



Enhancing Nature-based Solutions in North Macedonia

The role of ecosystems in disaster risk reduction and climate change adaptation

Vasko Popovski and Bogoljub Sterijovski



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Executive summary

The main goal of this scoping study is to provide a state-of-the-art overview of the national aspect of North Macedonia in regard of pilot activities to apply the Nature-based Solutions (NbS) concept for disaster risk reduction (DRR). The study refers to the available information from existing policies, programmes, and strategies (at the global, regional, national, and local levels). The analysed data are related to NbS for DRR, directly or indirectly. To establish this new process in North Macedonia, essential steps are required, such as:

1. **Filling in the knowledge gap:** There is a lack of a systemic overview of NbS in North Macedonia. Stand-alone studies are available on specific NbS approaches, such as ecosystem-based disaster risk reduction, but these are neither systemic nor comprehensive, for example regarding stakeholder engagement. Specifically, data on the link to gender and inequality are lacking, as is an understanding of the traditional and local knowledge on NbS. **Recommendation:** Support research that drives the collation and meta-analyses of Ecosystem-based disaster risk reduction and climate change adaptation compared to the DRR and grey infrastructure approaches. The findings should then be published to be openly accessible and visible within North Macedonia and to the global practitioners and researchers of NbS.
2. **Break down silos linked to climate change:** Priority hazards for DRR and climate change adaptation in the country are floods, wildfires, extreme weather events, and droughts. Improving air quality and waste management remain two areas of pressing concern for the country. Nearly all of these are predicted to be exacerbated by climate change in the coming years, and while the existence of an interministerial advisory body on climate change issues is optimistic, participating ministries tend not to have units or departments dedicated to climate change, which translates into limited capacities. **Recommendation:** Build a common language and understanding of NbS while designing cross-ministerial workshops and events for ministries to learn from one another.
3. **Mainstream ecosystem services:** While ecosystem services are acknowledged and complementary to various policies and legislation, there is a lack of capacity at the national and local level among both decision-makers and service users. The application of the ecosystem services concept in ecosystem management in the country is still modest. **Recommendation:** Introduce ecosystem services through the umbrella framework of NbS. Build NbS complementary capacities specifically

regarding greening the economy, environmental monitoring, public participation, and education for sustainable development.

4. **Preserve North Macedonia's unique biological diversity:** There is a need to intensify efforts to protect, sustainably manage and restore the natural capital and natural ecosystems of North Macedonia. Due to the country's complex geography and climate conditions created from the presence of both continental and Mediterranean climates, biodiversity is very high, represented by almost 22,000 species, of which over 1000 are endemic. Climate change is another priority threat that concerns the expected rise in temperature and decrease in the volume of precipitation, which can be expected to result in the extinction or reduced range of several sub-alpine or alpine species and habitats, as well as the expansion of arid areas, increased risk of fires, and increased erosion. **Recommendation:** Monitor and undertake actions to mitigate the effects of climate change on biodiversity.

5. **Drive investment:** Investments in environmental protection and infrastructure remains insufficient, despite increased spending in recent years. The administrative capacity at all levels remains weak and financial resources are still insufficient to implement existing legislation. **Recommendation:** Promote awareness of NBS and case studies for investment.

6. **From policy to implementation:** Despite many linkages between NbS and policy/law/institutions, challenges remain regarding effective implementation and compliance with the obligations. This is most apparent concerning climate change. **Recommendation:** More efforts are needed to align with the EU climate acquis and to strengthen technical and administrative capacities. **Recommendation:** Strengthen national capacities for integrating environmental requirements into sectoral policies and enhancing reporting on implementation.

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- Ms. Milica Radanović, Nature-based Solutions Officer, IUCN ECARO.

Acronyms

CBD	Convention on Biological Diversity
CCA	Climate change adaptation
CMC	Crisis Management Centre
CSO	Civil society organisation
DPPI	Disaster Preparedness and Prevention Initiative
DRM	Disaster risk management
DRR	Disaster risk reduction
EbA	Ecosystem-based approach
EC	European Commission
Eco-DRR	Ecosystem-based disaster risk reduction
GDP	Gross domestic product
GHG	Greenhouse gases
HDI	Human Development Index
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
LDN	Land degradation neutrality
MAFWM	Ministry of Agriculture, Forestry and Water Management
MEPP	Ministry of Environment and Physical Planning
NbS	Nature-based Solutions
NBSAP	National Biodiversity Strategy and Action Plan
PES	Payment for ecosystem services
SDG	Sustainable Development Goal
SEE 2020	South East Europe 2020 Strategy
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WCC	World Conservation Congress

1. Purpose and methodology of the scoping study

The overall purpose of the Scoping Study (hereinafter: the Study) is to provide a state-of-the-art overview of the **North Macedonian national context concerning the application of Nature-based Solutions (NbS) approaches for climate change adaptation (CCA) and disaster risk reduction (DRR) along with impacts to biodiversity.**

Moreover, the objectives of the Study are to: 1) understand the national context, in terms of the institutional, policy, and legal framework for the application of NbS, 2) provide an overview of the most common natural hazards and disasters in North Macedonia and the correlated risks, 3) elaborate on the added benefit of deploying NbS in the given context, 4) identify the knowledge, institutional and capacity gaps and barriers for the application of NbS, and 5) provide recommendations and entry points for mainstreaming NbS into national DRR and climate change policies and strategies.

The Study relies on available data and information originating from existing policies, programmes, and strategies (at the global, regional, national, and local levels), taking into account data collected on past and ongoing initiatives, projects, and activities in North Macedonia on NbS for DRR, as well as impacts on climate change and the environment. It includes an overview of the current development in North Macedonia concerning NbS and its application in the national context, followed by semi-structured interviews and discussions with selected key partners and relevant national stakeholders.

Furthermore, to identify and elaborate best practice cases and examples of NbS implementation, a comprehensive desk study was performed during the initial phase to compile the data and information on all ongoing projects, programmes, activities, and initiatives currently applying NbS in North Macedonia.

Special attention has been given to the screening and examining of relevant national documents and policies: strategies, plans, and programmes that reveal existing or potential linkages between NbS, climate-smart adaptation, and DRR policies and measures, including climate and biodiversity, as well as climate and gender interconnections.

The Study also includes mapping and identification of the experiences on NbS in/or involving North Macedonia that can illustrate the benefits and applicability of NbS and reveal entry points for possible scale-up of NbS interventions based on existing experiences.

The cross-check of the main findings and conclusion of the Study preceded its finalisation, including gathering and incorporating inputs and suggestions from stakeholders and partners. In addition to feedback from relevant stakeholders and other actors across various sectors on the identified priorities and potential pilot sites proposed for North Macedonia, this process contributed to knowledge-building and awareness-raising through the sharing of data and information on the current state of affairs regarding disaster risks, climate change impacts and the identification of opportunities presented by NbS application.

The Scoping Study has been developed under the auspices of the *ADAPT: Nature-based Solutions for resilient societies in the Western Balkans* project, funded by the Swedish International Development Cooperation Agency (Sida) and implemented by IUCN.

1.1. The ADAPT Project

The [ADAPT: Nature-based Solutions for resilient societies in the Western Balkans](#) project aims to increase ecosystem and community resilience to climate change and environmental degradation in the Western Balkans. This regional umbrella initiative works with the six Western Balkan economies and regional and local partners.

ADAPT aims to introduce NbS as a contribution towards reducing of environmental degradation and increasing climate resilience, including social equity and gender equality, in the Western Balkan region. In order to achieve balanced results and achieve a positive, long-term impact on communities and ecosystems in the region, the project has strong regional and national components. Regionally, it focuses on aligning NbS and DRR policy, knowledge generation and sharing, capacity development and networking, while the focus at the national level is on national policy, stakeholder engagement and demonstration through pilot NbS projects.

The project is implemented through three strategies:

- ✓ Enhance knowledge and awareness of NbS for DRR among decision-makers, natural resource managers, and local communities, with a specific focus on gender;
- ✓ Integrate NbS and equitable climate-smart planning into adaptation and disaster reduction policy; and
- ✓ Implement NbS for DRR and their scale-up.

2. Introduction

The Western Balkans are one of the most vulnerable regions in Europe in terms of climate change and environmental impacts. The 2016 European Environment Agency report¹ on climate change impacts and vulnerability in Europe considers Southeast and southern Europe as areas highly prone to climate change effects, and regions with the highest impact of climate change and the number of severely affected sectors and domains.

NbS are “actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits.”

- [IUCN Resolution](#) (WCC 2016 Res 069)

At the same time, the Western Balkans also represents a uniquely biodiverse region of Europe, consisting of a diversity of ecosystems. It is these ecosystems that play a vital role in sustaining society and have the potential to address development concerns through NbS. Though NbS have the potential to address societal challenges such as human health, economic and social development, ecosystem degradation and biodiversity loss, food security and water security (Figure 1)², this Study focuses on their links to CCA and DRR.



Figure 1. Major societal challenges addressed by NbS (Source: IUCN Global Standard for NbS, see footnote 2)

NbS rely heavily on the concept of ecosystems, the services they provide and the approaches to working with them. While the concept and application of working with ecosystems is not new, with some communities having decades of practice, the demand for and visibility of NbS

¹ European Environment Agency (2017). *Climate change, impacts and vulnerability in Europe 2016. An indicator-based report*. Luxembourg, Luxembourg: Publications Office of the European Union. [DOI:10.2800/534806](https://doi.org/10.2800/534806)

² IUCN (2020). *Guidance for using the IUCN Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of Nature-based Solutions*. First edition. Gland, Switzerland: IUCN. [DOI:10.2305/IUCN.CH.2020.09.en](https://doi.org/10.2305/IUCN.CH.2020.09.en)

has only grown to prominence in the last decade. As the NbS movement grows in momentum globally, so do the opportunities for the potential for NbS to address societal challenges in North Macedonia.

2.1. Ecosystems, ecosystem services and the ecosystem approach

An ecosystem is defined as a “dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit”³. Through the concept of ecosystem services, which are the benefits that people derive from ecosystems⁴, it is largely recognised that ecosystems support life and are important for human well-being.

The Millennium Ecosystem Assessment (2005)⁵ categorised ecosystem services into four groups: (1) provisioning services, (2) regulating services, (3) cultural services, and (4) supporting services. However, the provision of and access to these services and benefits require that a particular ecosystem is healthy and properly managed. This classification is superseded in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessments⁶ by the system used under “nature’s contributions to people” as in most cases, many services fit into more than one category.

Our dependence on ecosystem services, coupled with the fact that the degradation of ecosystems is proceeding at unprecedented and alarming rates worldwide⁷ is an alarming and pressing issue threatening human security, livelihood and sustenance. For example, pollution of freshwater ecosystems reduces access to safe and clean drinking water (provisioning services); intensive farming decreases the quality, fertility and productivity of arable lands (supporting services); land clearing and loss of vegetation increases the vulnerability of societies to hazards such as floods and exacerbate disaster risks (regulating services). Several of the major challenges that societies are currently facing can be traced back to an environmental problem.

Environmental risks also dominate the global risks landscape. Extreme weather events, climate action failure ‘natural’ disasters, biodiversity loss and human-made environmental

³ United Nations (1992). *The Convention on Biological Diversity of 5 June 1992*. New York, USA: United Nations.

⁴ Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Synthesis*. Washington, DC, USA: Millennium Ecosystem Assessment.

⁵ Ibid.

⁶ IPBES (2019). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Bonn, Germany: IPBES. [DOI:10.5281/zenodo.3831673](https://doi.org/10.5281/zenodo.3831673)

⁷ Steffen, W. et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*. 6223 (347), 1259855-1 – 1259855-10. [DOI:10.1126/science.1259855](https://doi.org/10.1126/science.1259855)

disasters are among the top global risks to societies and economies in terms of likelihood and possible impacts (Figure 2).



Figure 2. Top 10 identified global risks in terms of likelihood and impacts for 2021 (Source: World Economic Forum, 2021, [The Global Risks Report 2021 16th Edition Insight Report](#))

With these challenges and risks in mind, there is an urgency now to invest in effective and long-term approaches for DRR and CCA. Healthy and well-managed ecosystems have central roles to play in such strategies, and it is essential to recognise that the degradation of critical ecosystems exacerbates climatic risks (Figure 3) and that their conservation, sustainable use and restoration has the potential to reduce climatic risks.

