the tourist destination, loss of biodiversity, less water availability or increased frequency of diseases;
- change in tourist travel patterns; change of desired tourist activities;
- through social influences, which can result in social unrest and political instability.

For summer tourism, experts have been warning for years that the lack of water and extreme heat could make many regions unattractive for vacations. Back in 2008, the World Tourism Organisation warned about the vulnerability of this economic sector due to climate change. Forest fires, new infectious diseases, loss of biodiversity, spreading of jellyfish due to rising sea temperatures - all this could cause big problems to traditional tourism.

6.10. Cumulative impact assessment of planning solutions

Table 6.1. Impact assessment of planning solutions

IMPACT INTENSITY	MARKER
Extremely negative impact	
Moderately negative impact	
No impact	
Moderately positive impact	
Extremely positive impact	
Not possible to assess the impact	

	Air quality	**Climate change**	**Land**	**Biodiversity**	**Water**	**Sea**	**Cultural heritage**	**Landscape**	**Population**	**Human health**
HOUSING										
Establishing a stable financing system for construction of social housing facilities										
Development of the rental sector, improve availability of adequate apartments to families which cannot meet their housing needs										
Improve housing pool owned by the state or local self-government units – creating national housing pool										
Improve the management and maintenance system for the existing housing pool										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
Implement legalisation procedure for illegal structures										
LAND POLICY										
Create a base for monitoring the status of and processes in space by elaborating planning documents with implementation into GIS										
Establish control mechanisms as part of elaboration of lower-level plans										
Limit housing construction outside settlements to already determined construction sites (without new housing zones)										
Discourage conversion of agricultural land and attractive tourist zones and locations into construction land or settlements of apartments intended to the market by tax policy										
Encourage change od use of existing structures which are underused for economic/"productive" uses, e.g. tourism										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
CULTURAL HERITAGE										
Improve the protection system by strengthening staff and institutional reforms										
Active renewal of authentic village agglomerations and their activities										
Integrating urban fortification into functions by modern revitalisation of old city centres										
Reconnaissance and modern revitalisation of industrial architecture of the 20th century										
Conservation of special Ambiental characteristics of built-up space and landscape										
Conservation of characteristics urban matrix with natural landscape										
SOCIAL ACTIVITY										
Establish functions of pre-school, primary and secondary education in all municipalities in Montenegro and in centres within the										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
network of settlements, and in all centres of regional importance and in the settlements in which the demographic structure requires so										
Establish the function of academic/higher education in all centres of regional importance										
Establish institutions for the development of research activity in centres of regional importance										
Establish an adequate primary healthcare system in all municipalities in Montenegro and provide centres of regional importance with general hospitals										
Build facilities for children with development difficulties, children with behavioural disorders and children without parental care within all networks of settlements where the demographic structure requires so										
Build homes for elderly in all										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
municipalities that are regional centres										
Create adequate sport infrastructure for sport and recreation activities in every municipality within the network of settlements										
MINING										
Exploitation of technical and building stone										
Exploitation of metallic mineral resources										
Coal exploitation										
Exploration and production of hydrocarbons										
AGRICULTURE										
Sustainable agriculture development with an emphasis on organic production										
Increase the share of arable land										
Strengthening competitiveness and application of new technologies										
MARICULTURE										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
Improve existing locations for shell farming by investing in infrastructure and new technologies										
Relocate fish farming from the territory of the Boka Bat due to extremely negative environmental impact										
Improve legal framework to invest (rent locations) and regulate infrastructure on farms										
Mariculture development (fish farming) on the open sea										
Restrict activities with considerable negative impacts on the marine environment										
FORESTRY										
Sustainable multifunctional forest management										
Improve planning documents and forest information system (in GIS) for sustainable management										
Protection of forestland and protective forests										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
Improve the status of forests and improve resilience to climate extremes										
WOOD INDUSTRY										
Limit export of raw material										
Building professional capacity										
Encouragement for the development semi-final and final timber products										
HUNTING										
Improve management and develop information system										
Prevent illegal hunting										
TOURISM										
Diversification of tourism products, extension of tourism season										
Introduce a modern system for measuring and monitoring accommodation capacity for the purpose of investments in high-category accommodation										
Conserve spatial and natural values for the purpose of										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
sustainable tourism development										
Develop cruising tourism										
Increase the total number of tourists										
MARINE ECONOMY										
Improve business operations of ports and ensure better connections										
TRANSPORT										
Develop road network for the purpose of better spatial integration										
Improve transport safety and security and improve the regulatory framework										
Increase the share of railway transport and develop the railway infrastructure										
Build new airports										
Increase the share of air transport										
Develop water transport										
ENERGY										
Increase the share of renewable energy sources in final consumption										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
Reduce greenhouse gas emissions from the energy sector										
Increase energy efficiency of final consumption										
Develop power infrastructure for electricity transmission and distribution										
Reduce dependence of energy import while optimally using available generation resources and invest in new generation facilities										
Gas infrastructure										
WATER MANAGEMENT										
Ensure sufficient quantities of water of appropriate quality for supplying water to the population and for various economic needs so as not to endanger the environment										
Achieve and maintain a good status and good ecological potential of bodies of groundwater and underground water										

	Air quality	Climate change	Land	Biodiversity	Water	Sea	Cultural heritage	Landscape	Population	Human health
Reduce risk of harmful impact of water										
WASTE MANAGEMENT										
Integrated municipal waste management										
Reduce waste production per capita										
Increase the level of waste recycling										
Reuse construction and recycled waste										
Transition to circular economy										
Prevent uncontrolled disposal, depositing and incineration of municipal waste										
Reduce the number of illegal dumpsites										
Controlled management of special types of waste										

Table 6.1. provides impact assessment for planning solutions by sector and provides individual segments of the environment. As it was emphasised earlier in the introduction of the chapter, one should bear in mind the limitations of impact assessment in relation to the level of elaboration of the planning document. The foregoing refers in particular to certain objectives stated in the Plan, for which it is not entirely clear how they will be implemented, which consequently results in the inability to fully assess and evaluate the impacts.

For the sake of clarification, we give an example related to the energy sector, where the Plan envisages a reduction in dependence on energy imports with optimal use of available production resources and investment in new generation facilities. Reducing dependence on energy imports can be achieved in different ways, which can often have extremely negative effects on the environment (for example, the construction of hydro power plants or solar and wind power plants, which affects the permanent occupancy of space, the reduction of the number of species and habitats, and the like). New production facilities can also be related to the use of fossil fuels. On the other hand, reducing dependence on energy imports is also achieved by better management of the existing system, as well as by increasing energy efficiency. In this sense, it is almost impossible to assess the impact of the mentioned planning objective on the segments of the environment.

Overview of impacts assessed by sectors

We give an overview of results by sector in order to clarify the impacts assessed in Table 6.1.

In the part of the Spatial Plan that concerns **housing**, the Plan sets objectives that are mostly without impact on environmental segments, except in the case of impacts related to the population and people's health, which are assessed as moderately positive and extremely positive. In the housing sector, improvements related to the control and management of the sector, the establishment of a social housing system, the control and management of the rental sector, as well as the legalisation of existing illegal buildings are foreseen. Considering the current situation in this sector, any improvement can be evaluated as a positive impact on the population. On the other hand, most of the listed objectives do not have a significant impact on other segments of the environment. In the case of an increase in the state-owned housing stock, i.e. owned by local self-government units - the formation of a national housing stock, the impact cannot be assessed since the way in which this will be achieved has not been fully explained. The method may include the expansion of construction areas and the construction of new settlements, which may have negative consequences for other segments of the environment.

Planned solutions related to **land policy** were mostly evaluated as moderately positive because they foresee improvements in the area of sector management. We emphasize here that in the case of land policy, no negative impacts were recognized. On the other hand, certain planning solutions such as tax policy disincentivising the conversion of agricultural land and attractive tourist zones and locations into construction land, i.e. apartment complexes for the market and stimulating the conversion of existing buildings that are insufficiently used for commercial/”productive” purposes – e.g. tourism, it was not possible to assess the impact on the population and people's health, given the rather unclear ways in which the goal will be achieved.

In the part of the Plan that deals with the topic of cultural heritage, the solutions provided for in the plan are assessed as having a moderate positive or no impact on segments of the living environment such as air quality, climate change, water, etc. The impact on cultural heritage is extremely positive, as the Plan foresees improvements related to the improvement and management of cultural property, as well as the creation of missing documentation and

databases. The impact of the Plan related to cultural heritage on the population and people's health cannot be assessed at this level.

The activities foreseen in the Plan related to the development of the social activities sector were assessed as extremely positive for the population and people's health. The envisaged solutions will have a positive impact on the quality of life of the population and consequently on the health of the population. Other segments of the environment will generally not be affected as a result of the implementation of the Plan.

By evaluating the impact, it can be concluded that the **mining** sector is one of the sectors in which the most significant impact on the environment is expected. The impacts of the majority of planning solutions were evaluated negatively, with moderately negative to extremely negative impacts on the quality of air, water, soil, biodiversity being the most prominent. Mining activities involve large spatial units, and their implementation is accompanied by emissions of pollutants that affect the deterioration of the quality of the environment.

On the one hand, mining activities are a necessary sector of industry, both from the aspect of domestic consumption of mineral resources, as well as in relation to the export of raw materials and the increase of revenues. The mining sector affects the increase in income and the creation of new jobs, so its impact on the population, considering only economic factors, is assessed as positive. Given that at this level of impact assessment, the Table does not show the positions of future locations where mining activities will be carried out, some impacts could not be assessed, as is the case for cultural heritage. We use this opportunity to point out that the planned opening of the Brskovo Mine is related to the location where the cultural monument of the medieval town of Brskovo is located.

Planning solutions for the **agriculture** sector were mostly evaluated as positive or without impact. A possible moderately negative impact is recognized only in relation to the increase of cultivated areas, which can contribute to the loss of some habitats and species depending on the area and the location. The impacts that could not be assessed are related to the introduction of new technologies in the agricultural sector, but given that the technologies are not listed, the impacts cannot be quantified at a satisfactory level.

The **mariculture** sector has moderately negative impacts in the part related to fish farming in the open sea, while in principle it can be said that planning solutions have mainly positive impacts on environmental segments.

The **forestry** sector, in the case of the application of planning solutions, will undergo positive changes, i.e. most of the planned activities are evaluated moderately positively. The impacts of forestry are not recognised in relation to the marine environment and cultural heritage. Improving forest management will have an extremely positive impact on people's health.

The activities foreseen in the Plan for the **wood industry** sector are mostly without impact on environmental segments or their impact is assessed as moderately positive.

In the field of **hunting**, the fight against poaching and the resulting positive impact on biodiversity, which has been assessed as extremely positive, is particularly noteworthy. No significant impacts were recognized on other segments of the environment.

The activities foreseen in the Plan in relation to the **tourism** sector were evaluated differently. An extremely negative impact was recognized in terms of impact on the sea and marine biodiversity

due to the development of cruise tourism. In addition, moderate negative impacts on most segments of the environment were recognised in connection with the increase in the total number of tourists in the country. The influx of a larger number of tourists has a positive impact on the income of the local population, and it is also evaluated as positive in terms of the population. Other planning solutions were rated as moderately positive or without impact, whereby the conservation of spatial and natural values for the needs of sustainable tourism development, which only has a moderately positive impact on all segments, is emphasised.

Solutions that have a negative impact on the environment are not foreseen for the **maritime economy** sector.

