Ecosystem Services in Urban Planning
Kolašin's new approach

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Montenegro
Ministry of ecology,
spatial planning and urbanism

IMPRESSUM

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FOREWORD

Ministry of Ecology, Spatial Planning and Urbanism of Montenegro

Becoming the world's first climate-neutral continent by 2050 is the greatest challenge and opportunity of our time. To achieve this goal, the European Commission presented the European Green Deal (2019), the most ambitious package of measures that should enable the citizens and the business sector of Europe to actualize the benefits of the green transition.

In order to implement the European Green Deal, it is necessary to carefully assess, analyze and design existing and future legislation. At the same time, it is very important to leave space for new ideas that exceed the stereotype in order to achieve a sustainable future as quickly and efficiently as possible.

In this regard, Montenegro, has recognized the importance of local spatial plans in the implementation of applicable and economically sustainable instruments for balanced spatial development, green transition and as a response to climate change crisis. Concepts such as Ecosystem services and Green infrastructure are innovative instruments for operationalizing the ambitious goals of the Montenegrin 2030 agenda.

Amendments to the Spatial Urban Plan (SUP) Kolašin are an opportunity for a participatory approach to spatial planning and integration of defined instruments in order to achieve the green vision of the city. Integral part of this process is building the capacity of the local government in the implementation of the adopted policies and we believe that the BACID Workshop is an added value in this direction.

The obvious synergy between Ecosystem services and Green infrastructure and policies in the field of environmental protection, land use, water and usage of other natural resources, opens up a range of possibilities for integrated management of natural resources. We believe that the process started at the level of the Municipality of Kolašin is just the beginning towards defining the methodology and approach at the national level.

Dr Sonja Radovic Jelovac
Principal architect I Doctor Europaeus

Lead Planner for the Amendments of the Spatial Urbanistic Plan of the Municipality of Kolašin
Ministry of Ecology, Spatial Planning and Urbanism of Montenegro

Municipality of Kolašin

The sustainable development of the Municipality of Kolašin is based on its extraordinary natural assets and resources that must be carefully treated in its strategic development. As the Municipality is becoming the main tourist destination in northern Montenegro and undergoing major infrastructure development, we believe that Amendments to the Municipality's SUP require an innovative approach in order to integrate natural resources management.

In cooperation with our partners, we have recognized the local importance of the concept of ecosystem services (ES) and green infrastructure (GI), and created an ecosystem-based development approach as the basis for climate adaptation, public participation and catalysing socio-economic growth in the form of green tourism. Integrating these concepts in the Municipality's Spatial Urban Plan will further clarify the process of their identification, valuation and mapping, to create the conditions for appropriate decision-making by the administrative bodies.

The key natural assets on which our development depends are unpolluted water and air, pure springs, rivers, lakes, forests and pastures, and the Biogradska Gora National Park and Tara River UNESCO Biosphere Reserve. These, and many other Emerald and Natura 2000 areas, compel us to work continuously to formulate adequate policies and involve major stakeholders in the decision-making process.

Integrating ES and GI in the SUP Amendments is a way of creating a safe and sustainable future for everyone. We are confident that the BACID workshop „Building Planning Capacities in Urban Ecosystem Services for the Municipality of Kolašin" is a step towards inclusive and resilient urban development, which balances socio-economic development with protection of the local environment in Kolašin's urban and spatial policies.

Ljiljana Rakočević, dipl.ing.

Head of the Secretariat for Spatial Planning, Communal Affairs, and Traffic, Municipality of Kolašin

BACKGROUND

Integrating ecosystem-based sustainable development principles as a basis for climate adaptation, public participation and catalysing socio-economic growth, is a challenge for all spatial planning processes. This brochure compiles and presents the efforts to strengthen the integration of ecosystem services (ES) into the Kolašin Spatial Urban Plan.

A starting point was established with a workshop involving the relevant stakeholders, including the Municipality and its Secretariat, the Ministry of Ecology, Spatial Planning and Urbanism, universities, and non-governmental research bodies. The workshop was designed to build up local capacities for cross-sectoral planning of urban ecosystems, paving the way for inclusive and resilient urban development (SDG11) which balances socio-economic development and protects the local environment (SDG15) as part of Kolašin's current urban and spatial policies.

The initiative was executed within the framework of BACID II, the second phase of the programme "Building Administrative Capacity in the Danube Region and Western Balkans (2018-2021)". Funded by the Austrian Development Agency (ADA), the programme is implemented by the Austrian Association of Cities and Towns (AACT) and the KDZ - Centre for Public Administration Research, and aims to strengthen governance and support administrative reforms. This will be achieved through integration of Austrian and international know-how, expert exchanges and inter-sectoral partnerships.

The workshop was led by the Austrian Institute of Technology (AIT) with the expert input of Drees & Sommer Switzerland, and hosted by the Municipality of Kolašin with support from the local partner, the Scientific Institute Panarchy 11 – Research for Resilience.

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Head of Competence Unit Digital Resilient Cities
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Figure 01.
Urban Gardens
Source: „Urban Garden" by Seattle Parks & Recreation is licensed with CC BY 2.0

Figure 02.
Merging nature and architecture
Source: ©_ultraforma_– GettyImages.com

INTRODUCTION TO URBAN ECOSYSTEM SERVICES

A firm and growing body of evidence clearly indicates that the world is warming. This is the result of human activity which is increasing levels of greenhouse gases in the atmosphere. According to UN HABITAT, while only covering 2% of land mass[1], cities are responsible for 80% of greenhouse gas emissions. This immense ecological footprint reveals how inseparably the natural world, cities and sustainability are linked. The evidence shows that the art and process of building and managing cities must be fundamentally rethought. The urban landscape is the aspect of the urban fabric which probably offers the greatest potential to improve the sustainability of cities, due to its structure, form and similarity to natural systems. However, it is often neglected in innovative and sustainable urban design and planning.

Ecosystem services (ES) refer to "the benefits people obtain from ecosystems".[2] However, we neglect the importance of ecosystem services, tending to rely solely on the built volume (the traffic infrastructure and buildings of a city) as the only determining factors for a sustainable city. This brochure proposes that sustainable ecosystems should be the ecological framework for urban design, integrating urbanism and ecology. Green infrastructures function as the glue between social, economic and ecological aspects, catalysing the interaction between different urban media. Green infrastructures must consider aesthetic values, as well as investment, in order to become performative landscapes which can increase the productivity and self-sufficiency of cities. Landscapes can support many more functional uses, while being financially sustainable and less damaged by human activity. Therefore, landscapes and their ecosystem services clearly contribute to urban sustainability and self-sufficiency, in addition to green building concepts and innovative mobility solutions.