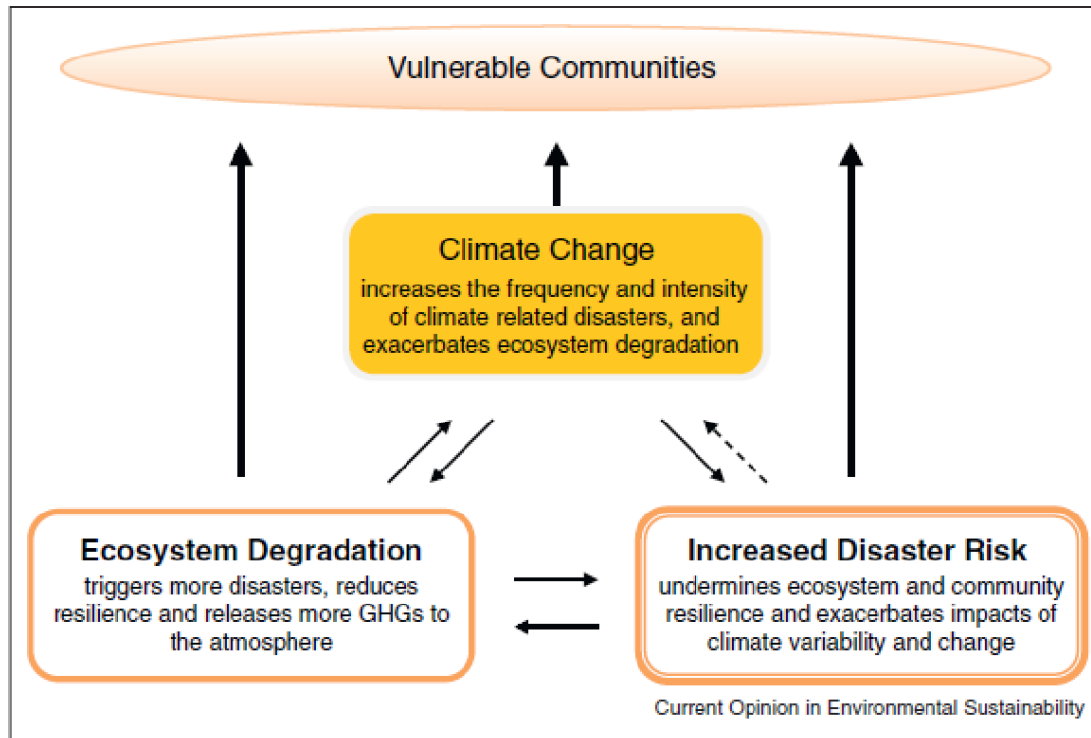


Figure 3. Simplified model on interactions between climate change, ecosystem degradation and increased disaster risk (Source: Munang et al., 2013, see footnote 8)

Ecosystem-based approaches (EbA), through the protection, restoration, and sustainable use of natural resources provide effective proactive tools to maintain the regulating services that are essential for CCA and DRR⁸. A variety of interventions may use EbA for CCA and DRR, and the two most established fields of practice are Ecosystem-based Adaptation (EbA) and Ecosystem-based Disaster Risk Reduction (Eco-DRR) (Figure 4).

⁸ Munang et al. (2013). The role of ecosystem services in climate change adaptation and disaster risk reduction. *Current Opinion in Environmental Sustainability*, 5(1), 47–52. DOI: [10.1016/j.cosust.2013.02.002](https://doi.org/10.1016/j.cosust.2013.02.002)

Ecosystem-based Disaster Risk Reduction (Eco-DRR): The sustainable management, conservation and restoration of ecosystems to provide services that reduce disaster risk by mitigating hazards and by increasing livelihood resilience. See also:

<https://tinyurl.com/5n7xh34s>

Ecosystem-based Adaptation (EbA): The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to climate change, maintain and increase resilience as well as to reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change. See also:

<https://www.iucn.org/theme/ecosystem-management/our-work/ecosystem-based-approaches-climate-change-adaptation>

Figure 4. Ecosystem-Based Disaster Risk Reduction and Climate Change Adaptation (Source: This figure is created by the author of this study.)

For the remaining sections of this Study, the acronym Eco-DRR/CCA will be used to refer to EbA that contribute to both DRR and CCA and defined as “the sustainable management, conservation, and restoration of ecosystems to reduce disaster risk and adapt to the consequences of climate change, to achieve sustainable and resilient development”⁹. Ecological assessments of habitats are an integral part of the process of developing management plans for the use and conservation of large natural ecosystems. Ecosystem assessment requires documentation, trend detection, and/or modelling of the changing distribution of springs, including accurate mapping, monitoring of discharge, water-quality, habitat, and biota in relation to local and regional stressors, as well as consistent, long-term information management.¹⁰

2.2. Nature-based Solutions

More recently, in the last decade, an umbrella term that gathers together the diversity of EbA for societal challenges has emerged. NbS have now gained significant momentum at the global level in terms of interest and investment. There is an increasing understanding that nature provides ‘no-regret solutions’ that are cost-effective and can contribute to increased community resilience beyond society’s capacity to absorb and recover from a single disaster,

⁹ Estrella, M. and Saalismaa, N. (2013). Ecosystem-based disaster risk reduction (Eco-DRR): An overview. In G. Renaud, K. Sudmeier-Rieux and M. Estrella (Ed.) *The role of ecosystems in disaster risk reduction*. New York, USA: United Nations University Press.

¹⁰ Robertson, M. (2011). Ecosystems Services. In J.O. Nriagu (Ed.) *Encyclopaedia of Environmental Health*. Elsevier.

such as a flood or drought. While still an emerging concept, NbS have demonstrated their value in providing multiple benefits to societies, e.g., in mitigating and adapting to climate change impacts, reducing disaster risks, improving community resilience and livelihoods, and safeguarding ecosystems and biodiversity (Figure 5).



Figure 5. NbS approaches based on the IUCN definition including the seven societal challenges that NbS address (climate change adaptation and mitigation, disaster risk reduction, economic and social development, human health, food security, water security and ecosystem degradation and biodiversity loss (Source: IUCN, 2020, see footnote 12)

Various approaches support the application of NbS, including Eco-DRR/CCA, as well as complementary approaches to those such as green infrastructure projects or ecosystem-based adaptation, across a variety of sectors and fields. Measures facilitating the practical implementation of NbS through policy development and enforcement, stakeholder involvement and building capacities of national institutions and/or local communities are equally important. The IUCN Global Standard for Nature-based Solutions^{TM11} launched in July

¹¹ IUCN (2020). *Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS*. First edition. Gland, Switzerland: IUCN. [DOI:10.2305/IUCN.CH.2020.08.en](https://doi.org/10.2305/IUCN.CH.2020.08.en)

2020, with its associated guidance¹² operationalises NbS, providing a common language and framework to design, verify and scale up NbS applications and policies.

Eco-DRR/CCA falls under the concept of NbS, which integrates science, policy, and practice for long-term sustainable solutions¹³. IUCN defines NbS as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits”¹⁴, a definition that was adopted at their World Conservation Congress (WCC) and endorsed by the IUCN’s considerable membership.

The main difference between NbS and conventional conservation approaches is that the primary focus is not the protection of biodiversity; instead, NbS primarily address a societal challenge, thus ensuring benefits for both nature and communities. This difference has been further elaborated upon and the NbS approach operationalised in the IUCN Global Standard for NbS (and its associated guidance), launched in July 2020.¹⁵ Under the IUCN definition, the societal challenges that NbS aims to address include climate change adaptation and mitigation, food security, water security, human health, DRR, social and economic development, and ecosystem degradation and biodiversity loss. It is noted that in the case of the seventh societal challenge recently added in this framework, that if an NbS intervention addresses ecosystem degradation and biodiversity loss, it must simultaneously address at least one of the other six societal challenges to be considered an NbS approach.

While the importance of ecosystem management for long-term resilience and its benefits are clear, investment in these approaches remains largely underdeveloped. As finance and demand for NbS grow, they offer an opportunity for North Macedonia to address some of its most pressing challenges concerning disasters and climate change. Baseline studies to identify gaps and opportunities for their mainstreaming in conventional DRR and CCA practices, and the dissemination of such information are expected to inform and catalyse actions for NbS. In North Macedonia, needs for mainstreaming of Eco-DRR and NbS arose from the increased number of natural disasters risks occurring during recent decades that seriously pressured the resilience texture of the country. With the increasing number of climate-related disasters, stronger climate change impacts and the level of environmental

¹² IUCN (2020). *Guidance for using the IUCN Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of Nature-based Solutions*. First edition. Gland, Switzerland: IUCN.

[DOI:10.2305/IUCN.CH.2020.09.en](https://doi.org/10.2305/IUCN.CH.2020.09.en)

¹³ Eggermont et al. (2015). Nature-based Solutions: New Influence for Environmental Management and Research in Europe. *GAIA - Ecological Perspectives for Science and Society*, 24(4), 243 – 248. [DOI: 10.14512/gaia.24.4.9](https://doi.org/10.14512/gaia.24.4.9)

¹⁴ Ibid., footnote 11

¹⁵ Ibid., footnote 12

degradation, such events are expected to double. Therefore, NbS can be a *modus operandi* for the achievement of sustainability and resilience of society and communities. Until recently, there were stand-alone activities for Eco-DRR mainstreaming in risk reduction, limited in scope, profile and area of interventions. Nevertheless, a project funded by the Japan International Cooperation Agency (JICA) and implemented by the Crisis Management Centre (CMC) and the Public Enterprise National Forests, has developed an integrated Eco-DRR model against floods, landslides, soil erosion and forest fires using numerous forest functions in North Macedonia. It is considered a blueprint for further replication and scaling up across the region and sectors.

3. North Macedonia Country Overview

3.1. Geographic profile

Covering an area of 25,713 km², the Republic of North Macedonia is one of the smallest countries on the European continent (Figure 6). It is a landlocked country situated in south-eastern Europe, in the central part of the Balkan Peninsula, an area with diverse physical and geographical features and natural resources. The state border covers a length of 896 km and borders on five countries: Serbia (102 km) to the north, Kosovo (179 km) to the northeast, Albania (186 km) to the west, Greece (256 km) to the south and Bulgaria (173 km) to the east. The southernmost point is at Markova Noga (eastern shore of Prespa Lake), the northernmost at Anishte (north of Kriva Palanka), the westernmost at Kestenjar (southwest of Debar) and the easternmost at Chengino Kale (east of Berovo). The distance from its northern to southern borders is 155 km, and 210 km from western to eastern borders. The old dissected relief structures enable easy communication with the neighbouring political, physical and geographical regions, and via these eastward to the Asian continent and westward to the Apennine Peninsula.



Figure 6. Topographic map of North Macedonia – political map (Source: Geology.com)

The physical geography and characteristics of North Macedonia are defined by its position, i.e., the central Vardar River Valley and high mountain ranges lying along the border with neighbouring countries: the Rhodope range in the east and the Dinaric range in the west and central parts of the country. According to its relief characteristics, the Republic of North Macedonia is a country of mountains and valleys. Most of the territory is mountainous (11,044 km² or 43%). Hilly terrain covers 9,769 km² or 38%, while plains make up 4,900 km² or 19%. The largest plain is Pelagonija in the southwest, covering an area of 4,000 km² and with an average altitude of approximately 600 m. Lastly, 2% of the land area is covered by water. The average altitude is 875 m, and there are 16 mountain peaks higher than 2,000 m. The highest point is the Golem Korab peak at an altitude of 2,753 m, situated in the west along the border with Albania. The lowest point in the country is on the Vardar River at an altitude of 44 m.

3.2. Climate conditions

The territory of North Macedonia is under the influence of two zonal climates (Mediterranean and continental) and one local (mountainous climate). The temperate Mediterranean climate penetrates through the Vardar and Strumica River valleys, while the continental climate dominates in the central parts of the country. The former is characterised by long, hot and dry summers and short, mild and rainy winters, while the latter is characterised by long, warm and dry summers followed by short, cold, wet and snowy winters. The mountainous climate is found on mountains with an altitude over 1,000 m and is characterised by short and fresh summers and long, cold and snowy winters (Figure 7).