Planning solutions related to the **transport** sector have a relatively large number of negative impacts on the environment. They are mostly related to the development of the road network, the construction of new airports and the development of water transport, where, among others, extremely negative impacts on the air, biodiversity, sea, climate change and soil have been recognised. Road traffic is a major source of harmful gas emissions, and the construction of transport infrastructure is related to the occupation of space, loss of species and habitats, negative visual effects on the landscape and the area along the road corridor. On the other hand, it contributes to better connectivity and economic prosperity, as well as transport safety.

Most of the negative impacts of the development of the **energy** sector are recognized as related to the development of new energy infrastructure, the implementation of which can contribute to the loss of species and habitats as well as negative impacts on the landscape. Positive impacts are related to the increase in the share of renewable energy sources, energy efficiency and the development of the electricity transmission network. We use the opportunity to note that the impacts were evaluated on the basis of planning objectives for the development of the sector, without taking into account individual planning solutions related to specific locations and energy facilities. This problem is described in detail in Chapter 3.

The **water management** sector foresees improvements in the area of water management, availability of the water supply network, improvement and conservation of water quality. The impacts were assessed as moderate to extremely positive, especially on the population and people's health. Certain segments will not suffer significant impacts due to the implementation of planning solutions related to this sector.

The plan envisages significant improvements related to waste management, and the impacts are mostly assessed as moderate to extremely positive. No negative impacts have been identified in this sector.

Table 6.2. Percentual share of assessed impacts of the Spatial Plan of Montenegro on environmental segments

	Total number of assessed impacts						
SECTOR	**Extremely negative**	**Moderately negative**	**No impact**	**Moderately positive**	**Extremely positive**	**Not possible to assess impact**	**Total**
Housing	0	0	31	9	2	8	50

Land policy	0	0	5	28	0	7	40
Cultural heritage	0	0	36	10	4	10	60
Social activity	0	0	54	2	14	0	70
Mining	15	12	5	4	0	3	39
Agriculture	0	1	3	21	1	4	30
Mariculture	0	4	21	16	5	4	50
Forestry	0	0	8	31	1	0	40
Wood industry	0	0	18	12	0	0	30
Hunting	0	0	18	0	2	0	20
Tourism	2	13	16	13	1	4	49
Maritime economy	0	0	4	4	0	2	10
Transportation	9	15	21	8	2	5	60
Energy	3	11	11	17	6	12	60
Water management	0	0	13	8	8	1	30
Waste management	0	0	5	19	56	0	80
SUM	29	56	269	202	102	60	718
%	4.0	7.8	37.5	28.1	14.2	8.4	**100**

Table 6.2. gives an overview of the percentage share of evaluated impacts by sector in relation to the intensity of impacts given in Table 6.1. Based on the presented calculation, it can be concluded that the impact of the Spatial Plan is mostly positive, with the participation of moderately positive and extremely positive influences represented by 28.1% and 14.2% respectively. The share of extremely negative impacts is 4.0%, i.e. the share of moderately negative impacts is 7.8%. The planning solutions are assessed as being without the impact on environmental segments for 37.5% of the impacts were assessed, while for 8.4% of planning solutions it was not possible to assess the impacts.

This Table should be understood conditionally because it does not deal with spatial conflicts and does not take into account the issues of certain planning solutions that are extremely controversial from the point of view of environmental and spatial protection. These areas, i.e. specific solutions that can lead to significant impacts on the environment, are addressed by the corresponding chapters of this Report.

7. MEASURES PLANNED TO PREVENT, MINIMISE OF ELIMINATE SIGNIFICANT IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT RESULTING BY THE IMPLEMENTATION OF THE PLAN

In accordance with the Law on Environmental Protection and other relevant laws, the prescribed system of measures and conditions for sustainable management, preservation and improvement of natural balance and living conditions, as well as for the prevention and reduction of environmental pollution will be applied on the territory of Montenegro.

Air quality protection measures

Air protection will be ensured through the application of the following measures:

- raising public awareness of the importance of air quality;
- the application of environmentally acceptable technologies and materials in the implementation of planning solutions and in order to meet the limit values of emissions of polluting substances;
- implement appropriate protection measures on existing pollutants, implement appropriate technical and technological solutions at the facilities, which ensure that the emission of polluting substances in the air meets the prescribed limit values;
- in the case of exceeding the limit values of polluting substances in the air, it is mandatory to take technical and technological measures or stop the technological process, in order to reduce the concentration of polluting substances to the prescribed values;
- reducing air pollution from the energy sector (use of ecological energy sources - electricity, solar energy, wind energy, biomass, geothermal energy, etc.), industry, agriculture, traffic, waste management;
- improving the air quality monitoring system in urban areas;
- strengthening the institutional framework and administrative capacities for dealing with issues of air protection, climate change and protection of the ozone layer;
- afforestation and creation of protective belts along roads and on degraded surfaces;
- definition of other air quality protection measures through the environmental impact assessment procedure.

Measures for reducing climate change impact

In order to reduce the climate change impact, the following activities will be undertaken:

- raising public awareness of climate change;
- plan all infrastructure projects, which result from measures of the Spatial Plan, taking into account potential climatic phenomena in the area of implementation of the measure;
- designing must be carried out in accordance with the guidelines of the National Strategy in the field of climate change under the Plan, the National Plan for Adaptation to Climate Change and the National Climate Change Report of Montenegro;
- defining areas threatened by climate change in order to determine adaptation measures and protection measures, revising sectoral strategies with the aim of including climate change as an essential factor of sustainable development in sectors vulnerable to climate change;

- updating the analysis of the vulnerability of protected areas to climate change in Montenegro;
- improvement of existing systems for monitoring, studying and forecasting climate change;
- encouraging revision of existing and introduction of new methods in the process of applying climate data and information in planning and design;
- improvement of irrigation of agricultural land;
- reducing the consumption of substances that damage the ozone layer.

Measures for protection and sustainable use of land

Land protection is closely related to air and water protection, because many of the pollutants are transferred from water to land through precipitation, slopes and cracks in the soil, etc.

Protection of the land from potential degradation should be provided by adequate drainage of wastewater, as well as by taking preventive measures when transferring or trans-shipping of materials of polluting nature.

Special conditions and measures in the function of land protection are the following:

- prevention of further loss of land and preservation and improvement of its quality, especially in the industrial, mining, energy, traffic and other sectors;
- controlled application of chemical agents in agricultural production and agrotechnical measures;
- protection against degradation and change of use of agricultural land;
- protection against erosion by taking anti-erosion measures and introducing effective measures for erosion control;
- prohibition of unregulated waste disposal and closure of unregulated dumpsites in order to protect soil;
- remediation of contaminated locations;
- development of a system for monitoring, protecting and improving soil quality;
- development of modern standard operating procedures and instructions for the execution of obligations in the field of soil protection;
- application of the concept of organic agriculture and replacement of the conventional method of application of protection chemicals and agrotechnical measures in agriculture;
- recultivation and revitalization of all surfaces degraded due to the use of mineral raw materials;
- collection, processing or destruction of animal waste in accordance with regulations on this type of waste;
- prevention of unplanned conversion of agricultural land into construction land.

Measure for protection and sustainable use of water

In order to protect water (ground and underground), the following protection measures are foreseen:

- developing the culture of the population about the need to preserve water resources;
- strengthening the capacity of the water management sector at the national and municipal level;
- improvement of the systematic control of drinking water quality;

- definition of source zones and determination of zones and sanitary protection measures of all sources;
- implementation of restrictive measures in order to preserve water in source areas and in areas of special importance;
- prohibition of activities that affect water in aquifers or ground streams;
- increasing the degree of connection to public sewage systems;
- municipal wastewater discharge and treatment in settlements;
- improvement of water quality in watercourses: construction and more efficient operation of existing waste water treatment facilities, as well as controlled use of fertilisers and plant protection agents;
- improvement of systematic measurement and monitoring of groundwater and underground water quality,
- it is prohibited to discharge wastewater into groundwater and underground waters, which exceed emission limit values - the quality of the treated effluent must meet the prescribed criteria for discharge into the sewage system/recipient;
- the discharge of wastewater that is excessively thermally contaminated is prohibited;
- industrial wastewater must be pre-treated to a quality level that meets the sanitary and technical conditions for discharge into the public sewer/recipient;
- improvement of systematic examination of quality parameters of discharged waters;
- rehabilitation and revitalisation of facilities and equipment of water infrastructure and construction of new facilities in accordance with sanitary and technical conditions;
- rehabilitation and remediation of contaminated watercourses;
- rationalisation of water consumption;
- regulating the supply of water to the population in the settlements, along with resolving the issue of wastewater discharge and treatment;
- collection and evacuation of wastewater through the separation sewerage system (separation of the wastewater collector from the rain collector);
- compliance with the relevant regulations that define waste management;
- elaboration of legally prescribed documents for water and energy facilities, and implementation of an environmental impact assessment for all facilities that may affect the water regime or water quality.

Measures for protection of biodiversity and natural resources

The protection of nature and the environment must give clear guidelines and be defined through the presentation of specific issues that threaten the biodiversity and nature of Montenegro or planned projects whose implementation would put them at risk of degradation, devastation or disappearance. In the coming period, the following are imposed as priority tasks in the field of nature and environment protection:

1. review of previously approved plans in connection with:
   a. concessions/exploitation of forests, i.e. projections of felling (the focus should be on concessions that are still ongoing, and which have largely devastated Komovi, Ljubišnja, and the surroundings of Pljevlja), and
   b. concessions for geological research and exploitation of technical and building stone and ores;

2. implementation of specific activities that will protect biodiversity in target areas, especially in protected areas, as well as in future NATURA 2000 areas (adopting action plans, defining and implementing conservation activities for endangered species, establishing a seed bank, etc.);

3. elaboration of priority documents in the field of biodiversity protection - Red Lists and Red Books (flora, fauna, fungi);
4. revision of the list of protected taxa from 2006;
5. the re-establishment of the Republic Institute for Nature Protection and the new scientific research institution such as Institute/Centre for Biological Research;
6. strengthening the awareness of all Montenegrin citizens about the importance of nature protection and voluntary involvement in protection actions;
7. building and strengthening the cooperation of experts, the Environment Protection Agency and the border police with the aim of illegal export of natural material, i.e. import of prohibited and protected animal species, control of the introduction of invasive species, and the like.

The protection of biodiversity and forests and the protection of nature will also be ensured by the following measures:

- increase in the area of protected natural resources of the territory of Montenegro, i.e. expansion of the network of protected areas;
- establishing an information system about the living world and other natural values of Montenegro;
- improvement of monitoring of biodiversity components;
- implementation of effective measures to control genetically modified organisms (GMO) in accordance with EU practice;
- improvement of methods for the sustainable use of the gene pool and the formation of a bank for the preservation of genetic material, with an increase in support for the preservation of genetic resources, and an increase in the number of entities and areas involved in conservation activities;
- improvement of sustainable management of forests and protected natural resources;
- preservation, improvement and expansion of existing forests (increase of areas under forests and improvement of forest structure);
- improvement of the management system of protected areas of national and international importance (including information system, supervision of economic activities and tourism, implementation of management plans for a period of 10 years, harmonisation of competences, etc.);
- improvement of the protection of special protected bird zones;
- implementation of assumed international obligations in documents such as conventions, agreements and contracts related to the protection of biodiversity and forests and nature protection;
- development of an ecological network in accordance with international standards;
- improvement of the ecological network management system (Emerald network, NATURA 2000, etc.);
- improving the management of individual habitats, species and corridors of migratory species of international importance;
- establishment of management of populations of strictly protected and protected wild species, large animals and hunting game;
- establish harmonisation of the scope of tourism development for the protection and preservation of natural values and the environment;
- when greening urban areas, it is necessary to form a system of public greenery, increase the percentage of green areas, the number and variety of existing categories of public greenery and maintain its close-to-nature status;
- retain green areas within existing residential blocks in family and multi-family housing zones and link them to the public green system.