In urban ecosystems, humans in particular interact strongly with other ecological processes while at the same time being themselves important ecological agents with powerful capacities for social and spatial organization. This demonstrates that the potential for successfully introducing ecological processes in urban areas is directly linked to 'natural' human behaviour, making it a strong social confirmation argument in favour of enhancing urban ecosystem services (UES).

1 Urban World Magazine, Volume, 1 Issue 2, March 2009, p.48.

2 Bolund, P.; Hunhammar, S: Ecosystem services in urban areas, Ecological Economics, Edition #29 (1999, p. 293-301).

Figure 03.
Food landscapes in cities
Source: GENSCH - urban agriculture - Cuba" by Sustainable sanitation is licensed with CC BY 2.0.

RANGE OF ECOSYSTEM SERVICES

Urban ecosystems can generate a range of ecosystem services which can potentially improve a city's sustainability significantly. They are classified into provisioning services, meaning goods obtained from the ES, including, for example, food, wood or fresh water; regulating services, which are gained for ES-related processes such as water purification; cultural services, or intangible benefits from ES, including tourism or recreation, for example; and habitat-related ecosystem services, which are ecological base functions which ensure the provision of the ES and can include the habitats themselves. The urban ecosystems offer a range of different services, including air filtration, micro-climate regulation, recreational and cultural values, noise reduction, better rainwater harvesting, drainage, urban agriculture, and energy generation.

UES can be delivered and observed on various scales, from local, to neighbourhood level, and even to the entire region. However, it is not possible to generalise about the importance of specific ES: the ecosystem services which matter most depend on the specific socio-economic and environmental characteristics of a project and its geography.

ECOSYSTEM SERVICES IN PLANNING PROJECTS

Concerning the application of UES in planning projects, they can be found in three predominant contexts: firstly, when cities and their inhabitants require ecosystem services (e.g., clean air) due to the local conditions; secondly, in a socio-economic context, where rapid urbanisation or specific urban development projects may endanger natural assets and biodiversity (e.g., specific flora or fauna); and thirdly, in planning processes, where specific urban planning strategies are employed to reduce negative impact on the ES.

With respect to the application of UES in policy-making and urban planning projects, it is clear that implementing the concept needs specific approaches and instruments. The evaluation and estimation of UES in the planning process poses a formidable challenge to the stakeholders, but promises to substantially elevate the quality and sustainability of a project, and allow for informed and transparent decision-making.

NOVEL METHODS AND APPROACHES FOR INTEGRATING URBAN ECOSYSTEM SERVICES INTO URBAN PLANNING

As major consumers and distributors of goods and services, cities have become the focal points of sustainability issues and have an ecological impact far beyond their geographic locations. Current urban planning, design and management is part of this problem, usually failing to consider how ecological systems are connected to urban landscapes.

In the 21st century, in which the distinction between urban and rural areas is slowly disappearing, fragments of these ideas are becoming suddenly relevant again. The country is 'entering' the city, meaning that urban environments could theoretically be flexible and introduce 'natural' features - in the form of locally produced goods, food, energy, services and – probably the most important resource – water, to reduce urban ecological impacts. This implies that 'nature' and the 'city' must seek out new forms of interaction. Therefore, integrated urban planning, including landscape design, needs to become more flexible and adaptable, to offer important services for the city, which would simultaneously enhance the socio-cultural and political implications of constructed space. This demonstrates a need for a multi-scalar, multifunctional and interdisciplinary approach to designing and planning cities.

As inherently nature-based solutions, urban ecosystems are vital for the city itself, and locally generated ecosystem services have one of the most substantial impacts on the quality of life in urban areas. They provide a healthy living and working environment for inhabitants, and remain in an ecologically-balanced relationship with local and global ecosystems.

Figure 04.
Urban ecosystems in urbanized areas
Source: 2015 CC BY-NC-SA 3.0 BR / Caroline Ferraz

The United Nations Centre for Human Settlement (UNCHS) has emphasized that human settlement: "is not merely the physical structure of a city but an integrated combination of all human activity processes as well as the natural structures needed to support them", arguing "that sustainable human settlement development should ensure economic growth, employment opportunities and social progress in harmony with the environment".[3]

The Cities Alliance argues that development is not in conflict with urban ecosystem services but contributes to the overall investment attractiveness: "A successful city should offer investors security, infrastructure (including water and energy) and efficiency. A successful city recognizes its natural assets, (...) its environment and builds on these to ensure the best possible returns."[4]

3 UNCHS, United Nation Center for Human Settlement: The Habitat Agenda and the Istanbul Declaration (Istanbul, 1996).

4 Cities Alliance: Livable Cities " The Benefits of Urban Environmental Planning (Washington D.C., 2007).

5 Waldheim, C. (Ed.): The landscape urbanism reader (New York, Princeton Architectural Press, 2006).

CITY AND NATURE IN BALANCE?

By encouraging diverse forms of interaction between 'city' and 'nature', and introducing urban ecosystem services, city-living and urbanization can be designed to be more sustainable and self-sufficient. Naturally, the most appropriate medium for such interaction is represented by the urban landscape, because of its structure, form and similarity to natural systems.

But is it practically possible to integrate urban landscapes into the remaining urban fabric, achieving the described flexibility dimension which improves a city´s relation to water, food and energy? Would it have a catalytic effect on sustainable urban development in a post-carbon age?

One example is offered by the theories of Landscape Urbanism which try to break down the traditional disciplinary and cultural opposition between natural and urban spatial features, recognizing instead that, even in densely built-up environments, natural processes can affect the future prospects of cities and the well-being of their inhabitants.[5]

INTEGRATION OF ECOSYSTEM SERVICES INTO URBAN PLANNING PRACTICE

Looking into urban planning practice, the main question is how urban ecosystem services can be integrated into the process. Very often the negative impacts of urban projects on ecosystems are poorly understood, as are the potential benefits of ecosystem integration and restoration in urban projects.

An important first step to integrating UES into the planning process is to identify and value the existing ecosystem services in a given planning area. This can be done using different data collection methods, including the analysis of statistical and spatial data. Often it is both necessary and helpful to generate new data to fill data gaps. Using artificial intelligence (AI) to analyse satellite data, for example, can help to efficiently map local resources which were not present in the available data. This kind of inventory makes it clear that the analysis of urban ecosystem services reaches beyond the usual borders of the planning area, even of the city itself. Therefore, based on the relevant resource flows (food, water etc.) and geographical circumstances, set boundaries, spatial as well as systemic, must be drawn during the inventory phase. Another important aspect of ecosystem services is the activation of society. In a first step, this can be achieved through involving communities in the stock-taking process, e.g., getting an understanding of cultural assets in the area. A second step of the analysis is to evaluate the importance of the identified services, taking into account the local geographical conditions. Where one location will benefit more from fresh air, another will strongly benefit from water resources.