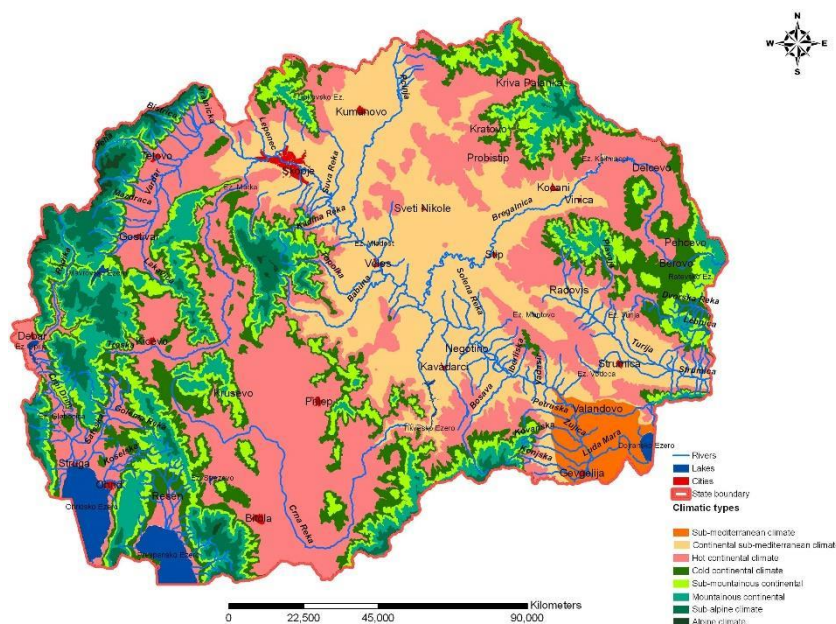


Figure 7. Climate regions map of North Macedonia (Source: [European Environment Agency, 2010](#))

The average annual precipitation has an uneven distribution, varying from 500 mm in the east to 1,700 mm in the western mountains, while the national average is 680 mm. The absolute annual maximum of precipitation was registered in the village of Zhirovnica in the Radika River Valley in 1962 with more than 2,792 mm. On the other hand, the lowest precipitation was measured in Gradsko, during 1948/49 with only 163 mm. It can be seen that the difference between these two extremes is 13-fold. The region with the lowest precipitation is the area between Tikvesh (476 mm), Sveti Nikole (471 mm) and Shtip (482 mm). Contrary to this, the region with the highest precipitation is the Radika River Valley (>1,400 mm). Another characteristic for the country is drought and frequently there are periods without precipitation for more than 90 days. In particular, three regions are exposed to drought: middle and lower course of the Vardar River, and the Strumica River basin. The most exposed is the Gevgelisko Pole area, with more than 228 drought periods.

The temperature range also features wide fluctuations: maximum summer temperatures in most agricultural areas rise to +40°C, while the lowest winter temperatures can drop to about -30°C.¹⁶ The warmest region in the country is the Demir Kapija region, where the highest absolute temperature was measured, 44.5°C on 22 August 1952, whereas the lowest absolute temperature was measured in Berovo, -31.5°C on 27 January 1954. The average annual temperature is +11.1°C. The warmest month is July with an average temperature of 20.3°C. The coldest month is January with an average of 0.3°C. With the recent impact of climate change, there are more days with temperatures above 30°C, considered “*tropical days*”. They are most frequent during July and August and they are with the highest values in the region of Gevgelija and Valandovo, with 73 days annually. On the other hand, precipitation is less frequent especially during the summer months, but with greater intensity, as in the Skopje flood of August 2016. The impacts on people of climate conditions, especially in the form of disasters, and how climate change exacerbates those is further explained in Sections 4.9 and 4.10.

3.3. Hydrology

The country has four river basins: Vardar, Strumica, Black Drim and South Morava (Figure 8). The Vardar basin is the largest (20,546 km² or 79.9% of the territory) and flows into the Aegean Sea. The Strumica basin is in the south-eastern (1,520 km² or 5.9% of the territory) and also flows into the Aegean Sea. The Black Drim basin is located in the west (3,355 km² or 13% of

¹⁶ United Nations Economic Commission for Europe (UNECE) (2019). [North Macedonia Environmental Performance Reviews Third Review](#). Geneva, Switzerland: UNECE.

the territory) and it flows towards the Adriatic Sea. The smallest river basin, South Morava (44 km² or 0.2% of the territory) is located in the north and flows into the Black Sea.¹⁷ In the country, there are 35 large and small rivers, three large lakes (Ohrid, Prespa and Dojran) and more than 160 lakes (50 small natural lakes and 110 artificial lakes). The largest river, the Vardar (388 km, out of which 301 km flows through North Macedonia), divides the country in two from north to south. The water potential of the four river basins is dependent on rainfall. The average annual precipitation in the Vardar basin is 700 mm, while the average for the Strumica basin is 790 mm, and for the Black Drim is 980 mm. The maximum precipitation (1,400 mm) is observed in the west, while the minimum (380 mm) is recorded in the east. There are 21 large reservoirs in the country and 120 smaller reservoirs built to harness the potential of these rivers.



Figure 8. River map of North Macedonia (Source: [Wikipedia](https://en.wikipedia.org/wiki/File:Map_of_rivers_in_North_Macedonia.png))

The monitoring of aquatic ecosystems is regulated by the Law on Waters, and falls under the authority of the National Hydrometeorological Service in Skopje and the Hydrobiological Institute in Ohrid. There is an ongoing transformation of monitoring in recent years to meet the requirements of the EU Water Framework Directive. Long-term training for monitoring of physical, chemical and biological parameters has been undertaken. Several pilot projects have been implemented, and the activities for monitoring of the Strumica River basin and Bregalnica River basin are particularly important.

¹⁷ Ministry of Environment and Physical Planning (2014). *Third National Communication on Climate Change*. Skopje, North Macedonia: Ministry of Environment and Physical Planning.

3.4. Forests and vegetation

Grass vegetation or ground vegetation in North Macedonia consists of meadows, pastures, semi-steppe vegetation, rock vegetation and swamp vegetation. Meadows are present in almost all valleys in the country, along rivers and streams, mainly where there are conditions for irrigation. They cover an area of 55,000 ha and are covered with clover and other grasses of economic importance. Pastures cover an area of 640,000 ha. They are divided into high mountain pastures, mountain ore pastures, hilly pastures and plain pastures. Despite the predominance of forest cover, nearly a quarter of the land area is pastures and mosaic farmland (Figure 9)¹⁸. On the other hand, the country's forests are under chronic stresses of illegal logging, deforestation for urbanisation purposes, and an increased number of wildfires in recent decades.

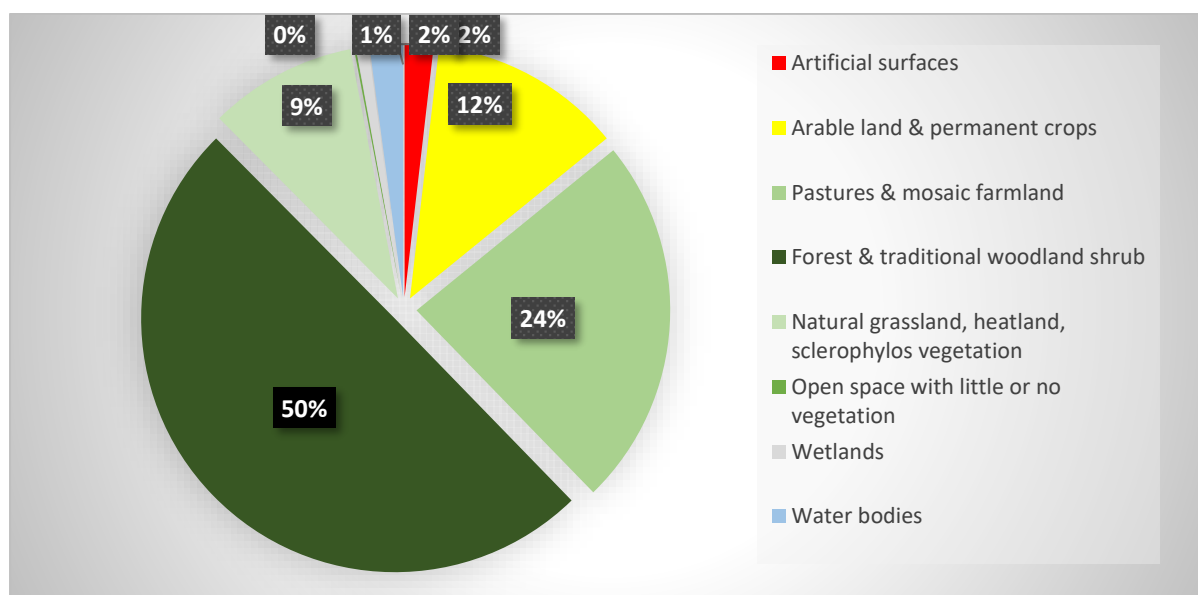


Figure 9. Land cover status of North Macedonia in 2018 based on the Land and Ecosystems Accounting (LEAC) categories (Source: European Environment Agency, 2021, see footnote 18)

In North Macedonia, the division by type of forest is as follows: deciduous forests cover 539,600 ha or 57%, coniferous forests 78,700 ha or 8%, and mixed deciduous and coniferous forests cover 335,000 ha or 35% of the total forest found in the country. Forests in the territory of the Republic of North Macedonia, from the aspect of planning and management, are divided into smaller areas, called forestry units (Figure 10). According to the Law on Forests, a forestry unit is part of the forest area which, as a rule, consists of the spatial whole of forest and forest

¹⁸ European Environment Agency [website]. Available at: <https://www.eea.europa.eu/themes/landuse/land-cover-country-fact-sheets>. Accessed on 20 January 2021.

land, and covers the forest complex in whole or in part. It is the basic unit for planning and represents a natural and economic unit determined according to the orographic and hydrographic features, roads and other natural and economic conditions for forest management and forest infrastructure.

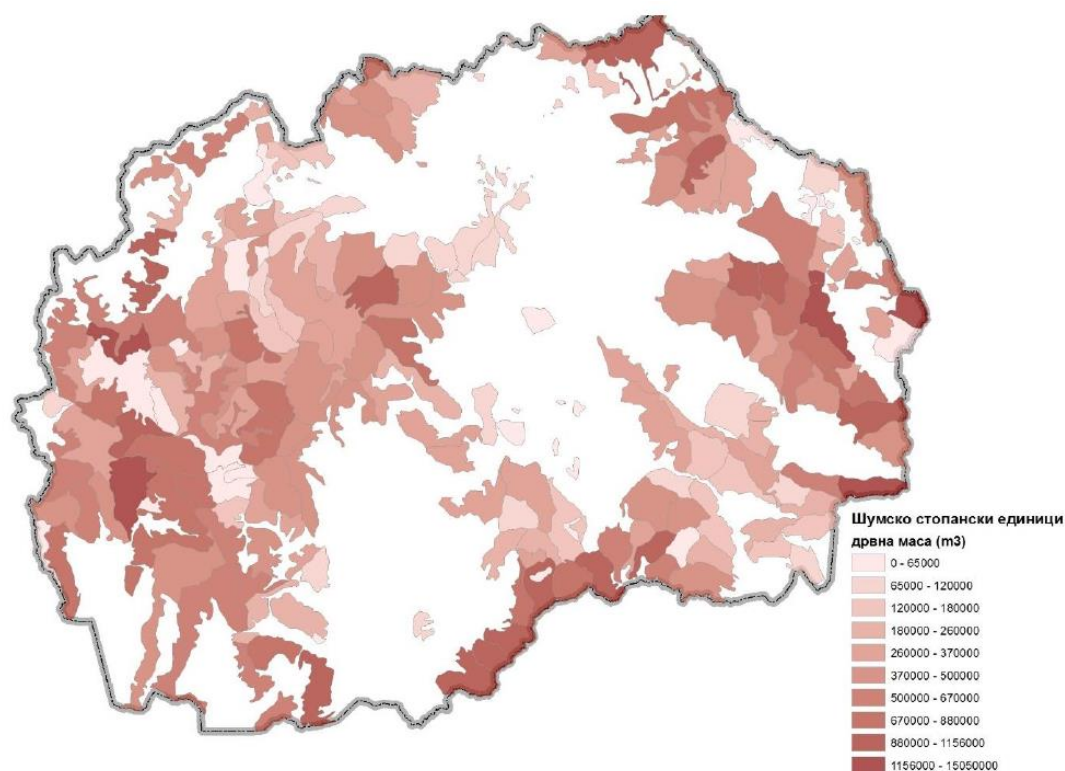


Figure 10. Forestry units in the Republic of Northern Macedonia (differences in colour indicate wood mass)
(Source: Report for "[Selection of ecosystem services, assessment and mapping of the capacity for their provision](#)", Nature Conservation Programme in North Macedonia - Phase 2, 2020)

Forest economic units are territorial units of forest and forest land covering forest complexes or parts thereof. Such a division is made for their purpose to have a defined area, wood mass, growth and other parameters that are used for more accurate and timely planning and recording, and for more efficient and sustainable forest management. The forestry unit is composed of smaller planning units, i.e., departments and subdivisions. The size of the departments has been determined legally to be up to 60 ha in high-stemmed plantations, and up to 100 ha in low-stemmed ones. The forestry unit covers forests of one owner or user with an area from 100 to 10,000 ha. As an exception, a forestry unit may be established from the forests of multiple owners and users, if together they do not own less than 100 ha of forests and forest land. In exceptional cases, the area of a forest economic unit can be over 10,000 ha, if it cannot be separated as a geographical unit, but not more than 15% of the legally determined area. In the national territory, over 190 forestry units have been defined, with new

special management plans or special harvesting plans and forest protection plans drafted every 10 years, in accordance with the Law on Forests and the Rulebook on the content of the Special Plan for private forest management over 30 ha, the manner of their preparation, adoption and approval.