Biodiversity protection measures provided under the GEF7 project "Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Protection of Hot-Spots in Montenegro" – *Draft Guidelines for Biodiversity Mainstreaming into Spatial Planning*

As part of spatial planning process and in order to conserve biodiversity and ecosystem services, it is very important to take into account the specificities of certain areas, habitats, as well as the needs of different types of organisms (e.g. shelters, feeding grounds, reproductive centres, migratory corridors, hibernation sites, etc.) to ensure their long-term preservation. Accordingly, general measures in relation to biodiversity include the following:

- Application of measures to mitigate the impact of development and infrastructure projects on biodiversity (from complete avoidance to measures to compensate for the spatial impact) in order to reduce their negative impact. This process includes application of the hierarchy mitigation and prioritisation of measures that ensure minimal disturbance of the habitat.
- Introduction of sustainable practices such as monitoring the environmental status of the environment and avoiding habitat destruction, ensuring clean water, preservation of agricultural land and aquatic ecosystems. This especially applies to agricultural areas, where the application of extensive agriculture should be continued in order to preserve the species related to these areas, such as some rare species.
- Monitoring changes in space and their impact on biodiversity (biomonitoring) by relevant organizations and institutions.
- If research shows that there are species in the area of the planned infrastructure project that are categorised as endangered (EN) or critically endangered (CR) according to the IUCN, it is necessary to implement *ex situ* protection measures.
- In the Mediterranean area, strict consideration of the preservation of forest stands, even when they are quite small (a few trees), considering the multiple importance of forests: forests are part of a specific landscape mosaic in the Mediterranean, they play an important role in protecting soil from erosion and landslides, protecting the coast from abrasion, in regulating the water regime of the area, mitigation of the consequences of climate change and have a positive effect on the microclimate of the area where they grow.
- In the Mediterranean area, it is important to preserve areas under natural vegetation, even in the immediate vicinity of planned accommodation facilities.
- There is no need to plan infrastructure projects in the estuary zone (downstream of coastal rivers that are influenced by the tide). Estuaries have specific macrophyte, phytoplankton and zooplankton communities. Numerous species of mammals, birds, fish and other animals depend on habitats in estuaries as a place to live, feed and breed. Many marine organisms, including commercially important fish species, depend on the estuary at some stage of their development.
- Exclude from infrastructure plans all areas of habitats that are recognized as a priority for protection in the Habitats Directive and are rare in Montenegro: *1150 Coastal lagoons, *2270 Coastal pine forests, *3170 Mediterranean temporary ponds, *3180 Turloughs, *5230 Tall laurel bushes, *7220 Petrifying springs with tufa formations (information about their location is given in the document Guidelines for Biodiversity Mainstreaming into Spatial Planning).
- Prohibit intensive use and development within habitats that are key in preserving ecological functions for conservation-important species. This especially applies to forest, wetland and water ecosystems, which are necessary for the smooth development of a

large number of important organisms, such as rare species of vertebrates and invertebrates.

- In the context of the construction of transport, power and telecommunication infrastructure, plan the creation of green corridors and crossings to enable the free movement of organisms between different habitats and reduce the fragmentation of habitats. This is especially true for migratory species and species that need large territories for unbridled development, such as large mammals.
- As part of spatial planning, it is necessary to identify and protect the shelters of species, including underground and above-ground structures, cracks in old trees and other natural and man-made elements such as thornbushes, oysters, springs, swamps and the like, which support reproduction, nutrition and ultimately the survival of organisms. It is recommended to ban their conversion and activities in a radius of 200m around them. In exceptional cases, plan the translocation of populations if possible. This is extremely important for all those species that need a variety of habitats to survive, such as bats or amphibians.

Landscape protection measures

As part of the protection, regulation and sustainable use of the area, it must be ensured that interventions in the space disturb the natural and ambient characteristics of the space as little as possible.

The steering of development projects and activities for their implementation should be in accordance with the capacity of the area.

Construction and infrastructure facilities must be integrated into the area in the planning and designing stages, depending on the type, and must be suitable to the configuration of the terrain.

Strict protection and sustainable use of protected natural resources, natural and cultural property is required.

The guidelines for determining and achieving the target quality of landscapes are as follows:

- In the areas where value is recognised based on a structure dominated by dynamics, functioning and changes harmonised with natural processes (natural areas), protection is provided for the structure of the area and the smooth functioning of natural processes, the protection of biodiversity, as well as the preservation and establishment of ecological networks. Rehabilitation (revitalisation and restoration) of areas with degraded natural processes is enabled. The revaluation of natural values and presentations are provided in order to educate and strengthen awareness of their significance (in relation to the protection regime). Adequate spatial development (rural and tourist) is made possible and is harmonised with the capacity of the area and the established protection regimes.
- Sustainable development in rural areas is based on the recognition, protection and improvement of their specific character, found values and capacity of the area.
- The development of urban areas is based on the fact that these will continue to be the areas with the greatest intensity of change, which are the result of contemporary social and economic trends, and on the fact that their structure and functioning should be especially adapted to climate change.

Measures for protection and improvement of the population's health

Adequate implementation of planning decisions in the field of environmental protection, primarily recommendations and obligation to conduct environmental impact assessments for plans and projects, as well as the establishment of monitoring of environmental parameters, and inspection supervision, play an important role in preserving the quality of life and health of people in the territory of Montenegro.

Sustainable management of the environment is a key factor in the prevention of numerous diseases whose direct causes are environmental factors, primarily anthropogenic influences and their synergistic effect with natural ones, as well as their mutual influences.

The impact of the status of the environment on human health is great and represent a consequential reaction, and the population is daily exposed to a series of physical, chemical and biological agents of natural and anthropogenic origin.

Measures to protect and improve the health of the population can be divided into several key areas:

- provision of the environment necessary for the healthy life of the population, especially children, through the protection and preservation of the quality of the environment;
- elimination of air pollution that occurs as a product of the combustion of energy sources, which can be linked to many diseases;
- establishment of a health risk assessment system based on the most significant environmental factors (air, water, noise and foodstuffs);
- timely warning and prevention of harmful effects of chemicals that pose a potential risk to human health;
- protection of human health from electromagnetic radiation;
- protection of people's lives and health in emergency situations by prevention planning and adequate response to the resulting situation, which would significantly reduce mortality and illnesses as a result of emergency situations, accidents and outbreaks of epidemics related to environmental risk factors;
- protection of human life and health from the consequences of climate change as a global threat to human health, which causes damage to the ozone layer, loss of biodiversity, etc.
- establishment of mechanisms for comprehensive and continuous monitoring of the health impact of environmental factors;
- improve preventive activities to protect the health of the population on the territory of Montenegro.

Measures for protection of cultural heritage and conservation of historical and archaeological sites

The affirmation of cultural heritage as a potential for sustainable spatial development of Montenegro is a strategic commitment. It is necessary to affirm the influence of different civilizations that inhabited the territory of Montenegro through the protection and presentation of material remains. The identity or urban and rural settlements will be preserved in this way.
It is necessary to treat cultural heritage as an inseparable part of the living environment - natural and created (in accordance with international standards), to look at it in correlation with its immediate environment and integrate it into functions that correspond to the needs of contemporary users.

As far as protection and planning of the presentation of cultural heritage is concerned, it is necessary to protect and preserve immovable cultural property by type and significance, in accordance with regulations.

Key measures:

- protection and improvement of cultural and historical entities and the immediate environment - Historic urban centres and suburbs (Herceg Novi, Kotor, Budva, Bar, Ulcinj, Perast, Sveti Stefan, Risan); Historical urban units (Cetinje, Rijeka Crnojevića, Virpazar, Nikšić-Grahovo, Podgorica);
- protection of rural architecture and ambient in the sense of active restoration of authentic rural agglomerations and their activities while creating conditions for the development of the economy - rural tourism, production of healthy food, etc.;
- protection of archaeological sites, which implies the creation of a database on archaeological and potential archaeological sites and the provision of measures for their technical protection; Procedures for construction and investments must be carried out through mechanisms and procedures prescribed by applicable thematic regulations;
- protection of fortifications: incorporate city fortifications into the functions of modern revitalisation of old city centres and improve them from the aspect of technical protection, transport accessibility and connection with isolated fortification points in the conditions of a new – adequate (compatible) function;
- protection of sacral architecture, which includes rehabilitation and maintenance while adhering to conservation principles. For structures whose sacral function cannot be restored, offer functions appropriate to the character of the structure, the architectural disposition and the need to preserve authenticity, taking into account the ethical relationship to the original purpose;
- protection of industrial architecture and architecture of the 20th century, which implies recognition and modern revitalisation while preserving the spirit of the time, function, and the location of a certain historical era;
- protection of the cultural landscape and the environment, which implies the recognition and demarcation of the cultural landscape according to the principle of preserving the special ambient characteristics of the built space and landscape.

Measures for rational use on non-renewable sources and higher use of RES

Rational use of non-renewable sources and greater use of RES is ensured by the following measures:

- intensification of research into the potential of renewable energy sources with the aim of their verification and more realistic balancing;
- significant improvement of energy efficiency with the goal of more rational use of non-renewable energy sources;
- increasing the scope of use of renewable energy sources;
- encouraging the rational use of natural resources, reducing the emission of pollutants into the air, reducing the generation and greater utilisation of waste.

Measures for waste management system improvement

The concept of waste management should be harmonised with the principles of the National Waste Management Plan 2023-2028.

Within the meaning of the Waste Management Law, waste management implies the reduction of the amount of generated waste, i.e. its reuse, as well as its collection, transport, treatment and disposal. Municipalities are responsible for organizing the entire process of waste collection and disposal in their territories. This work is performed through public utility companies (PUC) established by local self-governments.

Every producer of waste is obliged to characterise and categorise waste with the competent organisations and, depending on its nature, to handle it in accordance with legislation. The obligation of waste producers under the Waste Management Law and other main and secondary legislation governing this area is to provide the necessary space for safe disposal of waste, provide the necessary conditions and equipment for the collection, sorting and temporary storage of various waste materials, and that secondary raw materials, hazardous and other waste, be handed over to the entity that has the appropriate permit for waste management (storage, disposal, treatment and the like).

The improvement of the waste management system is ensured by the following measures:

- developing the culture of the population on the prescribed handling of waste;
- establishing an integrated waste management system;
- developing a waste management information system;
- organized collection of waste throughout the territory of Montenegro;
- municipal waste must be collected and regularly transported to the location designated by the competent authority;
- construction of the necessary infrastructure for waste treatment and disposal;
- safe sorting and storing of all types of waste that have a useful value until they are handed over to an authorized collector for further treatment; mixing of different types of waste is prohibited;
- greater utilization of waste that has a useful value by applying the principles of circular economy;
- greater use of construction and demolition waste;
- management of special types of waste (construction waste and demolition waste, waste from electrical and electronic products, end-of-life vehicles, batteries and accumulators, waste tires, waste lubricating oils, agricultural residues, sludge from wastewater treatment plants, medical and veterinary waste, industrial non-hazardous waste) should comply with the relevant laws.

Protection measures in case of disasters and emergencies

The disaster risk reduction and emergency management system is of special interest to Montenegro and is part of the national security system. Planning and regulation of space from the point of view of ensuring protection from natural disasters and technical and technological accidents is an integral part of planning, regulation and protection of space in accordance with disaster risk assessments and management plans in emergency situations.