NEW PLANNING INSTRUMENTS AND APPROACHES

The evaluation and analysis deliver a deep understanding of the local conditions, texture and interrelations of the ecosystem. The work with scenario techniques has proven highly successful in making this knowledge actionable and integrating it into an urban planning process.

Planning scenarios are created in a responsive planning environment to evaluate the impact of different planning options on the ecosystem. In past years, significant advances have been made in the development of such environments. The Austrian Institute of Technology (AIT), for example, has created an environment in which urban planners, decision-makers and concerned stakeholders can collaboratively plan and discuss the impacts of different planning options. Using an AI analysis framework, the stakeholders can see real-time performance changes when the options are amended, e.g., on climatic changes or increased energy demands. This makes it possible to discuss and quantify often abstract factors and interrelations with ecosystems. In short, it facilitates the restoration and strengthening of UES in an ongoing planning process.

The application of the described approach enables evidence-based decision-making and allows for a comprehensive understanding of the impacts and costs of planning decisions on determining the optimal development plan. It is easier to find balances and trade-offs between economic and social and environmental aspects as this uncovers both direct and indirect costs and damages. One example of this is the endangering of natural assets – the major driver of tourism – through a new resort development. A highly informed scenario approach has also proven to be a valuable component when it comes to stakeholder communication and interaction with the public.

Figure 05.
Augmented Reality Design Exploration at City Intelligence Lab (Cover image)
Source: AIT/APA-Fotoservice/Hinterramskogler

LEGACY OF ECOSYSTEM SERVICE ANALYSIS

Beyond enabling local authorities in their urban management, the analysis coupled with the final plan can also serve as a monitoring framework when a plan is being implemented. Defining key performance indicators (KPIs) for the plan which also reflect the UES can serve as a monitoring system, to see if the plan is on track or how deviations can be managed by the authorities in charge.

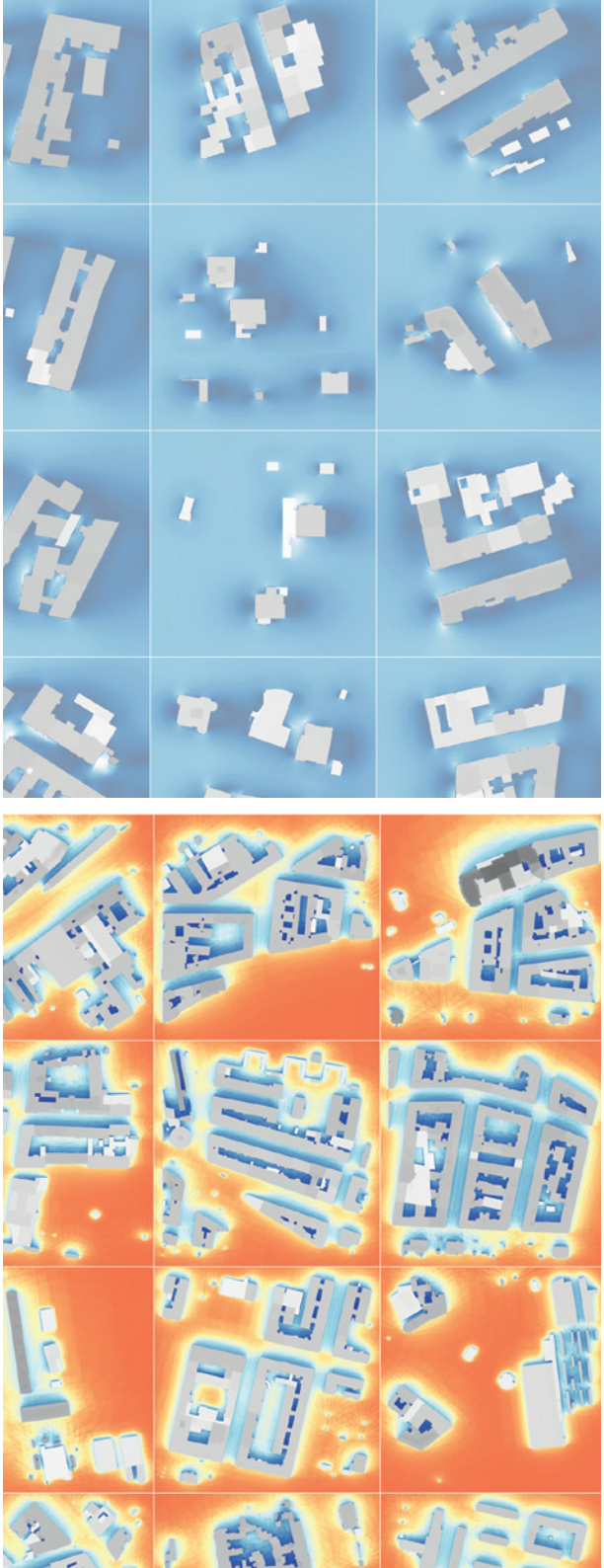


Figure 06.
AI-Real-Time Prediction of Wind Comfort and Solar Radiation
Source: AIT City Intelligence Lab

RESUME

The integration of UES into the urban planning practice is in its early days. New approaches which are supported by digital planning instruments bring many opportunities to make development plans more responsive and resilient. By using the latest planning instruments, from mapping to the real-time evaluation of plans, decision-makers as well as planners can gain a deeper understanding of how a plan may damage or benefit the local UES and activate the local community. Integrating UES into planning projects helps authorities to clearly set priorities and guidelines for developments, strengthening their position during the implementation phase, e.g., in negotiations with potential investors.

Figure 07.
Interactive Climate-Resilient Planning at City Intelligence Lab
Source: AIT/APA-Fotoservice/Hinterramskogler

GUIDELINES AND APPLICATION OF URBAN ECOSYSTEM SERVICES INTO LOCAL PLANS: EXAMPLE OF KOLAŠIN'S DEVELOPMENT PLAN

INTRODUCTION

The Municipality of Kolašin is located in central Montenegro and covers an area of 89,700 hectares. Major roads to the coast traverse its territory, through the capital city of Podgorica, and north of the country towards Mojkovac and Bijelo Polje. The major Bar-Belgrade regional railway and highway (under construction) passes through Kolašin.

The Municipality of Kolašin is predominantly mountainous, with mountain ranges including Bjelasica, Sinjajevina and Komovi, and with several peaks above 2,000 meters (Fig.1). The majority of the territory is above 900 meters altitude. There are key river basins within the municipal boundaries, i.e., the UNESCO Biosphere Reserve of the Tara River which flows north-north west in the direction of Bosnia and Herzegovina, and the Morača River, flowing south to Podgorica and the Skadar Lake.