Complete monitoring of forest habitats and the species living within (forest biodiversity) is not fully implemented, since monitoring is primarily aimed at detecting forest diseases and insects causing outbreaks and serious forest damage, i.e., it is mainly directed at the forest as a resource. This monitoring is performed by the Faculty of Forestry, University of St. Cyril and Methodius and the public enterprise National Forests. In the future, it is necessary to expand monitoring to also include the biodiversity aspect. In forest fires monitoring, a modern early warning and notification system has been implemented, under the authority of the Crisis Management Center.

3.5. Territorial organisation

In the total territory of North Macedonia is 25,713 km², there are 1,767 settlements, out of which 34 cities and 1,733 villages. The territorial organisation is based on local-self-government units (80 municipalities, out of which 33 are urban and 67 are rural), and the City of Skopje as a separate unit of local self-governance. North Macedonia is divided into eight statistical and planning regions: Eastern, North-eastern, Pelagonija, Polog, Skopje, South-eastern, Southwestern, and Vardar (Figure 11).



Figure 11. Map of Statistical Regions and Municipalities in North Macedonia (Source: MapsLand)

3.6. Demographic characteristics

The last census of the population and households was carried out in 2021. As per the 2021 Census, there were 1,836,713 citizens and 598,632 households.¹⁹ Compared to the 2002 Census, the total population has decreased by 185,834 inhabitants, representing a decline of 9.2%. An increase in the population was recorded in 13 of 80 municipalities, of which seven are municipalities that are part of the City of Skopje. The breakdown of the census is presented in Table 1. Much of the data from the 2021 Census is still being processed and is therefore not available for this report.

Table 1. North Macedonia: Basic Census Data 2021 (Source: State Statistics Office of the Republic of North Macedonia, see footnote 19)

Total	Male %	Female %	Macedonian %	Albanian %	Turkish %	Roma %	Others %
1,836,713	49.6	50.4	58.44	24.30	3.86	2.53	2.5

Based on a detailed analysis of age groups, the population is evidently aging, since the age group 0-14 decreased by 1.35% and the group of 65 years and older increased by 1.16%. The population density is 72 persons per km² and it is unevenly distributed and below the European

¹⁹ Data of the State Statistics Office of the Republic of North Macedonia. Census 2021 – General information [website]. Available at: <https://popis2021.stat.gov.mk/>. Accessed on 15 December 2022.

average of 124 inhabitants per km². The highest population density is in the Chair municipality of Skopje, covering an area of only 3 km² with a population density of 20,862 inhabitants per km², while the municipality of Novaci has the lowest density with 3.5 inhabitants per km². The majority of the population live in urban areas, 58.2%, as opposed to 49.8% in rural areas, with an average annual growth rate of 0.44%. The birth rate in the country for 2021 was 10.2 births per 1,000 people while the mortality rate was 15.5 per 1,000 inhabitants.²⁰ The current life expectancy for North Macedonia in 2022 is 75.7 years.²¹

3.7. Socio-economic profile

North Macedonia is a developing, upper-middle-income country with a small, open economy that is well integrated into international trade. The Human Development Index (HDI) for North Macedonia is 0.770, placing the country into the group of the countries with high human development, positioning it at 78 of 189 countries and territories.²² Between 2000 and 2019, North Macedonia's HDI value increased from 0.675 to 0.784, though "this trend started declining in 2020, as for most of the countries ranked in the HDI, dropping to 0,774 in 2020 and further plunging in 2021 to 0,770."²³ Its gross domestic product (GDP) for 2021 is calculated at USD 13.9 billion, with a per capita GDP of USD is 7,557.²⁴

According to the data, the at-risk-of-poverty rate in the Republic of North Macedonia in 2019 was 21.6%, meaning more than 436,000 North Macedonian citizens are suffering from poverty. Analysed by household types, the at-risk-of-poverty rate in households of two adults with two dependent children in 2019 was 19.3%. According to the most frequent activity status, the at-risk-of-poverty rate for employed persons was 8.5%, while for pensioners it was 7.7%. The Gini coefficient (a measure of income distribution inequality) was 30.7%.²⁵ The poverty rate is highest among households living on social assistance (90.6%), followed by those with incomes from agriculture (57.4%) and those with incomes from temporary work (57.3%).²⁶ About 9.1% of North Macedonian citizens live on less than two dollars a day, and in the past 15 years, a total of 600,000 citizens have chosen to emigrate. The richest 10% of the population in Macedonia control 34.5% of the country's wealth, while the poorest 10% of the

²⁰ Data of the State Statistics Office of the Republic of North Macedonia. Census 2021 – Key indicators [website]. Available at: <https://www.stat.gov.mk/KlucniIndikator.asp>. Accessed 15 December 2022.

²¹ World Bank [website]. Available at: <https://www.worldbank.org/en/country/northmacedonia/overview>. Accessed on 13 October 2022.

²² United Nations Development Program (UNDP) (2022). *Human Development Index 2022 – North Macedonia Pathway Through Uncertain Times*. Skopje, North Macedonia: UNDP North Macedonia.

²³ Ibid.

²⁴ Ibid., footnote 21

²⁵ Data of the State Statistics Office of the Republic of North Macedonia. Census 2021 – Standard of Living [website]. Available at: <https://tinyurl.com/22b2t68w>. Accessed 15 December 2022.

²⁶ Petrovska-Mitrevska, B. & Tuna, E. (2017). *Multidimensional Poverty Analysis Republic of Macedonia*. Skopje, Republic of Macedonia: Federation of Farmers of the Republic of Macedonia.

population only control 2.2 per cent of the wealth.²⁷ Following the COVID-19 pandemic, the unemployment rate decreased to 14.5%, though the youth unemployment rate remained high at 30.9%.²⁸

The policies for accelerated, inclusive and sustainable growth of North Macedonia are compatible with the EU accession process and the 2030 Agenda for Sustainable Development. This will be outlined in Section 6 on the policy context component of the Study.

North Macedonia is rich in natural resources, and the economy is mainly based on services, agriculture, food processing, lumber, mining, basic metals, tourism, textile industry. In 2020, the share of agriculture in North Macedonia's GDP was 8%, employing 15% of the active population. The agricultural sector is a very profitable business, with a net operating surplus reaching 51.7% of the total gross output, also due to widespread governmental subsidies. The industrial sector contributed to the GDP with approximately 22.35% and employing 31% of the active population; it includes chemical products, steel, machinery and textiles. The textile sector constitutes the main national industry (especially the leather industry), with textile production output being close to an all-time high in the last two decades. Following the COVID-19-induced global crisis, in 2020 industrial production volumes went down by 9.5%. The services sector contributed about 54.58% and employs more than half (53%) of the active population in the country. The main income sources come from transport, telecommunications and energy production (Figure 12. Share of economic sectors in the gross domestic product (GDP) from 2011 to 2021 (Source: Statista)).

²⁷ Borgen Project [website]. Available at: <https://tinyurl.com/2p9e4wav>. Accessed on 10 August 2021.

²⁸ World Bank [website]. Available at: <https://www.worldbank.org/en/country/northmacedonia/overview>. Accessed on 13 October 2022.

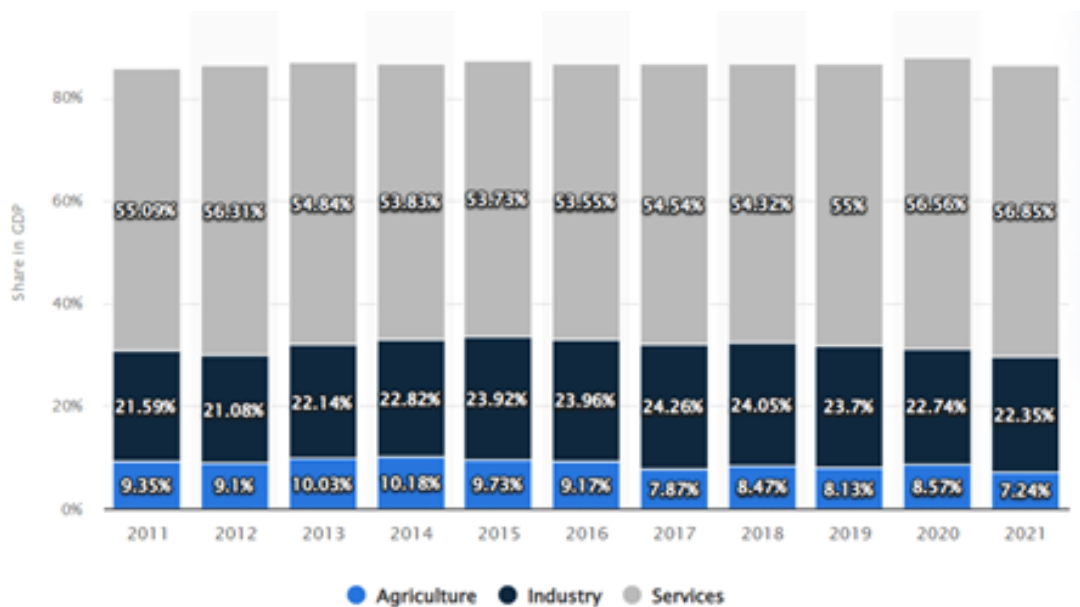


Figure 12. Share of economic sectors in the gross domestic product (GDP) from 2011 to 2021 (Source: Statista)

3.8. Biodiversity

North Macedonia occupies the central part of the Balkan Peninsula, one of the hotspots of European biological diversity.²⁹ According to the division of biomes in zone biome and orobiomes,³⁰ eight of the nine biomes occurring in the Balkans are found in the country: Mediterranean maritime woodlands and maquis, Mediterranean semi-deserts; sub-Mediterranean-Balkan forests; the orobiome of Balkan-Central-European forests; the orobiome of European forests of the taiga type; the orobiome of European high-mountain rocky grounds, tundra and pastures; the orobiome of Mediterranean forests on rocky grounds, and the orobiome of South Balkan mountain rocky grounds and arid pastures.

Progress in research in the recent period has been made in several biological diversity aspects. In 2016, the Study on Geodiversity and Geological Heritage of the Republic of North Macedonia and other components of nature (Biological and Landscape Diversity) was prepared, including relevant scientific data for these areas and also analysing landscapes for the first time. The study was prepared by national experts in coordination with the Ministry of

²⁹ Springer link [website] Kryštufek, B. & Reed, J. M. (2004). *Balkan biodiversity: pattern and process in the European hotspot*. Springer Verlag, 357 pp. Available at: <https://link.springer.com/book/10.1007/978-1-4020-2854-0> Accessed on 19 June 2021.

³⁰ Lopatin, I.K & Matvejev, S.D. (1995). *Zoogeography, Principles of Biogeography and Ecology of the Balkan Peninsula (distribution of biomes, distribution laws, elements of flora and fauna*. University textbook. Ljubljana, Slovenia: University of Ljubljana.

Environment and Physical Planning (MEPP) and was used as the scientific basis for the preparation of the National Strategy for Nature Protection.³¹

Over 100 species new to science have been described in the Republic of North Macedonia, as well a large number of new flora and fauna records. Additionally, many new phytocenoses have been described. The scientific papers on the spread and ecology of alien species in the aquatic and land ecosystems are also of note. All these scientific achievements are the result of different projects, especially valorisation studies for the designation of new protected areas. Among the monographs, we should mention the ground beetle species catalogue (Coleoptera, Carabidae), as well as the monograph on spiders in the Osogovo Mountains. The Macedonian Academy of Sciences and Arts issues the “Flora of the Republic of North Macedonia”, which outlines the systematic research of vascular plants on the territory of the Republic of North Macedonia.

When speaking of biodiversity data, despite many years of effort, a National Information System for Nature is yet to be established. Activities which will help in the establishment are underway. A Draft Rulebook for the Establishment of a National Information System for Nature has been prepared (to be adopted when the new Law on Nature enters into force), as well as a Draft Rulebook for the exchange of biological diversity data. Technical and software support is required for its establishment. A regional Biodiversity Information Management and Reporting Guide was prepared in cooperation with the Open Regional Fund for Biodiversity, aimed at improving institutional capacities so that they are in accordance with the reporting requirements to the Convention on Biological Diversity and other EU requirements (e.g., the Natura 2000 network), through the development of regional guidelines.