The modern concept of disaster risk reduction and emergency management is based on the fact that all levels and all phases of planning require definition of an acceptable level of disaster risk and intervening with a system of preventive, organisational and other measures and instruments to prevent their occurrence, i.e. reduce consequences to an acceptable level. The concept of planning and protection of space from natural disasters is based on the minimisation of risks to

human health and lives, natural and created values, as well as on the rehabilitation of spaces that are obviously threatened by these phenomena.

Planned solutions for protection against natural disasters are based on an active approach to disaster risk management, instead of a passive approach to protection (based on rescuing the vulnerable population).

This approach to strategic planning implies optimal coordination of disaster risks and spatial activities. In order to be able to make a proper assessment of the degree of vulnerability of the space, i.e. the limitations to its use, the lower planning levels need to create an information system of geospatial data in the function of the cadastre of the area threatened by disasters, which would provide relevant information for planning purposes, especially the display of zones of possible risks, the probability of occurrence, the extent of the consequences, and based on this, the priorities of the area's protection.

The territory of Montenegro can be threatened by earthquakes, floods, erosion and landslides, extremely high temperatures, storms, hail, atmospheric discharge, snowfall, wind, drought, fire.

The threat to space by seismic activity is an important factor to be considered in spatial planning and the land use, as well as in determining the degree of concentration of physical structures and infrastructure facilities.

Earthquakes are generated on the entire territory of Montenegro and in its surroundings. Significant seismogenic zones have been identified around Ulcinj and Bar, Budva and Brajići, as well as Boka Kotorska, but also in the immediate surroundings of Berane, the entire region of Skadar Lake, Maganik, etc. Seismicity in Montenegro is under the influence of numerous seismogenic zones - from the area of southern Croatia, eastern Herzegovina, northern Albania, and southern and southeastern Serbia. The study (Natural Disasters and Risk of Technical Incidents, S. Janković, M. Radulović, B. Glavatović, B. Micev, MSDT 2018) concludes that the underwater and coastal part of Montenegro have a significantly higher seismogenic potential compared to the northern region. Earthquakes with a magnitude above 6.5 can be expected with high probability in the coming period practically on the entire Montenegrin coast, undersea and immediate hinterland, with the possibility of large-scale tectonic ruptures and deformations of the Earth's crust. The seismogenic potential on the territory of Montenegro decreases slightly towards the inland, so that the expected maximum earthquake magnitudes in the far north do not exceed the value of 5.5 (Richter scale unit). Earthquake protection measures include the proper choice of location for the construction of buildings, the use of suitable building materials, the method of construction, the number of floors of buildings, etc., as well as the strict observance and application of valid construction and technical regulations for the construction of buildings in seismic areas. The possible effects connected with the aforementioned degree of the seismic intensity must be taken into account when designing and determining the type of materials for construction or reconstruction of buildings to prevent possible damage to buildings under the seismic effect to the higher possible extent.

Flood protection is ensured by the creation of flood risk assessment maps, the construction of embankments, the maintenance of streams and canals that play a role in the removal of storm water from settlements, and the observance of valid regulations in the design and construction of hydrotechnical facilities (characteristics of canals, culverts, etc.).

Fire protection is provided by:

- compliance with regulations when designing and building structures (distance between buildings, storage conditions for flammable liquids, gases and explosive substances);
- by building roads in line with the given rules (necessary minimum widths, minimum curve radii, etc.);
- ensuring the appropriate capacity of the water supply network for efficient extinguishing of fires;
- providing conditions for the work of the firefighting service.

Protection against technical and technological accidents is provided:

- by taking measures to prevent the release of any substance that is harmful or destructive to the soil or its characteristics, especially within the SEVESO plant;
- if there is a breakdown of a facility that contains hazardous substances, notify the competent services and specialised teams in accordance with accident protection plans for facilities in which hazardous substances are present or may be present in equal or greater quantities than prescribed (SEVESO facilities). The regulations governing environmental protection determine the obligation to create an accident prevention plan, a safety report and an accident protection plan, a list of hazardous materials and their quantities and criteria for determining the type of document prepared by the SEVESO plant operator.

Establishment of a unique information system for data collection, analysis and early warning, creation of a cadastre of threats of natural disasters for the purpose of spatial planning, institutionalisation of a system of protection against natural disasters and technological accidents, i.e. a risk management system, as well as the creation and implementation of spatial and urban documentation will contribute to reducing the possibility of occurrence of phenomena, planning adequate protection measures and timely response in case of natural disasters and technological accidents, as well as mitigating potential consequences.

Measures for environmental protection against cross-border impacts

As a signatory to the ESPOO Convention (implemented through the corresponding legal legislation), Montenegro has undertaken to inform other countries about projects that may have a cross-border impact.

At the strategic level of planning (SPMNE), it is not possible to determine specific projects that may imply cross-border impacts. In this context, it is possible to identify only the areas of spatial development within which the functioning of certain projects located in the bordering zone with other countries could cause cross-border impacts. This is particularly true for the field of energy because of the possible cross-border impact on water, air, internationally protected flying fauna (ornithofauna and chiroptera fauna).

In the context of environmental protection, the areas along the border need to be viewed in the context of the entire ecosystem, i.e. in cross-border cooperation with neighbouring countries, with which joint efforts should be made to prevent cross-border impacts on the environment, especially in the stage of elaboration of project documents, i.e. the Environmental Impact Assessment Study for the project. Only in this phase, when all relevant inputs are available, it is possible to use

simulation models to determine whether and what kind of cross-border impacts can be expected in the implementation of specific investment projects.

8. OVERVIEW OF THE REASONS USED AS THE BASIS FOR SELECTING THE PLAN AND PROGRAMME FROM THE ASPECT OF CONSIDERED VARIANT SOLUTIONS, AND THE DESCRIPTION OF THE ASSESSMENT METHOD, INCLUDING POTENTIAL DIFFICULTIES ENCOUNTERED IN FORMULATING THE REQUIRED DATA (SUCH AS TECHNICAL DATA OR THE LACK OF KNOW-HOW)

This part of the Environmental Impact Assessment Report for alternative solutions is a key element of the strategic assessment. Although alternatives have already been considered and proposed during the preparation of the Draft Plan, it is important to note that the assessment can include additional alternatives. Zero solution/scenario is a mandatory alternative that must be described, and the scenario should be considered if the Plan is not implemented.

For the selection of the most acceptable planning solution, and on the basis of the considered alternative solutions, it is essential to provide as much information and data and criteria as possible, on the basis of which the scenarios, i.e. alternative solutions, were proposed and considered. Clear and specific data are important to ensure the following in the further elaboration of this Report:

- strengths and weaknesses of assessed/proposed alternatives;
- a description as to whether and how alternatives should be considered in the Report,
- reasons for the selection of alternative and the method of selecting them,
- overview of reasons for not including the alternatives in the Plan.

All selected alternatives must be presented and evaluated in the Strategic Impact Assessment Report.

Based on the analysis of the concept SPMNE and the proposed three alternative solutions/scenarios, and bearing in mind the above, the task of the author of this Strategic Impact Assessment Report will be to describe the availability, accessibility and quality of the data and information required for the assessment of possible impacts. Therefore, we emphasise that both in the current and further parallel communication with the author of the planning document, we will insist on changing the approach to choosing a planning solution by considering alternative solutions/scenarios that will be the subject of an impact assessment. Namely, the scenario considered by the concept A. **Continuation of the trend** - (scenario of intensive development, insufficient control and protection of space) cannot be considered an alternative solution, but only a zero state/scenario, as highlighted in the previous sections of the text. Also, an adequate evaluation of the proposed scenarios B. **Restrictive scenario** - (scenario of intensive protection and reduced development) and C. **Scenario of sustainable development** - (scenario of more intensive development based on the “green economy” policy - spatially and ecologically acceptable) require clearly defined main elements (analysis of the existing situation, relevant legislation, valid strategic and planning documents) to define the criteria for evaluating the proposed scenarios and choose the most acceptable solution for future development in line with the principles of environmental protection.

The scenarios considered by the Concept Spatial Plan do not rely on the existing characteristics and quantification of spatial needs by sector or on the characteristics and already identified limited benefits resulting from previous analyses.
The considered scenarios were not based on differences within the framework of defined general and specific development objectives. As the indicators for selection, comparative evaluation - evaluation and ranking of variant solutions (scenarios) of the spatial development of Montenegro are not defined, they must be considered and defined through further elaboration of the document and in close cooperation between the authors of the planning document and this Report. This process must define indicators for the selection of individual planning solutions by topic, whereby valuable biodiversity areas must be recognised as one of the main criteria.[32] Accordingly, data on mapped valuable habitats is expected to be one of the main indicators for the final selection of proposed scenarios and the potential proposal and selection of a new scenario.

The proposed scenarios are not actually defined in such a way to allow discussing future development and choosing the optimal scenario (it is unclear why scenario B is defined as restrictive), but theoretical scenarios are provided with a proposal of a logical scenario that is known in advance. The scenarios are not described with quantified data (e.g. size and type of protected areas, number of tourist beds, area for social activities, new energy sources) or with some concrete development and protection characteristics, which is necessary to define the criteria for evaluation and final selection of the most favourable scenario.

In the part that considers the scenario of intensive protection, it remains unclear which criteria were used as the basis for choosing the respective approach and reviewing the scenario, and which resources, values and areas they refer to. As considered by the author of the strategic assessment, this scenario implies some characteristics actually should not be part of intensive protection, but a realistic option, which entails further elaboration and coordination with other sectoral policies, whereby a part of them can be considered and already applied (polycentric development, regulated waste management and disposal, control of construction, aseismic planning), which indicates that it is not meaningful to abandon them in advance. The argument that Montenegro is not yet prepared for such a scenario without clearly set and evaluated criteria points to a lack of will, knowledge and ambition towards a direct transition to sustainable development, which brings us into conflict with the commitments under current international documents and declarative goals. All of the above points to the use of the opportunity to exploit the essential potential of the Spatial Plan. It is easy to assess that not setting the protection of natural values and enormous potential as one of the primary development criteria and as such not including it in the period of intensification of development poses a great danger that Montenegro, along with the achievement of the desired level of (economic) development of the country, will lose values in space, which in the period of cohesion would still be subject to intensive protection.[33]

Taking into account the above, with this version of the strategic assessment document, the author was not able to choose the most acceptable planning solution in addition to the assessment of the proposed scenario **C. Sustainable development scenario** - (scenario of more intensive development based on the "green economy" policy - spatially and ecologically acceptable)[34].

[32] G. Berlengi, A. Mlakar, V. Šećerov: Assessment of the Concept Spatial Plan of Montenegro, 2021.
[33] G. Berlengi, A. Mlakar, V. Šećerov: Assessment of the Concept Spatial Plan of Montenegro, 2021.
[34] Chapter 6. Impacts on human health and the environment, including factors such as biological diversity, population, fauna, flora, soil, water, ait, climate factors affecting the climate change, material resources, cultural heritage, including architectural and archaeological heritage, landscape and mutual relations of these factors.

Although the most favourable scenario has not been selected, the author provides clear guidelines for changes and corrections to the selected scenario C in the Plan, due to the identified conflicts in space, and in order to achieve the goals of nature and environmental protection. The above may also imply the need to consider a new planning solution/scenario after the process of public participation and obtaining potentially new data, guidelines and recommendations. Chapter 3 provides clear guidelines for areas of exceptional biodiversity value, which must be preserved.[35]

9. OVERVIEW OF POTENTIAL SIGNIFICANT CROSS-BORDER ENVIRONMENTAL IMPACTS

The issue of cross-border impacts of planning solutions will be considered in more detail in the subsequent stages of the elaboration of this document and the Plan.