Most of the territory is covered with vegetation: 60.11% forest, 31.04% agricultural land, 8.85% rest – settlements, roads, rocky land. There is a low percentage of urbanised areas 1.03%, and 0.83% rural area.

The Municipality has a population of around 8,400 inhabitants (2011), of whom 2,900 are resident in the town.

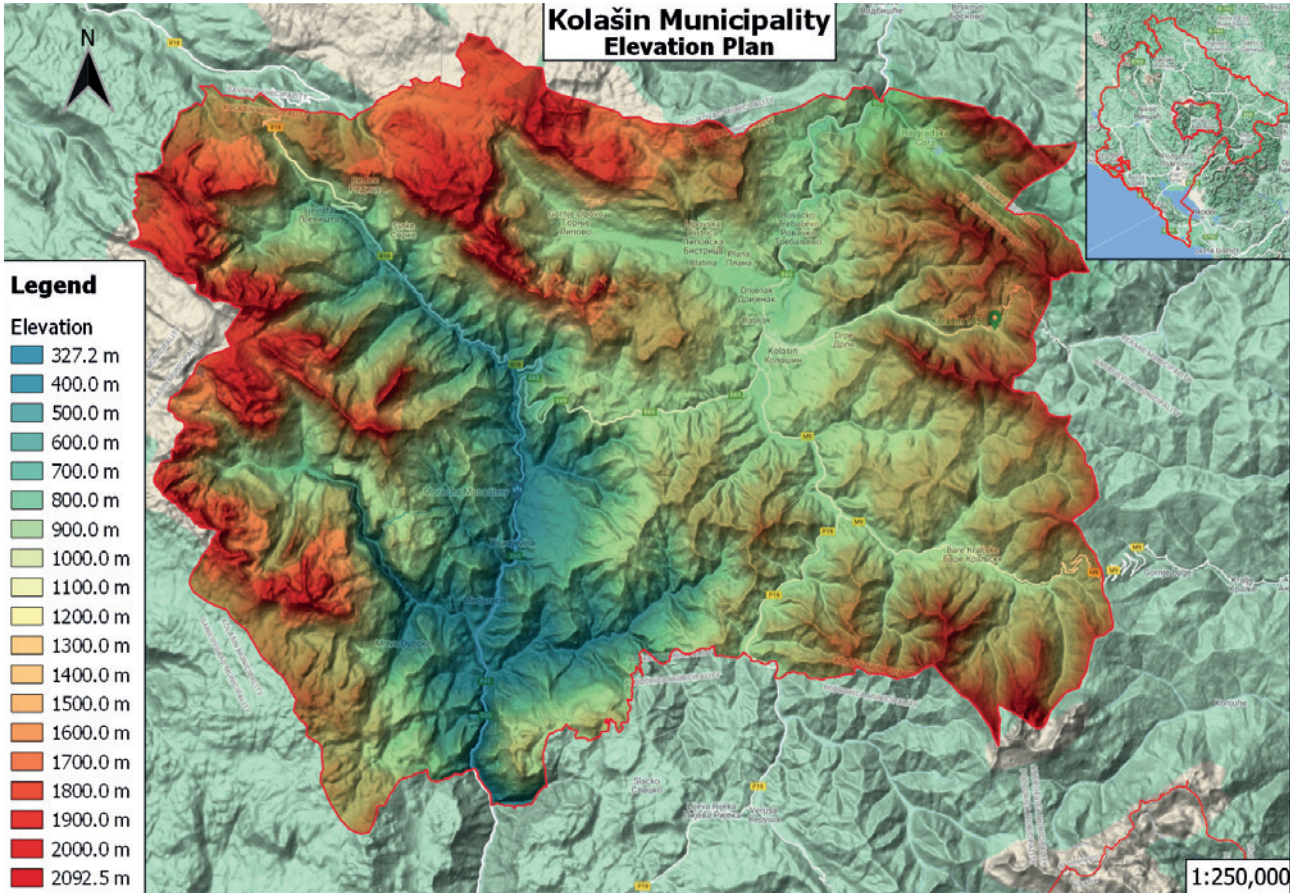


Figure 08.
The Elevation plan of the Municipality of Kolašin. (Cover image)
Source: Scientific Institute PANARCHY 11

AMENDMENTS TO THE SPATIAL URBAN PLAN (SUP) OF THE MUNICIPALITY OF KOLAŠIN

In 2014, the Spatial Urban Plan (SUP) of the Municipality of Kolašin was approved (Official Gazette of Montenegro - Municipal Regulations No. 12/14). In August 2019, the Government of Montenegro decided to amend the Spatial Urban Plan due to local development challenges and pressures caused by intensive infrastructure development and interest in high-end tourism development.

The main principles in the development of the Amendments to the SUP refer to a (1) combination of objectives, priorities, and instruments of implementation of the plan, (2) transparency of the planning process at all stages of its development, adoption and implementation, (3) introduction of a contemporary ecosystem approach to planning.

The approach to developing the plan is based on assessing the existing situation, assessing the natural and man-made conditions for development, especially regarding the possibility of land use for construction, assessing spatial planning documentation, and identifying areas of special importance. A special focus was placed on a multidisciplinary approach to assessing the existing situation.

The Municipality of Kolašin is administratively divided into 18 local communities and 38 cadastral municipalities with 70 settlements. For the purposes of the Amendments of the Kolašin SUP and organization of the planning process, the area of the municipality was divided into 7 (seven) planning units. The planning units were defined based on the existing administrative division of the Municipality of Kolašin, and the boundaries of the planning units coincide with the boundaries of the settlements. For each of the planning units, the concept of spatial development was elaborated.

2.1. ECONOMIC AND SOCIO-ECONOMIC CHALLENGES – ABSTRACT FROM THE AMENDMENTS OF THE KOLAŠIN SUP

Currently, the main economic drivers in the Municipality are infrastructural development projects, such as the construction of the first highway in Montenegro or the development of ski resort infrastructure, and high-end tourism facilities.

Nevertheless, from a planning point of view, the main driver of socio-economic development is the **population**, which, in conjunction with additional factors, affects the development of this area: the problems the Municipality faces are unfavourable demographic indicators.

The population is rapidly aging, with inhabitants between 25 to 44 years of age insufficiently represented: this age group is a vital force in driving overall development. In addition, the number of inhabitants in Kolašin has been in decline for many years.

There is a low rate of job creation, leading to unemployment. Consequently, young people leave the Municipality due to a lack of adequate employment, which has an adverse impact on the age structure in Kolašin.

Agriculture is one of the main drivers of economic development in this area, and the population of Kolašin is traditionally engaged in farming. However, the past decade has seen issues caused by the process of de-agrarization. The agricultural population is declining. One of the key problems that hinders agricultural development is insufficiently organized purchasing of agricultural products.