3.8.1 Species

The border area between North Macedonia and Greece (Pelister, Kajmakchalan and Kozhuf) and the border area between Macedonia and Albania (Shar Planina and Korab) have been identified as exceptionally rich in endemic taxa.³² A smaller share of the rich Balkan underground fauna is represented in Macedonia, especially in the western limestone mountains. Estimation of the number of species present in North Macedonia was stipulated

³¹ Ministry of Environment and Physical Planning (2018). [National Strategy for Nature Protection \(2017-2027\)](#). Skopje, North Macedonia: Ministry of Environment and Physical Planning.

³² Stevanović, V., Tan, K. & Petrov, A. (2007). Mapping the endemic flora of the Balkans - a progress report. *Bocconea*, 21, 131-137. [DOI: 10.7320/Bocconea](https://doi.org/10.7320/Bocconea)

with the National Biodiversity Strategy and the Action Plan 2018–2023, listing a total of 21,889 species (Table 2)³³.

Table 2. Estimation of the number of species in North Macedonia (Source: Ministry of Environment and Physical Planning, see footnote 33)

Flora	Mammals	Birds	Amphibians and reptiles	Freshwater fish	Freshwater algae	Lichens	Fungi	Invertebrates	Total:
3,500 (4,540 taxa)	85	334	46	85	2,095	450	2,000	13,379	21,889

There are 976 species of plants and animals that are endemic to the country, 870 of which are considered local endemics. Of these endemic species, 150 are algae, 120 are vascular plants, 700 are invertebrates, and 27 are fish. Lake Ohrid is one of the main centres for endemic species in the country, along with Galičica, Jakupica-Karadzica, Korab and Pelister, and the Shar Mountains.³⁴

The genetic diversity of wild species in North Macedonia is insufficiently documented. Genetic research of wild species has been generally targeted at determining phylogenetic (relational) links between species. Most often, such research is carried out for species complexes in Ohrid and Prespa Lakes. There are no systematic studies of genetic diversity in the sphere of flora, except that 600 species of angiosperm plants have been cytologically described. Concerning fauna, several systematic groups have been researched to clarify the taxonomic status of the “species” and their phylogenetic relations (trout, amphipod and isopod crayfish). So far, activities for the conservation of genetic diversity of wild fauna has not been carried out.³⁵

Succession of habitats due to depopulation of rural areas as a result of economic changes on one hand and intensification of agricultural production on the other also threatens many habitats. Forest fires are one of the root causes for modification of habitats – in the period between 2015 and 2019, forest fires destroyed a total of 41,166 ha that was characterised with high diversity and/or presence of species characteristic for Mediterranean coastal forests and the maquis biome. Almost all rivers are under strong direct and indirect anthropogenic

³³ Ministry of Environment and Physical Planning (MEPP) (2018). [National Biodiversity Strategy and Action Plan for the period 2018-2023](#). Skopje, North Macedonia: MEPP.

³⁴ United Nations North Macedonia (2020). [Sustainable Development Goals Voluntary National Review](#). Skopje, North Macedonia: UN North Macedonia.

³⁵ Ibid., footnote 33

pressures (e.g., reservoirs and small hydropower plants built on some rivers). Other contributing factors to the loss of habitat and therefore genetic biodiversity include global economic and financial crisis, poverty, unsustainable hunting and fishing practices, unsustainable/uncontrolled collection of wild plants and fungi species, illegal logging, etc.

According to the latest scientific research and the detail of the data on the distribution of species, for some taxonomic groups, such as amphibians and reptiles, patterns of spatial distribution were determined, determining the richness of the diversity of amphibians and reptiles in the regions of Northern Macedonia. The spatial distribution patterns can be analysed through the species richness of a particular class and diversity hot spots of threatened species of amphibians and reptiles at the national level.³⁶

Through GIS sum raster analysis of amphibian species richness, high density regions for this class are: Prespa, Ohrid, Drim River valley, Mt Baba, Pelagonija plain, Mariovo, Kozhuf, Mt. Kavadarci region, Vardar River valley from Gevgelija to Demir Kapija, Dojran, Strumica plain, Mt. Ograzden, Bregalnica River, Mt. Malesevski, Mt. Osogovo, Ovce Pole and Stip, Slavisko Pole plain, Kumanovo, Mt. Skopska Crna Gora, Skopje plain, Mt. Shar, Mt. Korab, Mt. Bistra, Mt. Desat, Mt. Jablanica, and the Jakupica massif (Figure 13).

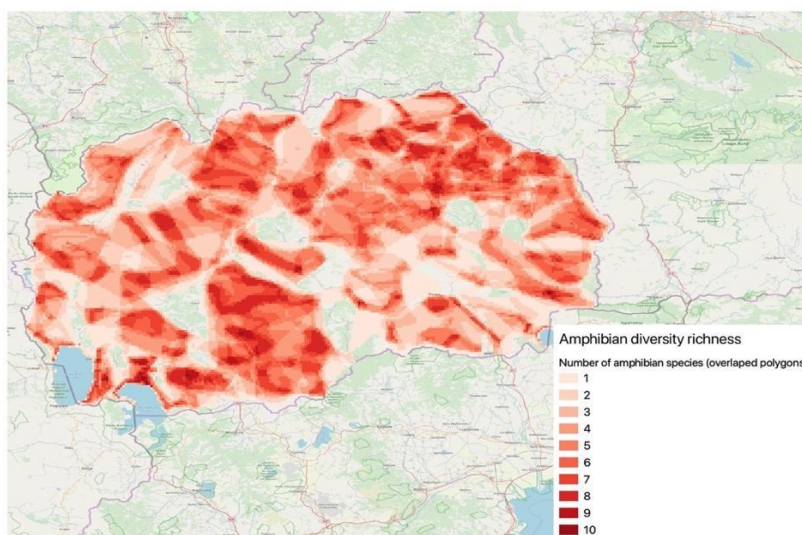


Figure 13. Amphibian diversity richness by the number of amphibian species (sum of overlapped species polygons) (Source: National Red List assessment, see footnote 36)

³⁶ Sterijovski, B., & Arsovski, D. (2020). National Red List assessment. Final report. Skopje, North Macedonia: GEF.

The situation is different, though, for reptiles. The diversity richness with the highest number of taxa is found in the Ohrid and Prespa regions, followed by the Mariovo region in the southeast. The Gevgelija and Dojran regions also show high numbers of overlapped species polygons. The highest density is recorded in the central and eastern parts of the country in the regions Veles, Ovce Pole and Slan Dol, Stip, Kocani plain, Strumica plain, with southern parts of Mt. Ograzden (Figure 14).

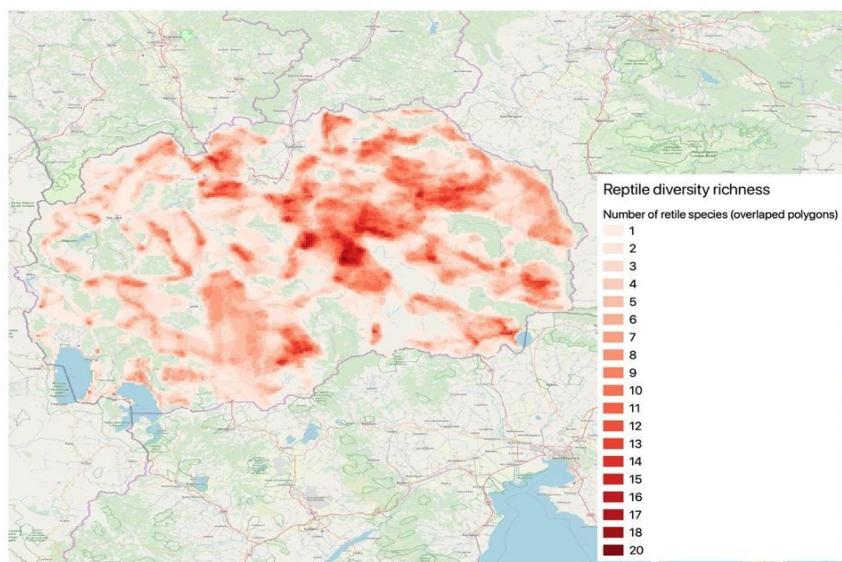


Figure 14. Reptile diversity richness by the number of amphibian species (sum of overlapped species polygons)
(Source: National Red List assessment, see footnote 36)

Similar surveys should be conducted for other taxonomic groups and to determine species hot spots at the national level.

3.8.2 Habitats and land use

A total of 28 basic sets of habitats have been identified in North Macedonia, including 177 habitat types at level 3 of the European Nature Information System (EUNIS). Some of these habitats are of anthropogenic origin, but still have significance for biological diversity and are therefore part of this classification. The number of generalised ecosystem types reflects the great ecosystem diversity in North Macedonia (Table 3).³⁷

³⁷ Ministry of Environment and Physical Planning (MEPP) (2018). [National Biodiversity Strategy and Action Plan for the period 2018-2023](#). Skopje, North Macedonia: MEPP.

Table 3. Generalised ecosystems in the territory of North Macedonia (Source: Ministry of Environment and Physical Planning, see footnote 37)

1. Lake ecosystems (ecosystems of surface standing water bodies, including accumulations, larger ponds and glacial lakes)	15. Anthropogenic scrub ecosystems
2. River ecosystems (ecosystems of surface running water bodies, including streams)	16. Deciduous Forest ecosystems (broadleaved woodlands)
3. Mountainous peaty ecosystems (acid peats)	17. Coniferous Forest ecosystems
4. Mountainous fen ecosystems (base peats)	18. Mixed deciduous and coniferous forest ecosystems
5. Marsh and swamp ecosystems (including saline marshes)	19. Cave ecosystems (including water bodies therein)
6. Ecosystems of dry montane grasslands	20. Rocky and stone-ground ecosystems (including rocks, rocky terrains and screes)
7. Ecosystems of mesophilous and seasonally wet grasslands and meadows	21. Ecosystems without or with sparse vegetation (including eroded areas)
8. Ecosystems of mountainous grasslands (including subalpine and alpine grasslands, as well grasslands on rocky grounds)	22. Farming agro-ecosystems
9. Saline steppe ecosystems	23. Aquatic agroecosystems (fishponds)
10. Alpine dwarf scrub ecosystems	24. Urban ecological systems
11. Alpine scrub ecosystems	25. Ecological systems of rural settlements
12. Degraded Forest ecosystems (including pseudomacquis, arborescent matorral, Thermo-Mediterranean thickets and garrigues)	26. Ecological systems of mining and industrial excavations
13. Ecosystems of phrygana and hedgehog-heaths	27. Ecological systems of entirely artificial water bodies
14. Riparian and fen scrub ecosystems	28. Ecological systems of waste deposits and landfills

According to EUNIS, all habitat groups of the first level under EUNIS classification are represented in North Macedonia, except marine habitats (A and B):

- C: Inland surface waters;
- D: Mires, bogs and fens;
- E: Grasslands and lands dominated by forbs, mosses and lichens;
- F: Heathland, scrub and tundra;
- G: Woodland, forest and other wooded lands;
- H: Inland unvegetated or sparsely vegetated habitats;
- I: Regularly or recently cultivated agricultural, horticultural and domestic habitats;
- J: Constructed, industrial and other artificial habitats, and
- X: Habitat complexes.

Construction of infrastructure facilities at the state level is also of concern and our recommendation is that strong emphasis should be placed on the assessment of the strategic environmental impact and taking appropriate protection measures. The assessment is used to evaluate the status of ecosystems, which affects their capacity to provide ecosystem services. The capacity of ecosystems directly depends on the physical, chemical and biological state of an ecosystem at a given point in time. These parameters are controlled by natural factors and anthropogenic pressures. In this regard, the impact of natural disasters and implementation of NbS measures can best be measured through the condition of ecosystems.

The condition of ecosystems was assessed for whole country including natural and semi-natural ecosystems, and artificial reservoirs (a total of six types or 15 subtypes of ecosystems).³⁸ The condition was not assessed for anthropogenic ecosystems (urban ecosystems and agricultural ecosystems). The assessment of the condition of different types of ecosystems uses qualitative or quantitative information on the structure and function of ecosystems and the impacts of drivers of change. To make the assessment more objective, it also contains additional information indicating connections to dwellings or other functionalities, and information on drivers and pressures that reduce the capacity of ecosystems to provide services. For these purposes, all available data were used, especially from national sources, to encompass the variability of the condition of the ecosystem within the country (Figure 15).

³⁸ Swiss Development Corporation (SDC) (2020). Selection of ecosystem services, assessment and mapping of the capacity for their provision. Skopje, North Macedonia: SDC.