We emphasise the fact that the relationship with neighbouring countries and the implementation of certain activities that may have cross-border impacts are regulated by conventions (primarily the ESPOO convention) and interstate agreements signed by Montenegro. Therefore, the citizens of the neighbouring countries will be informed about the preparation of the Spatial Plan, not later than at the time of the public hearing.

10. DESCRIPTION OF THE PROGRAMME FOR MONITORING THE ENVIRONMENTAL STATUS, INCLUDING HUMAN HEALTH

The program for monitoring the status of the environment for the Spatial Plan of Montenegro is an integral part of the existing monitoring program provided by the competent national or municipal body or established in a targeted manner.

Monitoring of the environmental status is carried out in accordance with the Law on the Environment (Official Gazette of Montenegro 052/16, 073/19) by systematic measurement, examination of quantitative and qualitative indicators of the environmental status, which includes monitoring of natural factors, i.e. changes in the environmental status and characteristics, including cross-border monitoring of the environmental status.

Monitoring is carried out on the basis of the annual monitoring program prepared by the Environment Protection Agency and submitted to the Ministry of Ecology, Spatial Planning and Urbanism, except for the Water Quality Monitoring Program that is proposed by the Ministry of Agriculture, Forestry and Water Management, in accordance with the Law on Waters (Official Gazette of the Republic of Montenegro 027/07 and Official Gazette of the Republic of Montenegro 073/10, 032/11, 047/11, 048/15, 052/16, 055/16, 02/17, 084/18) and implemented by the Institute for Hydrometeorology and Seismology of Montenegro. The drinking water quality monitoring program is implemented by the administrative body responsible for health on the basis of the Law on the Environmental (Official Gazette of Montenegro 052/16, 073/19), in accordance with special regulations. The annual monitoring program is adopted by the Government of Montenegro.

On the basis of the data obtained through the implementation of the annual monitoring program, the Environment Protection Agency prepares the annual report on the environmental status. The

[35] GEF7 Project “Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Protection of Biodiversity Hot-Spots” – Guidelines for Biodiversity Mainstreaming into Spatial Planning.

report provides an assessment of the overall environmental status. Funds for the implementation of the Monitoring Program are provided from the state budget. The number of parameters that are subject of monitoring varies depending on the available financial resources allocated in the budget. Consequently, noise, soil and radioactivity were not monitored in 2021.

Monitoring of air quality

Air quality in Montenegro has been continuously monitored automatically since mid-2009 in accordance with European air quality standards transposed into to the legislation of Montenegro.

In accordance with the Regulation establishing the network of measuring stations for monitoring over the air quality (Official Gazette of the Republic of Montenegro 44/10, 13/11, 64/18), optimal territorial coverage with data on air quality has been established. The defined measurement locations are representative, both from the aspect of the type of measurement station, and from the aspect of compatibility with other macro and micro locations within the same air quality zone.

In accordance with the Regulation, the territory of Montenegro is divided into three zones (Table 1), which are determined by a preliminary assessment of air quality in relation to the limits of assessment of polluting substances based on available data on concentrations of polluting substances and modelling of existing data. The boundaries of the air quality zones coincide with the external administrative boundaries of the municipalities that are part of those zones.

Table 9.1. Air quality zones

Air quality zone	Municipalities in the zone
North air quality zone	Andrijevica, Berane, Bijelo Polje, Gusinje, Pljevlja, Kolašin, Mojkovac, Petnjica, Plav, Plužine, Rožaje, Šavnik and Žabljak
Central air quality zone	Podgorica, Nikšić, Danilovgrad and Cetinje
South air quality zone	Bar, Budva, Kotor, Tivat, Ulcinj and Herceg Novi

The Rulebook on the manner and conditions for air quality monitoring (Official Gazette of Montenegro 21/11) provides the manner of air quality monitoring and data collection, as well as reference measurement methods, criteria for achieving data quality, ensuring data quality and their validation.

The assessment of air quality was carried out in accordance with the Regulation determining the types of polluting substances, limit values and other air quality standards (Official Gazette of the Republic of Montenegro 45/08, 25/12).

It is recommended that the number of measuring points be increased in the coming period, so that all municipalities are covered by a network of air quality monitoring stations.

Climate change monitoring

National Inventories of greenhouse gases for the period 1990-2019 were updated as part of cooperation with the Austrian Environment Protection Agency, twinning light project Development of Integrated Air Emissions Inventory Tool and Update of Air Emissions Inventory for the period 2011-2018, including 2019 for the purpose of updating the National Inventory Report (NIR) for

3BUR. The 2006 IPCC international methodology and a specially created Excel tool for calculation of GHG emissions and emission of polluting gases into the air were used to update the inventory time series.

Updated inventories, i.e. sources and sinks of GHG emissions (carbon (IV) oxide (CO_2), methane (CH_4), nitrogen (I) oxide (N_2O), synthetic gases (fluorinated carbon compounds – HFCs, PFCs and sulphur(VI)fluoride – SF6), were analysed for each of the four main sectors:

1. Energy
2. Industrial processes and product use
3. Agriculture, land use change and forestry
4. Waste

As part of the report on the environmental status, the part concerning climate change, the Environment Protection Agency provides an analysis of air temperature and precipitation.

Monitoring of waters

By adopting the Water Framework Directive 2000/60/EC (WFD), the European Union completely renewed its policy in the domain of water. The Directive articulates the conditions that should enable the implementation of the adopted policy of sustainable use of water and its protection.

The main goal of this Directive refers to bringing all natural waters to a "good status", i.e. ensuring a good hydrological, chemical and ecological status of waters. The purpose of the Directive is to establish frameworks for the protection of groundwater, river mouths into the sea, marine coastal and groundwater in order to:

- prevent further degradation, protect and improve the status of aquatic ecosystems;
- promote sustainable water use based on a long-term policy of protection of available water resources;
- reduce progressively the contamination of groundwater and underground water;
- reduce impacts of floods and droughts, etc.

Art. 75 and 77 of the Law on Waters (Official Gazette of the Republic of Montenegro 27/07 and Official Gazette of Montenegro 73/10, 32/11, 47/11, 48/15 and 52/16, 55/16, 02/17, 080/17, 084/18) create the legal basis for the protection of groundwater and underground waters in Montenegro. Monitoring of groundwater and underground waters is carried out in accordance with the Rulebook on the manner and deadlines for determining the status of groundwaters (Official Gazette of Montenegro 25/2019) and the Rulebook on the manner and deadlines for determining the status of underground waters (Official Gazette of Montenegro 52 /2019). Regulations on the method and deadlines for determining the status of groundwater and underground water, the method and deadlines for determining the status of groundwater and underground water, the method of monitoring the chemical and ecological status of groundwater, the list of priority substances for groundwater, the method of monitoring the chemical and quantitative status of underground water, and the measures to be implemented to improve the status of groundwater and underground waters. Water quality is tested by the competent state administration body in charge of hydrometeorology (Institute for Hydrometeorology and Seismology of Montenegro) in accordance with the Annual Program for monitoring groundwater and underground waters adopted by the Ministry.

Permanent control of the quality of groundwater in Montenegro is carried out to assess the quality of watercourses, monitor pollution trends and preserve the quality of water resources. Water quality tests at sources serve to evaluate the suitability of water for water supply and recreation of the population in order to protect the source and the health of the population.

The purpose of testing of water properties is to determine the status of water: groundwater (as chemical and ecological status), underground water (as chemical and quantitative status). The elements for determining each of the above-mentioned statuses are determined as very good, good, moderate, poor and very poor, and the classification of individual artificial and significantly modified water bodies is made on the basis of ecological potential as good, moderate, poor and very poor.

Monitoring of the sea

The program for monitoring the status of the coastal marine ecosystems of Montenegro is methodologically aligned with the requirements of national regulations: the Law on the Environment (Official Gazette of the Republic of Montenegro 52/16), the Law on Water (Official Gazette of the Republic of Montenegro 84/18), the Regulation on Classification and Categorisation of Groundwater and Underground Water (Official Gazette of the Republic of Montenegro 84/18), the requirements of the relevant EU directives, the Guide of the European Environment Agency (EEA) on transitional, coastal and marine waters (Eurowaternet technical guidelines), and accompanying reporting instructions (WISE-SoE Reporting on Transitional, Coastal and Marine Waters), as well as the requirements of the MEDPOL programme, which is implemented based on the fulfilment of the obligations under the Convention for the Protection of the Marine Environment and the Mediterranean Coastal Area - the Barcelona Convention and the accompanying Protocol on the Protection of the Mediterranean Sea from Pollution from Land-Based Sources and Land-Based Activities (LBS Protocol).

Taking into account the requirements of the EEA, the Barcelona Convention and the LBS protocol, the comprehensive Programme for Monitoring the Status of the Coastal Marine Ecosystem is based on the assessment of the status of marine biodiversity, starting from the analysis of biological and chemical indicators of pollution. The implementation of this programme creates the basic prerequisites for reporting on the status of the coastal marine ecosystem of Montenegro to the European Environment Agency and the Coordination Unit of the Mediterranean Action Plan (UNEP/MAP), which is in charge of supervising the implementation of the Barcelona Convention.

The Programme for Monitoring the Status of the Coastal Marine Ecosystem of Montenegro comprises the following complementary sub-programmes:

1. Eutrophication monitoring programme,
2. Monitoring programme for contaminants in biota,
3. Programme for monitoring of intake by tributaries,
4. Programme for monitoring of intake by effluents,
5. Biodiversity monitoring programme.

The Public Enterprise Morsko Dobro has been monitoring the sanitary quality of marine water at public swimming pools during the summer tourist season for many years. The classification and categorisation of the quality of marine water for bathing is carried out in accordance with Article 74d of the Law on Water (Official Gazette of the Republic of Montenegro 27/07 and Official Gazette of Montenegro 32/11, 47/11, 48/15, 52/16, 55/16, 02/17, 80/17 and 84/18) and the Rulebook setting forth the manner and deadlines for the implementation of appropriate measures

to ensure the preservation, protection and improvement of the quality of bathing water (Official Gazette of Montenegro 28/19).

Monitoring of biodiversity

Biodiversity monitoring is planned, systematic and continuous monitoring of the status of biological diversity for the purpose of preservation, protection and improvement. If realistic, recent and comprehensive data on biodiversity that has been systematically collected and processed is available for areas that are important due to the presence of nationally and internationally important species and habitats, it is also very important to identify the right model for monitoring their status, i.e. identifying threats, pressures and negative influences as this is a prerequisite for adequate management, their protection and conservation. This especially applies to protected areas, but equally to areas that are not formally protected but recognised as Emerald areas and future areas that will be part of the NATURA 2000 network (in order to protect nature, the implementation of continuous monitoring is defined by the Law on Nature Protection, Official Gazette of Montenegro 054/16 of 15/08/2016; Law on National Parks, Official Gazette of Montenegro 028/14 of 04/07/2014, 039/16 of 29.06.2016: Law on the Environment 01-818/2 of 3 August, 2016; other legal acts). This is due to the fact that Montenegro is in the final stages of EU accession process (membership is expected during the period when the relevant Plan is in force), so the acknowledgement and acceptance of pre-accession obligations of protection and preservation of nature will significantly facilitate our country's institutional obligations when it formally becomes a member of the European community of countries. Namely, Article 11 of the Habitats Directive states that member states are responsible for monitoring the preservation and protection of important habitats and species, with special reference to priority types of natural habitats and priority species, so efficient and continuous monitoring is a useful tool for acquiring sufficient knowledge for the proper management of the most valuable natural property (species, habitats, areas - already prepared monitoring protocols, action plans, management plans for species, habitats, areas, etc.).