The **forests** provide Kolašin with an excellent basis for developing the forestry and timber processing industry. However, this economic activity also faces difficulties. Due to a stagnation in development, the current timber processing capacities are limited, particularly in terms of technological innovation and production facilities.

The Municipality has excellent potential for significant activation and use of **hydropower** for electricity production and strengthening the national energy sector. However, Kolašin has not yet exploited this potential.

One of the drivers of the overall development of the Municipality is the **tourism** sector. The current tourism development is striving towards the use of real potentials and possibilities. The Municipality has significant potential for sustainable eco-tourism and achieving social and economic growth based on tourism. Currently, the tourist offering is based on amenities such as landscapes, panoramas, fresh air, favourable temperatures, good accessibility, protected areas, ski resorts, gastronomy, as well as the compact city centre with its pedestrian zone. However, Kolašin is insufficiently promoted as a popular year-round tourist destination. The tourism industry lacks synergy with complementary industries and an experienced workforce.

The **unfavourable** factors for eco-tourism development are inadequate waste treatment, a lack of parking spaces, a lack of marked pedestrian and bicycle paths, an insufficient number of caravan campsites, insufficient application of energy efficient construction standards, a lack of control and implementation of architectural and technical solutions during the construction and renovation of facilities.

VISION

Considering its natural, cultural and historical features, Kolašin is one of the best preserved mountainous regions in Europe, and ideal as both a summer and winter tourism destination (Fig.2). As the key challenges relate to the sensible development of the tourism sector, the strategic documents should emphasize a sustainable ecosystem approach towards the balanced use of resources, while protecting the structure of biodiversity.

Consequently, the vision for the municipality and town of Kolašin would be as follows:

Kolašin is a modern and sustainable mountain town that aspires to green economic growth, social equity and environmental protection, creating a prominent and successful green tourism destination.

For the purpose of the Amendments to the Kolašin SUP, the strategic support for the ecosystem approach is available in the European Union strategies that set ambitious goals to achieve healthy and resilient ecosystems.

Figure 09. Kolašin City Center.
Source: Photo Credits Bojan Kuburović

ECOSYSTEM SERVICES AND GREEN INFRASTRUCTURE CONCEPTS TO ACHIEVE THE VISION OF MODERN KOLAŠIN

To achieve the overall vision for the Municipality of Kolašin, the Amendments to the SUP need to create conditions for improving the relationship between humans and nature. This is emphasized in view of the socio-economic challenges, combined with biodiversity loss, climate change and the global pandemic.

In its National Biodiversity Strategy and Action Plan 2016-2020, Montenegro has identified biodiversity protection as one of several social and political priorities in the overall development. The general approach to biodiversity protection is multidisciplinary and multisectoral, through the creation of preconditions for the implementation of objectives, environmental infrastructure and funding mechanisms.

The National Strategy for Sustainable Development of Montenegro to 2030 recognizes the importance and lack of an ecosystem approach in spatial planning and planning of economic activities. Pressures caused by spontaneous urbanization and inefficient management of natural resources lead to a reduction in biodiversity, loss of valuable habitats, and a reduction in the functionality and stability of ecosystems, impairing the potential for economic and social development.

In this regard, it is imperative to include an ecosystem approach in spatial planning through the framework of ecosystem services and green infrastructure. The goal is to create a strong framework for the implementation of a new paradigm of integrated natural resource management, at a time when the traditional zoning-based approach to planning is proving inadequate for sustainable development.

4.1. ECOSYSTEM SERVICES AND GREEN INFRASTRUCTURE IN MONTENEGRO

The importance of biodiversity and ecosystem services is underestimated and neglected in spatial and development planning, where ecosystem services and assessments of the impact on biodiversity and ecosystem benefits are inadequately evaluated. Such practices, and the perception that ecosystem services are unlimited, affect the ability of ecosystems to provide services of the same scope and quality.

The pressures and factors leading to ecosystem degradation include: accelerated urbanization, illegal construction, pollution of watercourses with untreated wastewater, inadequate use of forests, forest fires, climate change, conversion of agricultural and forest land into construction land, abandonment of traditional land use, and landscape fragmentation with large infrastructural projects.

The cumulative effect of these factors is a decrease in the functionality and stability of the ecosystem, loss of biological diversity, endangerment of habitats with rare endemic species, and loss of resilient areas.

To improve ecosystem services, green infrastructure is employed as a strategically planned network of natural and semi-natural areas formed to provide a wide range of ecosystem services, such as air and water purification, adaptation to climate change, etc., as a means of improving the quality of life. This concept also includes ‚blue infrastructure', i.e., landscape elements such as streams, rivers, and lakes, as well as wastewater treatment plants.

In Montenegro, green infrastructure is indirectly applied through the system of green spaces at a municipal level. However, contemporary use, research and application of the concept is lacking. Nevertheless, it is recognized in current development and environmental strategies.

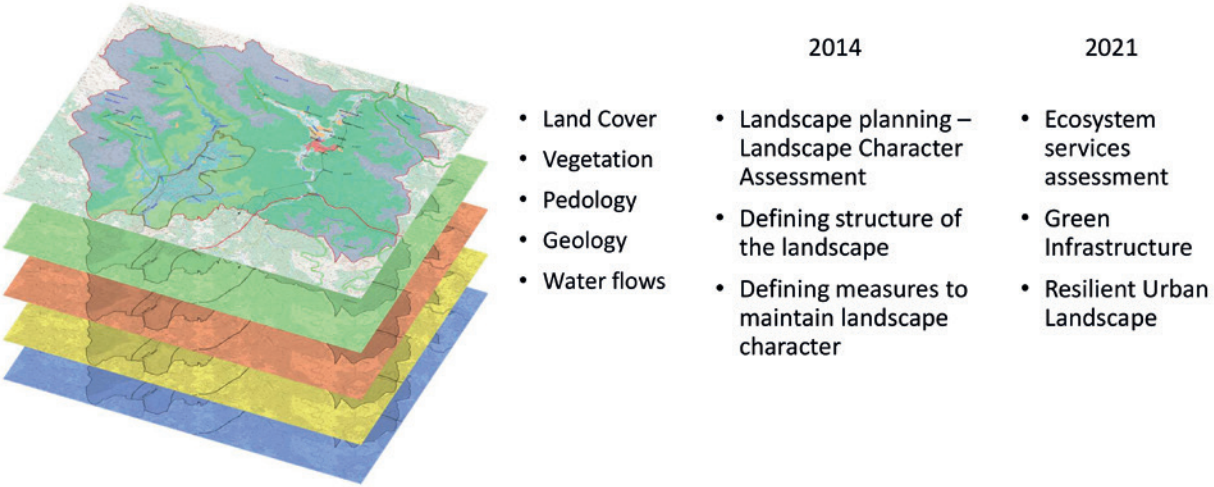


Figure 10. Amendments of SUP Kolašin – step forward.
Source: Scientific Institute PANARCHY 11

4.2. GOALS OF IMPLEMENTING ES AND GI IN THE AMENDMENTS OF THE KOLAŠIN SUP

The main objectives of implementing ES and GI in this local plan are to provide the planning and methodological basis for:

1. adequate evaluation, identification and mapping of ecosystem services and their inclusion in sectoral policies;

2. identifying, mapping and planning critical ‚green' and ‚blue' infrastructure in order to provide resilient areas; and

3. the formation of resilient urban landscapes for the local General Urban Plan.