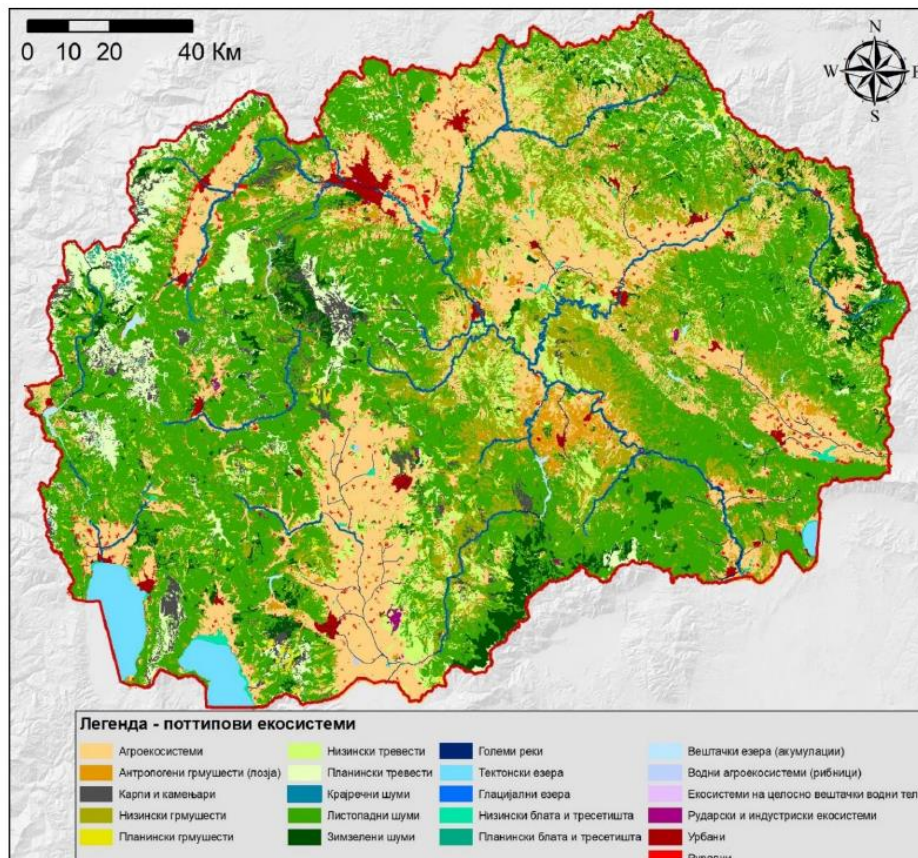


Figure 15. Map of types and subtypes of ecosystems in North Macedonia (Source: SDC, see footnote 38)

3.8.3 Protected areas

The system of protected areas includes 82 areas, covering an area of 357,778.05 hectares or 13.92% of the territory of the Republic of Northern Macedonia. The Law on Declaring Part of Shar Mountain as a National Park was adopted in 2021, and increased the share of protected areas at the national level from 10.8% to 13.3% of the national territory.

National parks cover about 6.91% of the territory, followed by natural monuments (3.0%), while all other categories of protected areas cover 4.01% of the territory. Progress has been achieved and 11.5% of the national territory by 2020 was declared as protected area, as stipulated by the 2004 Sector Study for the Protection of Natural Heritage, prepared for physical planning purposes.³⁹

³⁹ Agency for Spatial Planning (2004). *Spatial Plan of the Republic of Macedonia: Spatial Planning Strategy*. Skopje, North Macedonia: Agency for Spatial Planning.

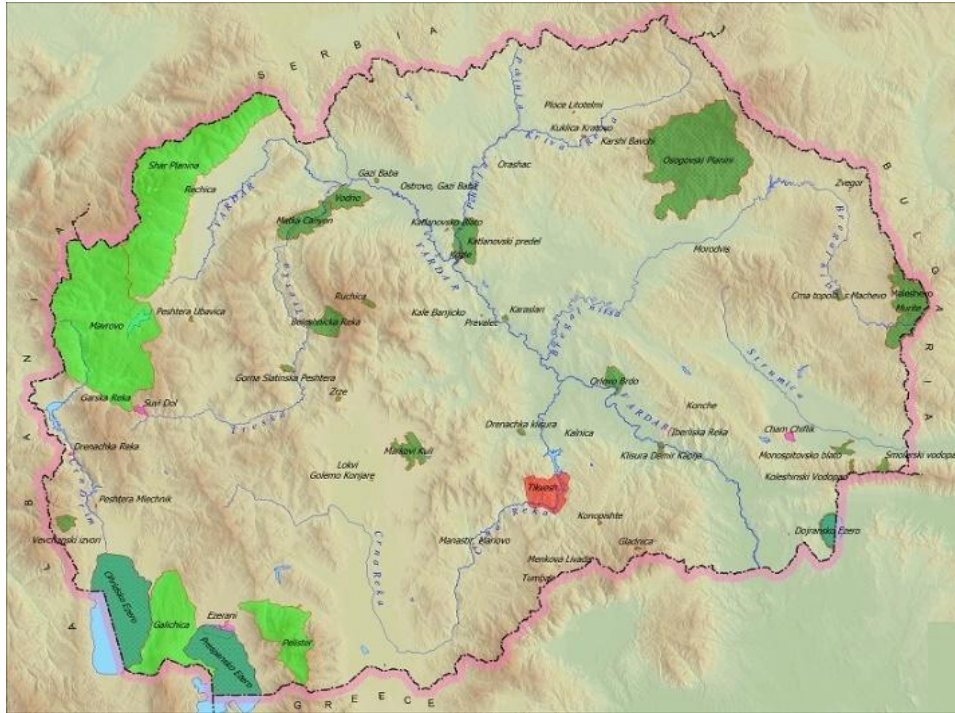


Figure 16. Distribution of protected areas in the Republic of North Macedonia as of 2021 (Source: Ministry of Environment and Physical Planning, see footnote 37)

In North Macedonia, three sites are designated as Wetlands of International Importance (Ramsar Sites): Lake Prespa (1995; 18,920 ha), Lake Dojran (2008; 2696 ha),⁴⁰ and Lake Ohrid (2021; 25,205 ha).

Furthermore, Lake Ohrid is a Nature Monument (1979) enlisted as a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site, while the site Dlaboka Reka in Mavrovo National Park is inscribed on the UNESCO List of Beech Forests (2021). In 2004, two Nature Monuments – Markovi Kuli and the Slatino Source Cave – were placed on the tentative list of UNESCO. In 2014, the Ohrid-Prespa Transboundary Biosphere Reserve was designated as part of the UNESCO Criterion of Human and Biosphere Programme.

3.8.4 Payment for ecosystem services

During the last decade, the issue of payment for ecosystem services (PES) has gained continuous attention on policymaker agendas, and in the research and academia spheres. Initially, various best practices and case studies globally and from the broader region were presented to policymakers and practitioners in the country, aiming to capture the potential

⁴⁰ Ramsar [website]. Available at: <https://www.ramsar.org/wetland/north-macedonia>. Accessed on 20 April 2021.

lessons-learnt and appropriate approaches for the Macedonian context. Accordingly, the first steps were initiated through stand-alone interventions within the comprehensive framework of natural resources projects e.g., Lake Prespa and Lake Ohrid projects. Consequently, with the advancement of the EU approximation and integration process and the ratification of international conventions and mainstreaming the global sustainable development mechanisms into the national normative and institutional frameworks, the PES concept was profiled as one of the key principles for the sustainable management of nature and its resources.

At present, there is a definition of ecosystem services in the Republic of North Macedonia in several categories (support, supply, regulatory and cultural), creating a solid foundation for further adjustment of the specific functions of each category. Nevertheless, despite these attempts, the application of the concept of ecosystem services in ecosystem management remains modest. Several project initiatives were included as part of larger programmes in which PES is piloted (Programme for nature conservation in Macedonia – Phase II 2017 – 2020⁴¹, and the GEM Balkans - Creating conditions for the development of forest and catchment areas in the Balkans⁴²), or PES concepts were developed within projects (Private Forests for Positive Changes in the Polog Planning Region⁴³, Project for the modernisation of agriculture⁴⁴, Ezerani Nature Park), or PES feasibility studies and strategies are prepared (Local Environmental Action Plan of the City of Skopje (2020–2026),⁴⁵ “BLUE and GREEN versus BLACK and GRAY” Project (Study: Integrated Ecosystem Approach for the Lake Ohrid Basin as a Tool for Conservation and Protection of Natural Resources).⁴⁶ Within the framework of the Global Environment Fund (GEF) Drin Project,⁴⁷ the ecosystem services of Lake Ohrid were evaluated, and the total value of the ecosystem services of the Lake Ohrid watershed in 2017 was estimated at USD 295.1 million. The unit value per area, taking into consideration the entire watershed area, was USD 2,102/ha. Within this, the value of services of Lake Ohrid was USD 63.3 million or 21.4% of the total value; the value of services of forests, protected and agriculture areas within the watershed was USD 35.52 million (12% of the total economic

⁴¹ Macedonian Ecological Society [website]. Available at: <https://mes.org.mk/blog/programa-za-zachuvuvane-na-priodata-vo-makedonija-faza-ii/>. Accessed on 08 August 2020.

⁴² GeMBalkans [website]. Available at: <https://tinyurl.com/ycxy3yc7>. Accessed on 08 August 2020.

⁴³ Redford Centre [website]. Available at: <https://refordcentre.org/projects/>. Accessed on 08 August 2020.

⁴⁴ Ministry of Agriculture, Forestry and Water Economy (MAFWM) (2019). *Agriculture Modernization Project. Environmental management framework and social aspects*. Skopje, North Macedonia: MAFWM.

⁴⁵ City of Skopje (2020). *Local environmental action plan for the period 2020-2026: Leap 3 of the city of Skopje*. Skopje, North Macedonia: City of Skopje.

⁴⁶ Local Development Agency – Struga, Euro Partners Development (2016). *Integrated Ecosystem Approach for the Lake Ohrid*. Struga, North Macedonia: Local Development Agency – Struga, Euro Partners Development.

⁴⁷ Drincorda [website]. Available at: <http://drincorda.iwlearn.org/>. Accessed on 10 November 2022.

value); and the value of services related to the entire watershed was USD 196.55 million or 66.6% of the total value.⁴⁸

Accordingly, there is a need to introduce specific normative frameworks for PES, and to define the ecosystem services market and beneficiaries. In the creation of a normative framework for PES, regulations must be based on concrete experiences that have proven to be successful in the region and the country. Alongside the existing normative framework for PES mainstreaming, the capacities of national and local authorities, and of the users of environmental services, are weak. The responsible authorities cannot identify which services can be sustainably provided to users and the users of environmental services cannot recognise the cost of the services and are not willing to pay for them. With regards to forest ecosystem services, until now very limited efforts were made either to promote the protective functions of forests or to promote forest products and services sustainably, since there is still no market-oriented ecosystem service. Furthermore, the forestry planning system does not apply the ecosystem approach, leading not only to the provision of services and payment for them, but also to an increase in forest biodiversity and its protection. Furthermore, PES is not mainstreamed in other sectors where ecosystem services can potentially be utilised e.g., climate change, DRR, smart agriculture, sustainable water management, etc.

The Nature Conservation Programme in North Macedonia was supported by MEPP in the preparation of mechanisms for the PES, including methodology and instructions for application of the mechanism for payment for ecosystem service. At the national level, a selection of ecosystems and country-wide mapping has been carried out. Work is being done on determining the ecosystem status, and plans are in place to develop a pilot mechanism for the payment of ecosystem services. A brochure for ecosystem services has been prepared and a long-term plan made for strengthening of capacities of all stakeholders for ecosystem services. As part of plan implementation, training modules are being carried out for stakeholders about issues related to ecosystem services. Furthermore, the payment mechanism for ecosystem services will be introduced, as the first in one pilot area, with the possibility of replicating it in other protected areas in the country.

3.8.5 Pressures on the biodiversity and ecosystem services

Areas of biodiversity and ecosystem services, as well as nature, are exposed to chronic stresses and acute shocks. Predominantly, these pressures are of anthropogenic origin,

⁴⁸ Global Water Partnership Mediterranean [website]. Available at: <https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2021/valuing-lake-ohrid/>. Accessed on 16 November 2022.

though threats can also come from other sources. As per the United Nations Economic Commission for Europe (UNECE) *Third Environmental Performance Review*,⁴⁹ pressures on species and ecosystems can be classified as follows:

- Land intake (urbanisation, transport infrastructure development, open-pit mineral exploitation);
- Development of energy installations and infrastructure (construction of reservoirs in river gorges, small hydropower plants);
- Habitat fragmentation and human-made barriers for migratory species caused by transport infrastructure projects;
- Logging and deforestation;
- Acidification;
- Eutrophication;
- Desertification;
- Intensified agriculture;
- Hunting and fishing;
- Collection of non-wood forest products;
- Tourism;
- Climate change;
- Living modified organisms and genetically modified organisms.