An analysis of systematically collected and processed information on biodiversity needs to be conducted for all other areas that are preserved in their original state, but are not protected, before elaboration of any plan that would devastate this area in terms of drastic modifications to landscape and degradation of species and habitats (mines, quarries, salina, hydro and wind power plants, mass urbanisation and other similar interventions), equally as for protected areas, to assess their status and the value of biological diversity, followed by recommendations concerning the need to implement monitoring of biodiversity.

Monitoring of soil quality

Monitoring of soil status and testing of the content of dangerous and harmful substances in the soil is carried out in accordance with the Law on the Environment (Official Gazette of Montenegro 052/16, 073/19), the Law on Agricultural Land (Official Gazette of the Republic of Montenegro 015/92, 059/92, 027/94, Official Gazette of Montenegro 073/10, 032/11) and the Rulebook on permitted concentrations of harmful and hazardous substances in soil and methods for their testing (Official Gazette of the Republic of Montenegro 018/97), and it also complies with the requirements of the Stockholm Convention on Persistent Organic Pollutants (POPs).

Noise monitoring

The Law on the Environment (Official Gazette of Montenegro 052/16, 073/19) and Law on Environmental Noise Protection (Official Gazette of Montenegro 028/11, 01/14, 02 /18) stipulate

the obligation to measure the level of environmental noise and the degree of noise exposure of the population.

Since 2019, noise monitoring has not been carried out in Montenegro due to a lack of financial resources.

Noise monitoring is an important indicator of the quality of life of the population and should be continued in order to implement adequate noise reduction measures based on the measurement results, especially during the summer months when the influx of tourists is significantly higher.

Monitoring of radioactivity

Monitoring of radioactivity in the environment, i.e. continuous measurement and monitoring of the content of radionuclides (of natural and artificial origin) in the environment provides data on the average level of radioactivity and can indicate possible changes in the environment that may be a consequence of global or local pollution caused by the use of sources of ionizing radiation.

Monitoring of radioactivity in the environment is carried out throughout the year, in regular circumstance when the content of radionuclides in all segments of the environment is monitored.

Monitoring of radioactivity in the environment includes testing of the level of external radiation, testing of the content of radionuclides in the air, testing of the content of radionuclides in precipitation, testing of the content of radionuclides in groundwaters (lakes, seas and rivers), testing of radionuclide content in soil, testing of radionuclide content in drinking water, testing of radionuclide content in human food, testing of radionuclide content in animal feed, testing of the level of exposure to ionizing radiation in dwellings and testing of the content of radionuclides in building material.

Radioactivity has not been monitored in Montenegro since 2019.

11. CONCLUSIONS FORMULATED IN THE ELABORATION OF THE STRATEGIC ASSESSMENT REPORT PRESENTED IN A WAY UNDERSTANDABLE TO THE POPULATION

Most problems that the authors encountered in all stages of the elaboration of the Strategic Environmental Impact Assessment Report related to the lack of adequate and comprehensive data. Bearing in mind that the Spatial Plan of Montenegro is currently in the Draft phase, which has been accepted by the Government of Montenegro, and that a public debate is expected for the proposed Draft, we especially emphasise the fact that this SIA Report is the working version of the document that provides additional guidelines for further modification of the Plan. During the further process of elaboration of both the planning document and the SIA Report, it is to be expected that both documents will undergo significant changes.

This SIA Report provides the data obtained through the GEF project – “Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Biodiversity Hot-Spots in Montenegro” (the draft of the study is attached to this SIA Report), which additionally influenced the quality of the document by highlighting and defining valuable biodiversity areas that must be preserved from further devastation and that must be taken into account during the further elaboration of the Plan. The results obtained by data processing as part of this project provide clear inputs for the review

of proposed planning solutions, in accordance with adequate protection measures and recommendations. The main identified conflicts in space are presented in Chapter 3 of this SIA Report.

The special importance of the respective study is demonstrated by the valuable data that should be taken into account in the further elaboration of the SPMNE through spatial planning documents of a lower hierarchical level.

12. SUMMARY

Strategic Environmental Impact Assessment (SIA) as an instrument for assessing potential negative impacts of plans and programs on the environment and human health, defines a set of different protection measures (measures of prevention, minimisation, mitigation, remediation or compensation). The SIA integrates socio-economic and bio-physical segments of the environment, connects, analyses and evaluates the activities of different spheres of interest and steers the policy, plan or program towards solutions that are primarily in the interest of the environment. The strategic environmental impact assessment for plans and strategies looks at the ecological dimension, but it is a special contribution to the achievement of the objectives of sustainable development through a careful analysis of the impact of the planning solutions.

The Spatial Plan of Montenegro (SPMNE) sets a strategic framework for spatial development and harmonisation of sectoral policies between which there are possible conflicts, the harmonisation of which must be in accordance with the defined principles and norms of spatial development. A necessary condition for achieving planning projections is the setting of rules and measures for sustainable spatial development, protection and improvement of the quality of space. This primarily refers to urban and rural development and the adequate construction of facilities and infrastructure. Controlled and targeted development will ensure higher social standards that are also sought in political decisions towards approaching the standards of European Union countries. This requires overcoming the identified development limitations resulting from natural factors and created conditions and institutionally solving the perceived weaknesses that manifested during the achievement of planning objectives in the previous period.

The draft SPMNE maintains the division into development zones of the coastal, central and northern regions until 2040, whereby the newly formed municipalities became an integral part of the corresponding zone. Controlled use of development potentials, implementation of priority activities in all regions and their development zones in a sustainable manner is suggested through the use of own potentials and protection of all segments of the environment, while strengthening the capacity of local self-governments for the implementation of defined development policies. Demographic and economic-market projection is being done. Monitoring and achievement of objectives, measures and initiatives related to the Europe 2020 Strategy are connected with the key mid-term priority - membership in the European Union. The development concept defined in Strategy S3 refers to a developed and competitive country that is based on three key strategic commitments:

- healthy Montenegro,
- sustainable Montenegro,
- modernised and digitalised Montenegro.

The Spatial Plan sets general development goals of the adoption of European economic policy and definition of common goals in line with the principles of open market economy and free competition.

Special long-term goals and overall long-term economic policy must continue to be based on large infrastructure projects, especially in the fields of energy, transport, tourism and agriculture. It is necessary to identify new economic initiatives that combine socioeconomic recovery with transformation towards a green economy, energy efficiency and adaptation to climate change.

For Montenegro, as a country in the EU integration process, to close the negotiation Chapter 27 on environmental protection, it is obliged to establish the international Natura 2000 network of protected areas, in accordance with the implementation of the project "Establishment of Natura 2000 in Montenegro". The objectives regarding the new areas and deadlines should be harmonised with the EU Biodiversity Strategy until 2030 and with the newly adopted Global Framework for Biodiversity of the UN Convention on Biological Diversity.

A specific objective of the SPMNE until 2040 is the planned projection of the protection of cultural heritage. Preservation of identity and active inclusion of cultural heritage in the strategy of responsible, balanced, sustainable development of Montenegro.

The protection of the cultural heritage of the sea - underwater archaeological sites implies the prohibition of all activities that can damage the cultural, social, economic, research, educational and other significance of archaeological sites (construction of buildings, dredging of the seabed, anchoring, fishing with deep trawl nets, shellfish/fish farms).

The activities of education, science, culture, sports, health and social protection, as a key indicator of the development of a society, are supported through the Spatial Plan with the aim of achieving general social and economic development, according to a polycentric model that will provide appropriate social activities in all regions and municipalities.

The sustainability of the spatial organisation should continue to be based on the polycentric development model. This model is also accepted in EU countries as optimal and appropriate for the territorial development of Montenegro. The objective of developing this model is to achieve a balanced spatial distribution of the population and mitigate the depopulation processes characteristic of the Northern region, especially for rural settlements.

The Spatial Plan is a strategic development document that defines the basic development objectives of Montenegro and the ways of achieving them for the planning period in a consistent and comprehensive manner:

- In the coming period, Montenegro will follow the constitutional obligation and the status of an ecological state in which harmony between the traditional way of life of people and their natural environment should be achieved, in which the environment is healthy, and the values of biodiversity, water, sea, air, land, space, as well as the values of other natural resources, improved and preserved for generations to come.
- It will ensure the preservation of valuable natural areas, through responsible evaluation and harmony of certain functions in the area with the natural environment, especially in the area of urban and rural development, construction of buildings and infrastructure.
- It will respect the principle that only a healthy environment, with preserved values of biodiversity, inland waters, sea, agricultural and forest land and other natural resources, can ensure long-term quality economic development.

- It will create preserved ecosystem values and services through sustainable and efficient management of natural and cultural values, ensure the remediation of environmental issues, reduce the impact on climate change and qualitatively improve the results in all economic sectors on the principles of "green economy".
- It will apply integrated management of the coastal area to achieve sustainable use and protection of the sea area of Montenegro.
- It will ensure the balanced development of the "blue economy" through a schedule of activities such as tourist offer, fishing and mariculture, maritime traffic, controlled exploitation of mineral raw materials, regulation of waterways and nautical and fishing infrastructure.
- It will prevent marine pollution through an ecosystem approach in all activities and preserve cultural heritage, areas and archaeological sites.
- Montenegro will ensure a more balanced economic development of the regions through development projections in all sectors of economic activity in the coming period and stop negative demographic trends.
- It will achieve economic and social progress and a dynamic process of European integration, with the adoption and practice of standards in all areas of work.
- It will develop the social standard by developing the institutions of health, education, science, culture, social and child protection and physical education and sports in all municipalities.
- It will control and improve urban development in order to achieve quality urban and public functions in accordance with humane principles and accepted European standards.
- It will improve rural development and preserve valuable rural areas, as a special development opportunity for tourism and the overall economy and will influence the reduction of negative demographic trends in rural areas, especially in the Northern Region.
- Montenegro will provide a greater share of energy from renewable sources through the development of energy and energy infrastructure and thereby enable energy efficiency, which will positively affect the economy and increase the quality of life in urban and rural areas and contribute to reduced emissions of greenhouse gases.
- More intensive transport development will ensure greater mobility and accessibility and faster and better development of all three regions.
- Additional efforts will be invested in the area of municipal infrastructure to ensure the water supply of the population and the economy with hygienically quality water and to ensure a healthy environment by wastewater treatment and quality waste management.
- High-quality tourism projects will be ensured in tourism in the coming period and the country will become a prestigious Mediterranean and mountain country based on the offer of mountain, rural and coastal tourism, using the advantages of healthy food, clean spring water and rich forest areas.
- The available natural resources will be used in the field of agriculture, along with strict protection of arable agricultural land and stimulating measures for the preservation and activation of unused agricultural land to support rural development.
- In the field of forestry, it will ensure the improvement and preservation of forest potential through adequate forest management.
- In the area of waste management on land and sea, it will provide a system in accordance with modern standards, waste generation and reduction and elimination of negative impacts on the environment.
- With adequate measures in the field of defence, protection and rescue, protection from natural disasters and seismic risk control, the required level of resistance and preparedness for possible natural risks will be ensured, thus achieving further security for the life of the population in the country and safe investment in the economy.

- By achieving the sectoral development goals, Montenegro will be accessible by transport, energy independent, with more organized urban and rural settlements, an economically developed country in the Balkans, which will develop good economic and cultural relations with countries in the region and in Europe.
- Institutions will acknowledge weaknesses and limitations in all sectors and start addressing them in a responsible manner.
- Montenegro will observe modern European principles with the aim of becoming a prosperous, ecologically clean, environmentally attractive country for living and new investments.
- After the adoption of the plan, it will institutionally monitor the implementation of all adopted objectives and ensure the implementation of the Plan in accordance with legal solutions.