4.3. IMPLEMENTATION OF ECOSYSTEM SERVICES

4.3.1. Methodological framework

The planned methodology is based on Ecosystem Services Assessment and Valuation (ESAV), which is a process of analysing and measuring how ecosystem services are generated, how they are managed, and how users perceive and use them. ESAV contributes to:

- understanding the importance of natural resources for the well-being and development of the community;
- inclusion of ecosystem services in the decision-making process, for the purpose of integrated resource management;
- understanding the objectives of nature protection and justifying decisions on protecting the area;
- inclusion of ecosystem services in sectoral policies and development balances; and
- identifying development opportunities based on sustainable use of natural resources.

4.3.2. Aims of the Amendments of the Kolašin SUP

- Assessment of ecosystem services at the municipal level in order to include ecosystem services in the decision-making processes of public administration and business entities;
- Assessment of ecosystem services for protected areas when adopting a plan for the management of protected areas;
- Assessment of ecosystem services when deciding on new protected areas.

These measures would be implemented through urban and technical requirements and environmental impact assessments.

4.3.3. Result

- Guidelines for the inclusion of ecosystem services in sectoral policies and the integrated management of natural resources;
- Basic identification, evaluation and mapping of ecosystem services, according to planning units and available data.

Source: Unsplash

4.4. IMPLEMENTATION OF GREEN INFRASTRUCTURE IN THE AMENDMENTS OF THE KOLAŠIN SUP AT MACRO AND MICRO LEVEL

4.4.1. Methodological framework for identifying, planning and managing elements of green infrastructure

The principle of the multifunctionality of green infrastructure is reflected on different scales. In order to provide an adequate strategy, it is necessary to understand the benefits at different levels. For the Amendments to the Kolašin SUP, the benefits at the level of the Municipality of Kolašin (macro) and the General Urban Plan of the Centre of Kolašin (micro) were analysed.

- Macro level of the Municipality of Kolašin - green infrastructure represents natural resources that have environmental, social, and economic benefits.

- Micro level of the General Urban Plan of the Centre of Kolašin - green infrastructure consists of green areas of public use, limited use, and special purpose use that have environmental, social, and economic benefits.

4.4.2. Macro level – the Municipality of Kolašin

The following elements of green infrastructure were analysed at macro level: green and blue corridors, lakes, protected areas, forests, nature parks, agricultural land.

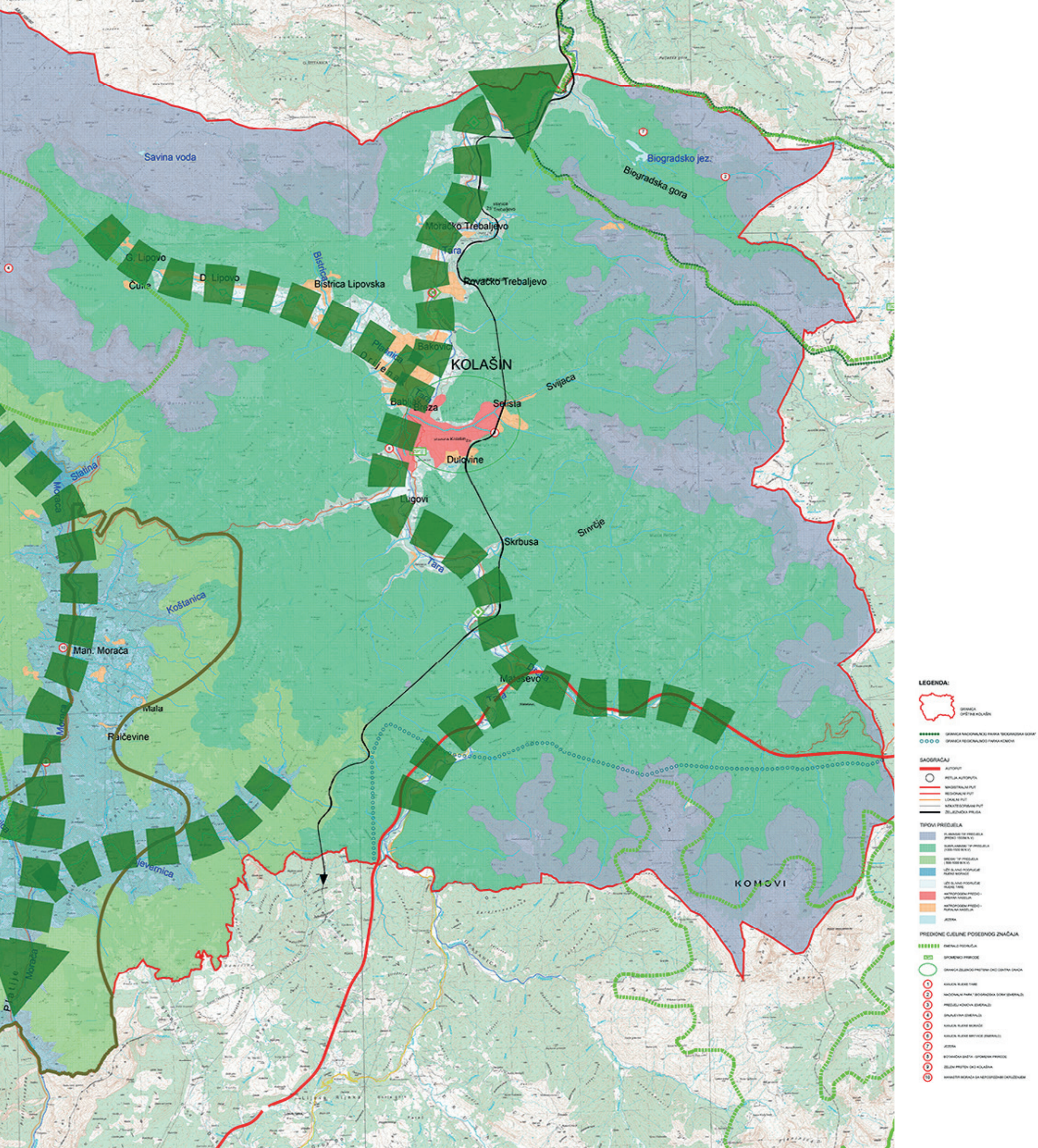
Benefits at the macro level were identified in order to provide an adequate strategy:

Environmental benefits: increased biodiversity, enhanced species movement and dispersal, climate change mitigation and adaptation, reduced flood risk, improved water quality.