The National Biodiversity Strategy and the Action Plan for the period 2018–2023 identifies several root causes and 17 threats to biological diversity (Table 4)⁵⁰. All identified threats to biological diversity in North Macedonia have been grouped into 13 main sectors/areas as presented in Table 5.

Measures for conservation or restoration have to be undertaken for critical ecosystems that deliver important services. Certainly, conservation is preferred to revitalisation, which is usually more expensive and more time consuming. Activities aimed at reducing the pressures on ecosystems, such as those in the agriculture and forestry sectors will facilitate spontaneous restoration of part of the degraded ecosystems. In certain cases, however, well designed and coordinated activities and measures will be required to restore their functions, i.e., the services they deliver. Efforts towards restoration should be focused primarily on ecosystem services that have key or critical impact on human well-being. Involving stakeholders in the activities to

⁴⁹ United Nations Economic Commission for Europe (2019). [North Macedonia Environmental Performance Reviews Third Review](#). Geneva, Switzerland: United Nations Economic Commission for Europe.

⁵⁰ Ministry of Environment and Physical Planning (MEPP) (2018). [National Biodiversity Strategy and Action Plan For the period 2018 – 2023](#). Skopje, North Macedonia: MEPP

identify key ecosystem services and implementing activities for the revitalisation of ecosystems delivering them, will also contribute to more equitable access to ecosystem services. Revitalisation of these ecosystems will additionally contribute to the conservation of biological diversity in the country.

Table 4. List of priority threats to biological diversity with explanations and root causes for threat endurance
(Source: Ministry of Environment and Physical Planning, see footnote 50)

#	Root Causes	Threats
1	Inadequate policies – in the past and the present	Abandonment/lack of mowing
		Abandonment of pastoral systems, lack of grazing
2	Lack of economic policies; inconsistent law enforcement and procedure implementation; unsustainable development; inadequate planning	Open-cast mining
3	Lack of law enforcement and procedure implementation; inadequate planning	Continuous urbanisation
4	Lack of law enforcement and procedure implementation; lack of awareness	Disposal of municipal waste
5	Lack of law enforcement and procedure implementation	Disposal of industrial waste
6	Poverty, lack of law enforcement; low awareness; markets	Trapping, poisoning, poaching
7	Low capacity of institutions; inadequate policies; insufficient funding	Missing or poorly directed conservation measures
8	Lack of law enforcement and procedure implementation	Groundwater pollution by leakages from waste disposal sites
9	Lack of knowledge, lack of awareness, law enforcement	Diffuse groundwater pollution due to agricultural and forestry activities
10	Lack of law enforcement, low awareness	Burning down existing vegetation
11	Lack of law enforcement; unsustainable development; policies	Reservoirs
12	Lack of planning	Surface water abstractions for agriculture
13	Lack of law enforcement, unsustainable development, economic policies	Surface water abstractions for hydropower generation

14	Inadequate policies in hunting; lack of awareness; poverty	Reduction of prey availability (including carcasses)
15	Climate change	Temperature changes
		Droughts and lower precipitation

Table 5. Analysis of threats by sectors/areas (Source: Ministry of Environment and Physical Planning, see footnote 50)

Sector/area	Sum of scores	Number of threats by priority			
		I	II	III	IV
A. Agriculture	155.5	2	5	13	12
B. Silviculture, forestry	72.5	0	5	5	3
C. Mining, extraction of materials and energy production	77.5	1	3	8	0
D. Transport and service corridors	84	0	5	7	6
E. Urbanization, residential and commercial development	105.5	3	5	6	1
F. Other use of biological resources except agriculture and forestry	103.5	1	4	8	8
G. Intrusion and disturbance by man	175	1	6	20	6
H. Pollution	182.5	2	13	10	1
I. Invasive, other problematic species and genes	23.5	0	1	2	1
J. Modification of natural systems	230.5	5	13	13	9
K. Natural biotic and abiotic processes (without disasters)	122	0	5	14	2
L. Geological events, natural disasters	26.5	0	2	2	4

The first National Red List of Threatened Species was published in 2019,⁵¹ identifying that almost half of amphibians and reptiles are threatened with extinction and four vascular plant species were Critically Endangered in North Macedonia. In 2020, this process continued as a National Red List for fungi and large carnivores. In the biodiverse and endemically rich North Macedonia, extinction risk for over 1,100 species has been assessed on a global scale, resulting in 110 species being listed as threatened on the global IUCN Red List of Threatened Species™. However, many species face a higher local extinction risk within North Macedonia than at the global level.

The current rate of species extinction worldwide is already a hundred times higher than in the pre-industrial era. This accelerated loss of biodiversity is caused not only by climate change but also by other anthropogenic factors, such as: population growth, land cover changes and land use land, the exploitation of certain species to the exclusion of others, the felling of forests, introduction of non-native species, as well as soil pollution and the degradation of water and air. Recent reports from the Intergovernmental Panel on Climate Change confirm that a high percentage of the world's species will be at increased risk of extinction if no action

⁵¹ National Red List of Macedonia [website]. Available at: <http://redlist.moepp.gov.mk/>. Accessed on 20 July 2021.

is taken to mitigate the risk and to adapt to climate change. Higher temperatures, droughts, floods and other extreme weather events already endanger the habitats and survival of many plants and animals. Increased temperature change affects the time of reproduction and migration of plants and animals, their distribution, length of the growing season, and the occurrence of diseases and pests. Without implementing measures to mitigate and adapt to climate change, there are estimates that more than a quarter of all land types will be at risk by 2050. In addition, researchers have pointed out that the loss of biodiversity in itself will accelerate climate change. Loss of biodiversity will reduce the productivity of existing ecosystems that have evolved and adapted to the local climate. The calculation of the consequences of such losses on ecosystem productivity is a major challenge that requires the development of new methodologies and tools. Data are still lacking on effective modelling and vulnerability assessment. Some of the recommended measures to adapt and mitigate the negative effects of climate changes in biodiversity are:

- more sustainable land use and management,
- better coordination and management of protected areas,
- comprehensive water management strategies, and
- use of renewable energy sources.⁵²

At the ecosystem level, in 2017 the European Commission (EC) initiated the European Red List of Habitats,⁵³ assessing a total of 490 habitats across 35 countries in Europe to determine their risk of collapse. This assessment, benefiting from the knowledge and expertise of over 300 experts, included relatively complete datasets from North Macedonia. While a systemic overview of North Macedonia is not available, it is possible to check each habitat for its presence. For example, the habitat type Alpine and subalpine calcareous grassland of the Balkan and Apennines (listed as Least Concern) is present in North Macedonia, though it is declining in both quantity and quality (Table 6). Data are often incomplete in terms of the amount of coverage. For example, both Eastern Mediterranean base-rich screes and Temperate high-mountain base-rich inland cliffs are listed as present in North Macedonia, yet data are missing as to the actual land cover under these habitat types.

⁵² Ministry of Environment and Physical Planning (MEPP) (2018). [National Biodiversity Strategy and Action Plan for the period 2018 – 2023](#). Skopje, North Macedonia: MEPP.

⁵³ European Union (EU) (2016). *European Red List of Habitats Part 2. Terrestrial and freshwater habitats*. Luxembourg, Luxembourg: EU.

Table 6. Example of a factsheet entry into the European Red List of Habitats showing the presence, coverage and trends of Alpine and subalpine calcareous grassland in EU28+ countries (Source: Eionet, [European Red List of Habitats](#))

EU 28+	Present or Presence Uncertain	Current area of habitat (km ²)	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Albania	Uncertain	Unknown	-	-
Bosnia and Herzegovina	Present	1,300	Decreasing	Decreasing
North Macedonia	Present	690	Decreasing	Decreasing
Kosovo	Present	Unknown	Decreasing	Decreasing
Montenegro	Uncertain	Unknown	-	-
Serbia	Uncertain	Unknown	-	-

Furthermore, the *Third National Report on Climate Change*⁵⁴ identified 18 habitats and 58 plant species that are vulnerable to climate change. An overview of the vulnerability of plant species shown based on different vegetation belts is given below.

- **Lowland belt.** Various impacts are possible – a decrease of humidity in the habitat, increase of temperature, drying of habitats, etc. The following species are most vulnerable: *Thymus oehmianus*, *Ramonda nathaliae*, *Ramonda serbica*, *Adiantum capillus-veneris*, *Drosera rotundifolia*, *Blackstonia perfoliata*, *Cladium mariscus*, *Carex elata*, *Marsilea quadrifolia*, *Salvinia natans*.
- **Mountain belt.** The increase in temperature will lead to shorter snowpacks lasting on the mountains, which are without a typical alpine belt (<2,300 m in elevation – Galichica, Bistra, Jablanica, and others). Changed ecological conditions in the sub-alpine region will affect the species that grow around the melting snow patches. Such species are Macedonia high mountain local endemic floristic species: *Crocus cvijichi* (Galichica), *Colchicum pieperianum* (Bistra), *Fritillaria macedonica* (Jablanica and others), *Ranunculus degenii*, *Saxifraga stellaris subsp. alpigena*, *Sphagnum spp.*, *Crocus scardicus*, *Crocus pelistericus*, *Trollius europaeus*, *Salix retusa*, *Salix reticulata*, *Salix herbacea*, *Salix Alpina*, *Rhododendron myrthifolium*, *Pedicularis ferdinandi*, *Rhododendron ferrugineum*, *Empetrum nigrum*, *Loiseleuria procumbens*,

⁵⁴ Ministry of Environment and Physical Planning (MEPP) (2014). *Third National Communication on Climate Change*. Skopje, North Macedonia: MEPP.

Dryas octopetala, *Listera cordata* (due to spruce forest decline and dieback), *Ranunculus degenii* (Mt. Shar) *Silene pusilla*, *Sphagnum species* (water capture).

- **Dojran Lake.** These changes particularly affect the common reed (*Phragmites australis*) zone and other aquatic macrophyte vegetation (the association *Myriophyllo-Nupharetum* is completely extinct). Vulnerable plant species are *Nuphar lutea*, *Nymphaea alba*, and *Salvinia natans*.
- **Prespa Lake.** Endangered plant species are: *Aldrovanda vesiculosa*, *Salvinia natans* and *Trapa natans*.
- **Ohrid Lake.** Endangered plant species are: *Carex elata*, *Senecio paludosus*, and *Ranunculus lingua*.

3.9. Disaster risk profile

The Republic of North Macedonia is exposed to the impacts of both natural and human-made hazards, such as floods, forest fires, droughts, earthquakes, landslides, weather-related events, etc. Floods are the most frequent and with the greatest intensity and magnitude, forest fires are increasing in intensity, while earthquakes have the greatest impact on the state and its citizens, in terms of loss of human life and material damage (Table 7).

Based on the analysis of major disastrous events that happened during the last three decades, it can be seen that floods dominate the disaster risk profile, followed by extreme temperatures, wildfires, and earthquakes. As per the *Global Facility for DRR*, for floods the average population affected each year is about 70,000, and the annual affected GDP is USD 500 million, while for earthquakes, the annual average population affected is 40,000 and the annual affected GDP is USD 200 million.⁵⁵ Based on the available data (Table 8), there were 79 human casualties from twelve disasters, 1.45 million inhabitants were affected in 21 disasters and only eight disasters had a price tag of USD half a billion. During this period, most human casualties were during the Skopje August 2016 Torrential Flood (22), wildfires in July 2007 affected almost half of the population (1,000,000 inhabitants) and the 1995 floods caused the highest damages of USD 245 million. Additionally, numerous small-scale disastrous events are chronically pressuring the resilience texture of society and the communities utilising their finite resources.

⁵⁵ Global Forum for Disaster Reduction and Recovery [website]. Available at: <https://www.gfdrr.org/en/publication/disaster-risk-profile-macedonia>. Accessed on 14 September 2020.