The areas that will be exposed to the significant impact of the Plan are of particular interest for assessing the impact of the considered planning solutions within the Strategic Environmental Impact Assessment. The areas that may be at significant risk during the implementation of the Plan, i.e. primarily identified conflicts in the area that must be addressed within the further stages of the elaboration of the Spatial Plan in order to preserve its basic purpose and function are indicated through development areas in line the methodology of the planning document.

Land policy: In order to successfully achieve the defined objectives of the Spatial Plan of Montenegro, the legalisation policy should be clearly proposed for buildings, especially those built in floodplains and marine property zones, sanitary protection zones of springs and other areas whose use is in conflict with the current purpose for housing and economic activities.

Purpose of land areas: The water areas, i.e. riverine and lacustrine land cannot be defined in practice in the next 5 to 10 years due to the procedure for determining the boundaries of the riverine and lacustrine land in accordance with the law. Areas that are significantly affected by floods are determined on the basis of several criteria, the most important of which is the number of inhabitants who may be threatened by floods. The question of areas that are currently not part of larger settlements remains open and these can lead to significant risks both for the population and property as a consequence of future urbanisation, as well as the reduction of the natural retention capacity of certain zones, which may result in an increase in flood waves.

The concept of the use of the marine area: The pressures that have the greatest impact on the marine ecosystem include tourism, shipbuilding, the construction or increase of the capacity of existing ports and marinas, as well as various developments of the coast, with a special focus on the regulation of beaches by backfilling. The impact of the exploitation of mineral raw materials has been assessed as highly negative due to the large radius of influence on the marine living communities, including on the shellfish farming process. The backfilling of the sea (beach replenishment), municipal and industrial water discharges have shown a very high vulnerability, primarily due to the quality of cultivated organisms, the health and safety of consumers, as well as the possible “suffocation” of cultivated organisms due to the construction on the coast by using inadequate building materials and water turbidity that can lead to clogging of the gills and impossibility of filtration and, in the worst case scenario, to the mortality of shellfish.

The part of the Draft Plan that concerns the purpose of the marine area mentions further construction and regulation of new areas on the coast, which will enhance the quantity and quality of bathing areas on the Montenegrin coast. Bearing in mind the obvious pressures on the marine and coastal environment, the projects of concreting the coast and backfilling the beaches, the question arises as to the zones for the development of bathing areas and further devastation of the coastal area. The vulnerability study should be taken as the basis for defining clear planning

guidelines and solutions, so that the remaining free space can be adequately used for other activities whose development is planned in the future.

Analysis of the BaU scenario (best practice scenario) expects that the development of current marine water uses will lead to a deterioration of several descriptors of the status of the marine environment, primarily with respect to marine litter, biodiversity and seabed integrity, but also (to a limited extent) for non-indigenous species, commercial fish species and contaminating substances.

Development of social activities: In order to realistically set specific objectives for the development of education, it is necessary to provide an accurate overview of the number of inhabitants of Montenegro, the number of children by municipality and the number of primary schools, secondary schools and preschool institutions that are missing, and are necessary for achieving an adequate level of education quality. The Draft Plan lacks clear data on how many institutions are missing by municipality. The same can be said for healthcare and the number of primary healthcare institutions that are missing in municipalities, as well as the capacities and number of health facilities for inpatient treatment. The policy of demographic development is not essentially in the domain of the SPMNE, but the reservation of areas in future development in relation to realistic trends is certainly directly related to the Plan.

The concept of development of energy and power infrastructure: A very complex picture of the energy balance, insufficiently explained through the Draft Plan, imposes a clear need for additional manageable sources of energy, which are necessary for the functioning of the system. Planned energy facilities that are based on the use of hydro potential are recognized as clear conflicts in space, contrary to the nature protection objectives. Planned hydro power plants attract a lot of public attention and cause issues in project implementation mainly due to the lack of a clear development vision. In the case of the Kruševo hydro power plant, it is an area that is part of the Dragišnica Komarnica Nature Park, and the solution entailing the hydro power plant is contrary to the existing Nature Protection Law. We are of the opinion that it is very important to address such conflicts between the existing land use and the planned development through the Spatial Plan of Montenegro. Building on the aforementioned, we also point out the facts related to the planned HPP Boka, which we consider to be completely unacceptable, given that the implementation of this project implies the release of huge amounts of fresh water into the Risan Bay, in the vicinity of the protected areas of Sopot and Dražin Vrt. In addition, such a large amount of fresh water transferred from the Bilećko Lake would contribute to a serious disruption of the natural balance of the marine ecosystem of this part of the Bay.

The development of renewable energy sources in Montenegro through the Spatial Plan should be accompanied by a clear analysis of the condition and areas that will be occupied, given that the locations are already known. Giving insufficiently clear guidelines for the use of certain areas leaves room for signing concession contracts first, and only then conflicts related to the protection of nature and the environment are recognised, which is a problem that Montenegro has been facing for years.

Water management: The problem of protecting sources of drinking water is imposed as the primary obligation of the community towards this irreplaceable resource. Available data indicate that sanitary protection zones have not been determined at numerous water sources in Montenegro, despite clear legal provisions highlighting the need for their determination. There is a specific issue concerning the definition of a wider protection zone of the spring, which coincides with the catchment area of the spring. It is also necessary to identify potential sources for future drinking water, which should be treated as existing water sources. Spatial planning should

definitely pay special attention to the preservation and protection of underwater springs, springs and all natural inflows of fresh water into the Bay of Kotor. We should specifically also mention the lack of data on the water regime on small torrential watercourses, which pose a serious safety problem in the period of floods.

Mining, industry and hydrocarbon exploration: In order to ensure the necessary quantities of sand and gravel, it is necessary to calculate the quantities required at the national level, compare them with the existing capacities of the quarries and look at the missing quantities and potential locations for future quarries. When determining a potential location, it is necessary to recognize a potential spatial conflict related to the concession area. Current practice of determination of concession areas suitable for mining development which are in direct conflict with other land uses misleads potential investors and prevents the development of mining projects because conflicts are not considered in the early stages of land use. These situations require a clear position of the Government with respect to the development policies of specific locations and the selection of priorities for the use of the areas.

Forestry development: Although they represent a dominant spatial component in the Draft SPMNE, forests and forest ecosystems have not been addressed and presented adequately with all their specificities and characteristics. The improvement of the status of forests should be based on multifunctionality, professional criteria and on the principles of the forestry profession, which should be emphasized more significantly in the document of the SPMNE. Sustainable and multifunctional forest management is the basic determinant of both the Forests Law and strategic documents. The exclusion of some of the groups of forest functions from the planning document of this level is unacceptable and essentially unsustainable from the point of view of modern forestry and may lead to the collapse of the system of multifunctional and sustainable management. Sustainable and multi-purpose forest management is achieved by adopting and implementing planning documents in accordance with laws, strategic decisions and accepted international obligations, so it is it is necessary to give a better insight into the strategic framework related to forests and forestry.

Although wood is still the most important product from the forest, the modern concept of forest valuation places a special emphasis on the protection of biodiversity and ecological services, which are closely related to the aforementioned and include supply services, regulation services, services of cultural importance and use for scientific purposes. In addition to the necessity of knowing and enhancing all functions of forests, contemporary trends are also related to the expansion of protective zones, mapping of urban forests and the improvement of agroforestry practices as part of the system of climate change adaptation and mitigation, population migration, etc. This is the essence of the latest EU Forest Strategy.

Hunting: When adopting the hunting rules, it is necessary to define buffer/protection zones of national parks and other protected areas as areas where hunting is not allowed (non-hunting areas) with a minimum width of 2 km in order to improve the protection of game and other important species, as well as to fight against increasing poaching. It should also be noted that in addition to the existing documents, management plans for bear and wolf will be prepared in the coming period in accordance with the Hunting Law and EU directives.

Maritime economy: Although the Tourism Development Strategy until 2025 does not provide information on the missing capacities for nautical tourism, the Draft plans for new capacities in nautical tourism - marinas in locations that meet maritime conditions, spatial context in relation to purpose and terrain, environmental protection and capacity of municipal infrastructure. The question arises as to which locations are suitable for the construction of marinas and the further

development of nautical infrastructure. The Draft states the possibility of opening a waterway on the Bojana River that would connect Skadar Lake and the Adriatic Sea. Further planning needs to take into account that Skadar Lake is a RAMSAR area under international protection and a National Park, so it is completely unacceptable to plan the development of nautical traffic, especially without clear guidelines as to the size and number of vessels.

Tourism: The part of the Draft Plan that deals with the development of tourism provides an overview only of protected areas that are under the highest categories of protection, although the areas of nature parks should be equally developed and promoted, which leads to the relief of space through the redistribution of the number of tourists and ultimately results in lower pressure on the environment of protected natural areas.

Transport infrastructure: The analysis the future route of the highway produces conclusions that the land variant completely avoiding the NP Skadar Lake has the advantage, if the comparison parameter related to the ecological aspect has the greatest weight. The conclusions should also indicate that the question arises not only in relation to the ecological aspect, but also in relation to the fact that other variants are not possible considering the relevant legal framework.

Regarding the highway corridor for high-speed motor traffic, the "FAST highway", the IPF5 Study concluded that the initial route from the valid SP is the most favourable, i.e. the route that crosses the Bay of Kotor via the Verige bridge and does not bypass Paštrovići. This route is disputed due to restrictions from the aspect of spatial protection.

Waste management: The waste collection system implemented in Montenegro consists primarily of the collection and disposal of mixed waste at the existing landfills in Podgorica and Bar, as well as at unregulated landfills and dumpsites distributed throughout the country, and these widespread dumpsites make a great pressure on the environment. It is estimated that there are more than 330 unregulated waste disposal sites in Montenegro where different amounts and types of waste are disposed of. Dumping of waste on these dumpsites needs to be prevented and they need to be rehabilitated in accordance with regulations.

Nature and environment protection: The process of mapping of Emerald and then Natura 2000 habitats identified the types of habitats of special interest for nature protection, which currently do not enjoy protection and thus suffer from various anthropogenic pressures. Important bird habitats (IBA) and plant habitats (IPA) have been identified under other initiatives, many of which are also not covered by the current protection system. Emerald areas are candidates for the Berne Convention and Montenegro is committed to devising a mechanism for their protection. In accordance with the "Action Plan for meeting the closing benchmarks in Chapter 27 - Environment and Climate Change"[36], the Spatial Plan of Montenegro must adequately treat them in terms of protection guidelines and avoiding conflicts between planning and the need to protect them.

Regarding the efficiency of the management system, a large number of protected areas do not have established management structures or management plans, so protection is often of a declarative nature.

This problem is particularly pronounced in the case of natural monuments. On the other hand, protected areas that have management structures are faced with a lack of professional and financial capacities for the full implementation of the activities foreseen in the management plans. Furthermore, management plans often neglect the ecosystem approach and do not have an

[36] Government of Montenegro, Ministry of Ecology, Spatial Planning and Urbanism (February 2021)

integrated concept of ecosystem services. A significant drawback for most protected areas is the mismatched data on boundaries, protection zones and their surface, incomplete and scarce information on biodiversity, as well as the incompatibility of the previously implemented procedures for declaring protected nature areas with the newly prescribed protection categories.

One of the basic indicators for choosing the proposed variant solutions and the potential proposal of a new one that will be used for adequate assessment of the magnitude of impact of the solutions planned in the SP will be the indicator of the status of biodiversity, habitats and species. The indicators will be considered as a basis for assessing possible negative impacts.