Social benefits: provision of sport and recreational opportunities, improved social resilience to environmental / climate change, enhanced physical, mental health and well-being, provision of products from the land / water.

Economic benefits: increased land and property values, enhanced economic growth and investment, enhanced quality of place, increased tourism, improved recreation and leisure offering, reduced flood risk, climate change adaptation and mitigation.

Figure 11.
Initial mapping of Green Infrastructure at Macro level.
Source: Scientific Institute PANARCHY 11


Savina voda
Biogradsko jez.
Biogradska gora
Moračko Trebaljevo
Rovačko Trebaljevo
Tara
G. Lipovo
D. Lipovo
Čulje
Bistrica
Bistrica Lipovska
Bakovići
KOLAŠIN
Svijaca
Selišta
Babljak
Breza
Dulovine
Lugovi
Skrbuša
Smrčje
Slatina
Morača
Koštanica
Man. Morača
Mala
Raičevine
Mateševo
Plašnica
Drijena
KOMOVI
LEGENDA:
SAOBRAĆAJ
AUTOPUT
PETLJA AUTOPUTA
LOKALNI PUT
TIPOVI PREDJELA
JEZERA
PREDIONE CJELINE POSEBNOG ZNAČAJA

4.4.3. Micro level – General Urban Plan of the Centre of Kolašin

The following elements of green infrastructure were analysed at micro level: green areas of public use, limited use and special purpose use. This typology is based on current Montenegrin spatial planning practice.

Benefits at the micro level have been identified in order to provide an adequate strategy:

Environmental benefits: improved thermal comfort, improved water and air quality, reduced noise pollution, reduced energy use, increased biodiversity.

Social benefits: provision of sport and recreational opportunities, improved social resilience to environmental / climate change, improved social interaction and community cohesion, enhanced physical, mental health and well-being, provision of products from the land / water.

Economic benefits: increased land and property values, enhanced economic growth and investment, enhanced quality of place, increased tourism, improved recreation and leisure offering, reduced flood risk, climate change adaptation and mitigation.

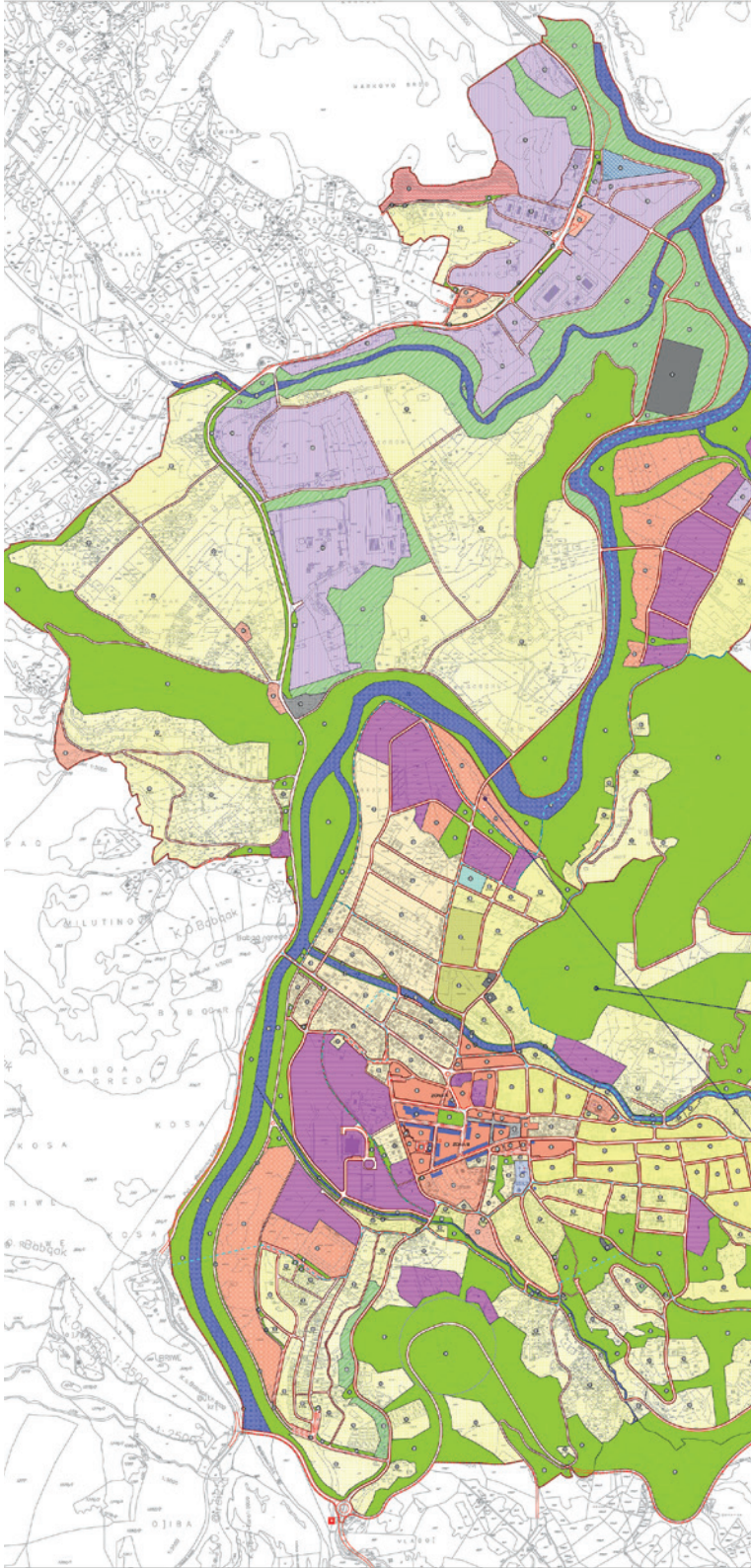
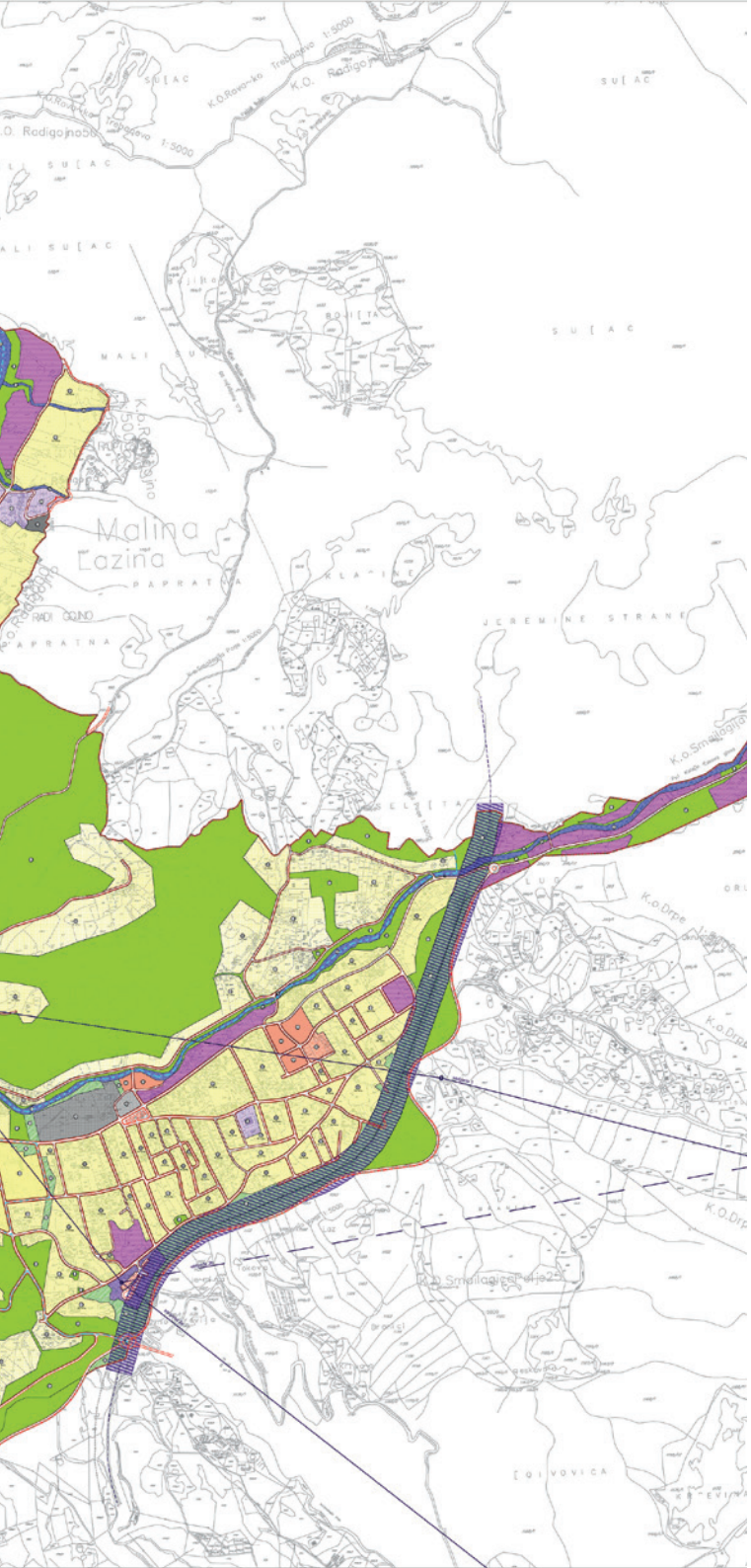


Figure 12.
Initial mapping of Green Infrastructure at Micro level - General Urban Plan of the Center of Kolašin.
Source: Scientific Institute PANARCHY 11



4.4.4. Result

- Guidelines and methodological framework for identification and mapping of critical green infrastructure, with special emphasis on national parks and protected areas;
- Guidelines for designing and sustainable management of green infrastructure;
- Basic identification and mapping of critical green infrastructure, according to available data.

These measures would be implemented through urban and technical requirements and environmental impact assessment.

OUTLOOK

The goal of the ecosystem approach in spatial planning is to combine different interests. Not only is it a way of providing improved ecosystem services (ES) and green infrastructure (GI), it is also a mechanism for better informed decision-making and joined-up thinking about urban and regional environmental planning.

The ES and GI approach can provide numerous social, economic and environmental benefits for water storage, flood purification and prevention, cooling of urban heat islands, improvement of health, well-being and access to nature for people, as well as space and habitat for flora and fauna. It also creates jobs and business opportunities, and promotes sustainable development and smart growth. However, there is still no widespread understanding that inclusion of ES in economic activities or using green infrastructure is a better solution than the single-purpose 'business as usual' approach to natural resources, in which grey infrastructure is usually employed as a solution.

ES and GI are perceived as a critical part of landscape and urban infrastructure, and as a positive way of approaching landscape planning and urban design. The primary goal is to increase the quality of natural capital, instead of concentrating exclusively on its quantity.

The idea that stakeholders should be involved in shaping the planning of the environment and green areas at different levels is also embedded in ecosystem services assessment and planning of the green infrastructure.

Recent enthusiasm for pushing these planning concepts suggests that ES and GI are becoming a 'meeting place' for academies, public bodies and practitioner agencies interested in the ecosystem approach and green space issues. They are helping to develop thinking that places a focus on the environment and goes beyond disciplinary and political boundaries.

The example of local ES and GI integration with international partners is a reassuring step, indicating that the approach is being implemented in important strategic documents in a timely manner, and involving significant work to ensure its implementation.

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Source: AIT / data source: OpenStreetMap

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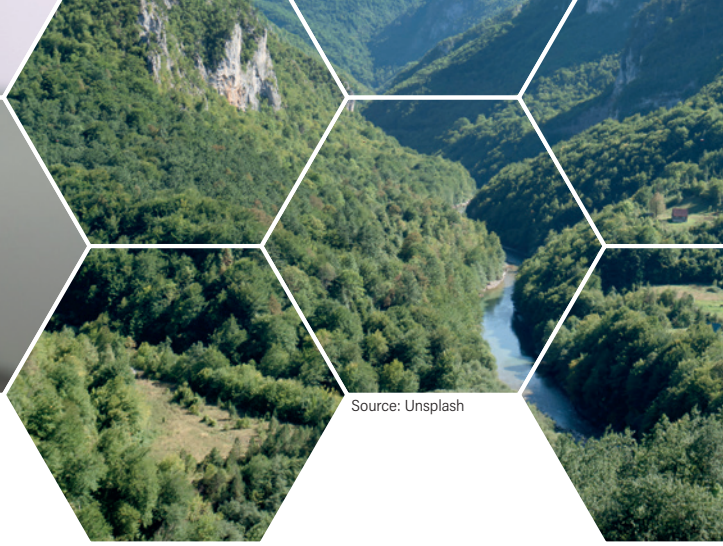
Source:
AIT/APA-Fotoservice/Hinterramskogler



Source: Unsplash

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Ministry of Ecology, Spatial Planning and Urbanism of Montenegro

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