Landscapes: The process of designing of new buildings as well as the reconstruction of existing ones observed a long-standing neglect of respect for the typology and elements of authentic architecture, uncontrolled construction and non-compliance with legislation. The consequence of ill-conceived new construction and poor restoration of traditional architecture is the devastation and impoverishment of the area and cultural heritage. Modern needs and new technologies dictate the transposition of local architectural patterns, as a principle based on the relationship to tradition, which means reinterpretation, not imitation, while preserving ambient qualities. Old houses, examples of traditional construction, individually or in groups, form an artistically and historically valuable environment. They are purchased mainly for their location. The structures get new functions, and then their adaptation begins. Facilities are upgraded, extended, expanded. Instead of the function being chosen in accordance with the object's limitations, the reverse process takes place, which leads from the existing function and capacity towards reconstruction and renovation ultimately leading to aggressive interventions on the structures and in the space. Also, new structures and groups of structures relying on the existing architectural heritage to a large extent distorts the appearance of rural areas. The materialisation, artistic and architectural expression of recent decades does not follow the principle of integration into the ambient and thus the space loses its uniqueness and landscape value.

The main objective of the strategic environmental impact assessment is to evaluate the proposed planning solutions and ensure their actual implementation in order to ensure the safety of the environment in the broadest concept, which includes the protection of space and regional characteristics, the protection of nature and biodiversity, water, agricultural land, forests, air, as well as ensuring the quality of life and health of people.

The general objectives of environmental protection stem from the general objectives of environmental protection defined under the Law on the Environment (Official Gazette of Montenegro 052/16), such as the preservation and protection of human health, the integrity, diversity and quality of ecosystems, the gene pool of animals and plant species, soil fertility, natural beauty and spatial values, cultural heritage and man-made goods.

The objectives relate to creating conditions for limited, reasonable and sustainable management of living and non-living nature, preservation of ecological stability of nature, quantity and quality of natural resources and prevention of hazards and risks to the environment.

The specific objectives of environmental protection are related to the elaboration of general objectives and are defined on the basis of perceived issues and requirements for environmental protection in the area covered by the Plan. Specific objectives are primarily a way to check the impacts on the environment, taking into account the spatial coverage of the Spatial Plan, the planned uses of the areas, the environmental status in the planning area and previously defined general objectives.

The impacts of the Spatial Plan of Montenegro are analysed in relation to sources of impact - impacts - effects and consequences. The sources of impact that will affect the quality of the environment of the area of intervention are the planning solutions of the Plan, both in a negative and a positive sense. The evaluation of planning solutions allows environmental impact assessment of the Plan and impact assessment in the space and in the environment. We particularly emphasise the issue of impact assessment for planning solutions against the level of elaboration of the planning document, as well as the lack of knowledge of the specific locations to which the planned projects refer, which is especially related to biodiversity (micro-locations of important species can sometimes be measured by tens of m^2).

The impacts of spatial planning on air quality, ambient noise, land, water, biodiversity and protected areas are addressed in terms of identifying the causes and conflicts they produce in space. The impacts of housing and land policy, mining, industry and hydrocarbon exploration, transport development corridors, the concept of the use of the sea, the concept of the development of energy and electricity infrastructure, water management, forestry, hunting, maritime industry, tourism development, the concept of the development of transport infrastructure, waste, defence and security of the country, the natural features and biodiversity of the country. Impacts on forests, marine biodiversity, landscapes, cultural heritage, population and human health, climate change are considered from several aspects: prediction of effects and taking appropriate action to prevent and minimise the negative consequences that they can entail. A summary assessment of the impact of planning solutions is given according to the set criteria.

The prescribed system of measures and conditions for sustainable management, preservation and improvement of natural balance and living conditions, as well as for the prevention and reduction of environmental pollution, will be applied in accordance with the Law on the Environment.

The scenarios considered by the Draft Spatial Plan do not rely on the existing characteristics and quantification of spatial needs by individual sectors, as well as on the characteristics and already identified limitations of benefits resulting from previous analyses. The considered scenarios were not based on differences that should be within the framework of established general and specific development objectives. As the indicators for selection, comparative evaluation - valuation and ranking of variant solutions (scenarios) of the spatial development of Montenegro are not defined, they must be considered and defined as part of further elaboration and in close cooperation between the authors of the planning document and this Report. This process must define indicators for the selection of individual planning solutions by topic, where valuable areas of biodiversity must be identified as one of the main criteria.[37]

The proposed scenarios are not actually defined in such a way that allows discussing future development and which could be used to select the optimal scenario (it is unclear why scenario B is defined as restrictive), but a theoretical scenario is provided where the proposed logical scenario is known. The scenarios are not described with quantified data (e.g. size and type of protected areas, number of tourist beds, area for social activities, new energy sources) or with some specific development and protection characteristics necessary to define the criteria for evaluation and the final selection of the most favourable scenario.

The part of consideration of the scenario of intensive protection is unclear as to the criteria used to select and discuss the scenario of intense protection and which resources, value and areas they refer to. According to the opinion of the author of the strategic assessment, this scenario

[37] G. Berlengi, A. Mlakar, V. Šećerov: Evaluation of the Draft Spatial Plan of Montenegro, 2021.

entails some characteristics that should actually not be part of intensive protection, but a realistic option, which implies additional elaboration and coordination with other sectoral policies and a part of which can be considered to be already applied (polycentric development, regulated waste management and disposal, controlled construction, aseismic planning), indicating that it is not meaningful to abandon them in advance. The argument that Montenegro is not yet prepared for such a scenario without clearly set and assessed criteria points to a lack of will, knowledge and ambition towards a direct transition to a sustainable type of development, which puts us into conflict with the commitments under current international documents and declarative goals. All of the above points to the use of the opportunity to exploit the essential potential of the Spatial Plan. In simple terms, not setting the protection of natural values and enormous potential as one of the primary development criteria and not including it as such in the period of intensification of development poses a great risk that Montenegro will lose spatial value by achieving the desired level of the (economic) development of the country, which would be subject to intense protection in the period of cohesion.[38]

Taking into account the above, this version of the strategic assessment document does not allow the author to choose the most acceptable planning solution in addition to evaluating the proposed scenario **C. Sustainable development scenario** - (scenario of more intensive development based on the "green economy" policy - spatially and ecologically acceptable)[39]. As compared to this version of the document, the next step is the completion of the data that will be obtained through the mentioned GEF project – "Biodiversity Mainstreaming into Sectoral Policies and Practices and Strengthened Biodiversity Hot-Spots in Montenegro", the report in question will be completed until the beginning of the public hearing. It is to be expected that this version of the document will provide clear inputs for the review of the proposed planning solutions, in accordance with adequate protection measures and recommendations. It is particularly important to note that the Report thus supplemented will place special emphasis on the guidelines for the implementation of the SP through the elaboration of spatial planning documents of a lower hierarchical level. In order to adequately inform the population and in accordance with the principles of strategic assessment, the SIA Report will provide a description of the methodology for defining the criteria for choosing the most favourable scenario, which implies the use of all available data that must be undeniably based on the principles of sustainable development.

The assessment of alternative solutions is a key element of strategic assessment. It is important to note that the assessment can include additional alternatives. The zero solution/scenario is a mandatory alternative that must be described, and the scenario needs to be considered against it if the Plan is not implemented. The concept considered scenario **A. Continuation of the trend** - (scenario of intensive development, insufficient control and protection of space) cannot be considered as an alternative solution, but exclusively as a zero status/scenario, which will as such be subject to mandatory consideration. Also, an adequate assessment of the proposed scenarios **B. Restrictive scenario** - (scenario of intensive protection and reduced scope of development) and **C. Sustainable development scenario** - (scenario of more intensive development based on the "green economy" - spatially and ecologically acceptable) requires clearly defined initial elements (analysis of the existing situation, relevant legal legislation, valid strategic and planning documents) in order to set the criteria for evaluating the proposed scenarios and choose the most

[38] G. Berlengi, A. Mlakar, V. Šećerov: Evaluation of the Draft Spatial Plan of Montenegro, 2021.
[39] Chapter 6. Impacts on human health and the environment, including factors such as biological diversity, population, fauna, flora, soil, water, air, climate factors affecting climate change, material resources, cultural heritage, including architectural and archaeological heritage, landscape and relations between these factors.

acceptable solution for future development in accordance with the principles of environmental protection.

The proposed scenarios are not actually defined in such a way to create a basis for discussing future development and choosing the optimal scenario, but rather theoretical scenarios with a logical scenario proposal known in advance. The scenarios are not described with quantified data (e.g. size and type of protected areas, number of tourist beds, area for social activities, new energy sources) or with some specific development and protection characteristics necessary to define the criteria for evaluation and the final selection of the most favourable scenario.

Monitoring of the environmental status is carried out in accordance with the Law on the Environment (Official Gazette of Montenegro 052/16, 073/19) by systematic measurement, examination of quantitative and qualitative indicators of the environmental status, including monitoring of natural factors, i.e. change in the status and characteristics of the environment, cross-border monitoring of the environmental status.

Optimal territorial coverage with data on air quality has been established in accordance with the Regulation establishing the network of measuring stations for monitoring over the air quality (Official Gazette of Montenegro 44/10, 13/11, 64/18). The defined measuring stations are representative, both from the aspect of the type of measurement station, and from the aspect of compatibility with other macro and micro locations within the same air quality zone.

With the adoption of the Water Framework Directive 2000/60/EC - WFD, the European Union completely renewed its policy in the domain of water. The Directive articulates the conditions that should enable the implementation of the adopted policy of sustainable use of water and its protection.

Taking into account the requirements of the EEA, the Barcelona Convention and the LBS protocol, the comprehensive Programme for Monitoring the Status of the Coastal Marine Ecosystem is based on the assessment of the status of marine biodiversity, starting from the analysis of biological and chemical indicators of pollution. The implementation of this programme creates the basic prerequisites for reporting on the status of the coastal marine ecosystem of Montenegro to the European Environment Agency and the Coordination Unit of the Mediterranean Action Plan (UNEP/MAP), which is in charge of supervising the implementation of the Barcelona Convention.

Biodiversity monitoring is planned, systematic and continuous monitoring of the status of biological diversity for the purpose of preservation, protection and improvement. If realistic, recent and comprehensive data on biodiversity that has been systematically collected and processed is available for areas that are important due to the presence of nationally and internationally important species and habitats, it is also very important to identify the right model for monitoring their status, i.e. identifying threats, pressures and negative influences as this is a prerequisite for adequate management, their protection and conservation. This especially applies to protected areas, but equally to areas that are not formally protected but recognised as Emerald areas and future areas that will be part of the NATURA 2000 network.

Monitoring of land conditions and examination of the content of dangerous and harmful substances in the soil is carried out in accordance with the Law on the Environment (Official Gazette of Montenegro 052/16, 073/19), the Law on Agricultural Land (Official Gazette of the Republic of Montenegro 015/92, 059/92, 027/94, Official Gazette of Montenegro 073/10, 032/11) and the Rulebook on permitted concentrations of harmful and dangerous substances in soil and methods for their testing (Official Gazette of the Republic of Montenegro 018/97), and it also

complies with the requirements of the Stockholm Convention on Persistent Organic Pollutants (POPs).

The Law on the Environment (Official Gazette of Montenegro 052/16, 073/19) and the Law on Environmental Noise Protection (Official Gazette of Montenegro 028/11, 01/14, 02 /18), define the obligation to measure environmental noise levels and the noise exposure of the population.

Monitoring of radioactivity in the environment, i.e. continuous measurement and monitoring of the content of radionuclides (of natural and artificial origin) in the environment, provides data on the average level of radioactivity and can indicate possible changes in the environment that may be a consequence of global or local pollution caused by the use of sources of ionizing radiation.

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