Table 7. Degree of the security threats in the territory of North Macedonia (Source: This table is created by the author of this study⁵⁶)

FIRST DEGREE		NO RISK (Regular situation)	
SECOND DEGREE		LOW RISK (Regular situation with rarely manifested occurrences of threat)	Landslides, rockfalls Pollution of air, water and soil Epidemics of infectious diseases of humans and animals
THIRD DEGREE		INCREASED RISK (Potential start of a crisis or a crisis situation)	Floods Fires Earthquake Extreme weather events
FOURTH DEGREE		HIGH RISK (Probability of a start of a crisis or a crisis situation)	
FIFTH DEGREE		HIGHEST RISK (Threat to vital values and conditions for declaration of a crisis or a crisis situation are established)	COVID-19 pandemic Migrant/refugee crisis

Table 8. Review of major disastrous events in North Macedonia during the period 1990 – 2018 (Source: This table is created by the author of this study⁵⁷)

No.	Date	Disaster type	Total deaths	Population affected	Total damages (USD '000)	Source
1	07. 1995	Flood	/	1,500	245,000	2
2	08. 2000	Wildfires	/	/	13,563	2
3	01.12.2001	Extreme temperatures	15	/	/	1
4	2001	Drought	/	/	14,111	4
5	08.03.2003	Flood	2	4,000	/	1
6	01.07.2004	Extreme temperatures	15	/	/	1
7	04.06.2004	Flood	/	100,000	5.661	1
8	01.01.2005	Storms	1	/	/	1
9	04.08.2005	Flood		2,000	/	1
10	07.2007	Wildfires	1	1,000,000	/	1

⁵⁶ Assessment of security threats in the Republic of North Macedonia was conducted in accordance with Article 6 of the Regulation on the methodology for preparation of the assessment of security threats in the Republic of Macedonia from all risks and hazards, its structure and content, modality of keeping and updating, and the identification of the entities of the crisis management system for delivery of complete or a part of the assessment (Official Gazette of the Republic of Macedonia 13/11).

⁵⁷ Prepared by the author using the following data: 1) Plan for Readiness and Response of the Health System in Dealing with Urgent Crisis Situations and Disasters, Ministry of Health, 2018; 2) International Disaster Database EM-DAT https://www.emdat.be/emdat_db/, 3) http://www.stat.gov.mk/pdf/2021/5.1.21.15_mk.pdf and 4) <https://tinyurl.com/4arr2sym>

11	04.12.2008	Flood	2	30,000	4,842	2
12	01.01.2012	Extreme temperatures	1	5,100	/	1
13	23.12.2012	Wildfire	4	/	/	2
14	24.02.2013	Flood	1	4,911	/	1
15	28.12.2014	Extreme temperatures	/	8,800	/	1
16	01-03 2015	Flood	2	170,000	40,421	2
17	03.08.2015	Flood	7	2,116	87,000	2
18	06.08.2016	Flood	22	33,582	50,000	2
19	11.09.2016	Earthquake	/	/	10,000	2
20	05.01.2017	Extreme temperatures	5	2,220	/	2
21	07-09.2021	Wildfires	1	80,000	42,653	2, 3

Concerning the regional hazard profile of the country, it can be said that it does not differ much from the national profile. Floods are the most significant danger and have the greatest impacts on the population and the resilience of communities. Wildfires pose a threat to large forested areas and to biodiversity, while frequent weather-related events have a significant negative impact on the population and their livelihood, local infrastructure, and socio-economic sectors at the local level. Consequently, the regional exposure to major hazards and risk levels are presented in Table 9⁵⁸.

Table 9. Hazard exposure profile of planning regions in North Macedonia (Source: EU Civil Protection, see footnote 58)

Hazard	Risk level	Region(s)
River flood	High	North, south, northeast, southeast, and central
Urban flood	High	Whole country
Wildfire	High	Whole country
Earthquake	Medium	Whole country
Water scarcity	Medium	Whole country (medium in the north, low in the rest)
Extreme heat	Medium	Whole country (hazard level is lower in the west)
Landslide	Low	West and southeast
Coastal flood	Very low	Whole country

Consequently, for this Study, the risk index of North Macedonia was measured through the overall INFORM risk index that identifies the risk from humanitarian crises and disasters that could overwhelm national response capacities. It is made up of three dimensions: hazards

⁵⁸ European Union Civil Protection (2018). [Peer Review – Report North Macedonia 2018](#). Brussels, Belgium: European Union Civil Protection.

and exposure, vulnerability, and lack of coping capacity (Figure 17. INFORM National Risk Index for North Macedonia (Source: DRMKC-INFORM, 2023, see footnote 59))⁵⁹.



Figure 17. INFORM National Risk Index for North Macedonia (Source: DRMKC-INFORM, 2023, see footnote 59)

The overall risk for the country is calculated as low. Hazard and exposure risk dimensions consist of natural hazards with an index of 2.1, in which earthquake poses the highest risk, followed by epidemics, floods and droughts. Human-made risks are very low and the risk of conflict is very low. The vulnerability index means that neither the community nor the infrastructure in North Macedonia is particularly vulnerable to the effects of a disaster. Finally, the lack of a coping capacity index of 3.6 means that the country is successfully implementing its obligations under the global frameworks priorities and performs well in overall risk reduction. Nevertheless, the weaker points are given to the overall disaster risk management (DRM) governance and infrastructure. The multi-annual trend line for the country's risks dimensions is presented below and shows that the situation in overall risk reduction is improving, despite the increasing risk threat (Figure 18).

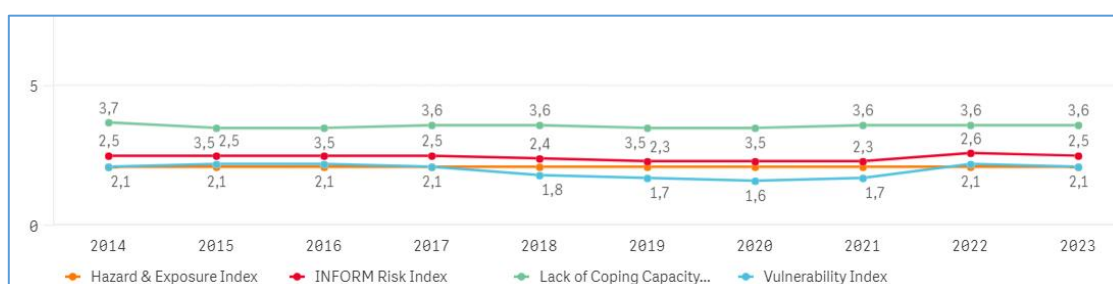


Figure 18. Multi-annual trend of the INFORM National Risk Index for North Macedonia (Source: DRMKC-INFORM, 2023, see footnote 59)

⁵⁹ EC DRMKC – INFORM [website]. Available at: <https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Country-Risk-Profile>. Accessed on 17 December 2023.

Consequently, priority hazards for DRR and CCA in the country are floods, wildfires, extreme weather events and droughts. It can be noted that quite a few of the threats can also have a severe impact on human wellbeing, for example in regards to groundwater pollution or unsafe disposal of waste. The complementarity of threats that impact ecosystems and societies is a clear example of how NbS can provide additional benefits to both while addressing primary societal challenges such as DRR or CCA.

3.10. Climate change vulnerability

Climate is changing, both globally and nationally. This is evident from the illustration of the rising temperatures from the period 1850 – 2022 through the “*warming stripes*” graphic that visually presents the change in temperatures in North Macedonia compiled by the University of Reading (Figure 19)⁶⁰.

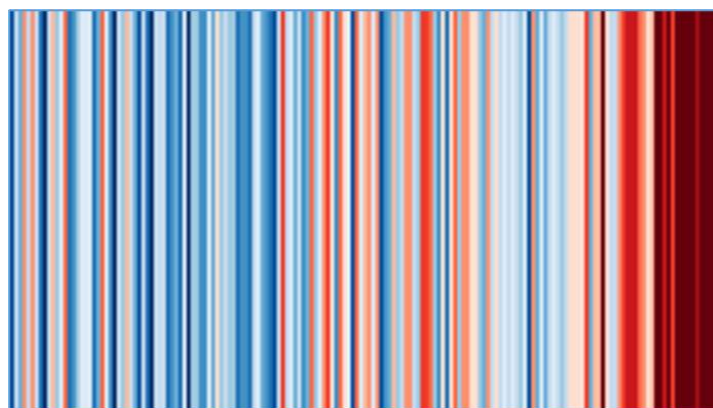


Figure 19. An overview of the increase in temperature in North Macedonia in the period 1850 – 2022 (Source: University of Reading, 2022, see footnote 60)

Within the framework of the Fourth National Report on Climate Change, climate change projections of the main climate elements (temperature and precipitation) were made using the regional greenhouse gases (GHG) emissions scenarios RCP2.6, RCP4.5 and RCP8.5, established by the IPCC Fifth Assessment Report (Figure 20). “They show that North Macedonia will have a hotter and drier climate by the end of the century, with an increase in hot temperature extremes and a decrease in cold temperature extremes. Despite projections for drier conditions, an increase in extreme precipitation events is expected, resulting in an increased risk of flash floods. In the summer period, the number of consecutive dry days is projected to increase, leading to more frequent droughts. The expected growing season is

⁶⁰ University of Reading [website]. Available at: <https://showyourstripes.info//europe/northmacedonia/all>. Accessed on 19 May 2023.

also expected to shift, resulting in a longer growing season.”⁶¹ Accordingly, projections were made and they are presented below for the RCP4.5 (stabilization scenario) and RCP8.5 (worst-case climate change scenario).

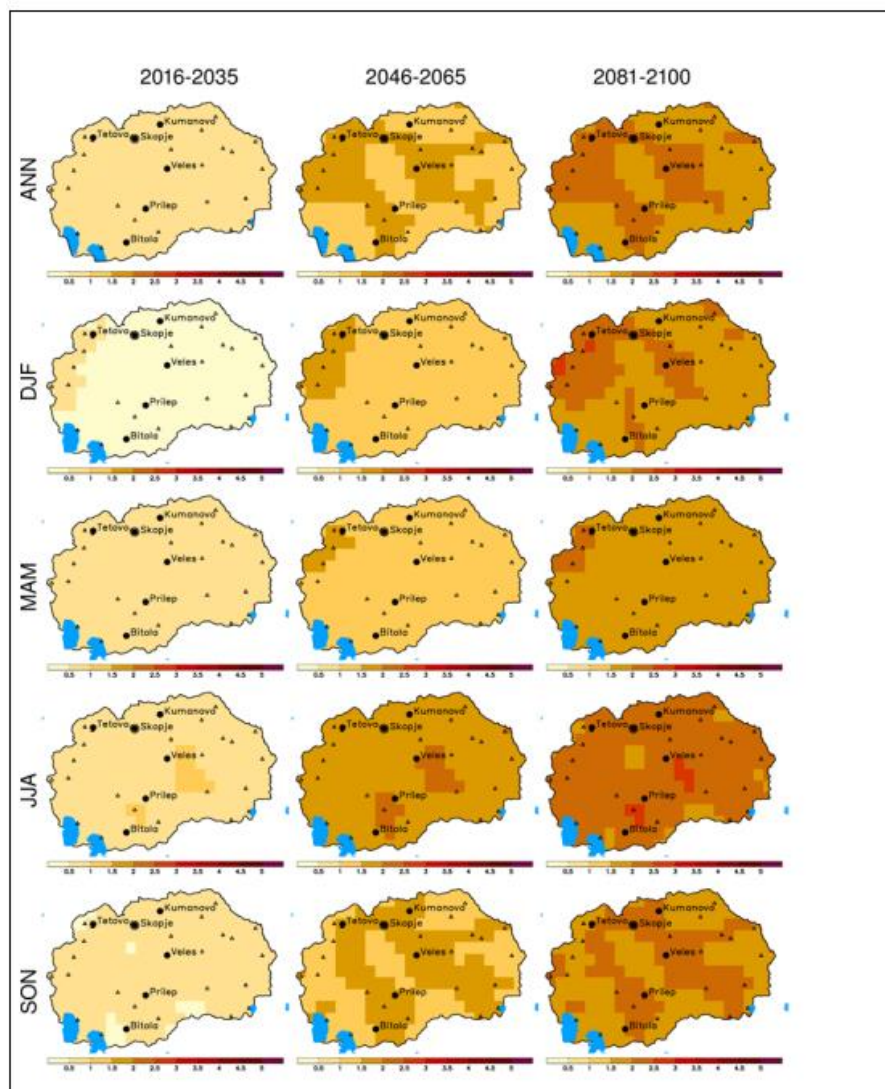


Figure 20. Future mean minimum daily temperature change, for three future periods with respect to the period 1986 – 2005, on annual level and for winter (DJF), spring (MAM), summer (JJA) and autumn (SON), for the RCP4.5 scenario (Source: Djurdjevic, 2020, [Report on Climate Change Projections and Changes in Climate Extremes for the Republic of North Macedonia](#))

For scenario RCP4.5 minimum daily temperature will continuously increase from about 1°C soon to more the 2.5°C by the end of the century. Summer is the season with the highest increase for the period at the end of the century, with some areas in which the increase is

⁶¹ Ministry of Environment and Physical Planning (2022). [Fourth National Report on Climate Change](#). Skopje, North Macedonia: Ministry of Environment and Physical Planning.

above 2.5 °C, and changes for the other three seasons, are similar to the change of mean daily temperature for the same scenario.

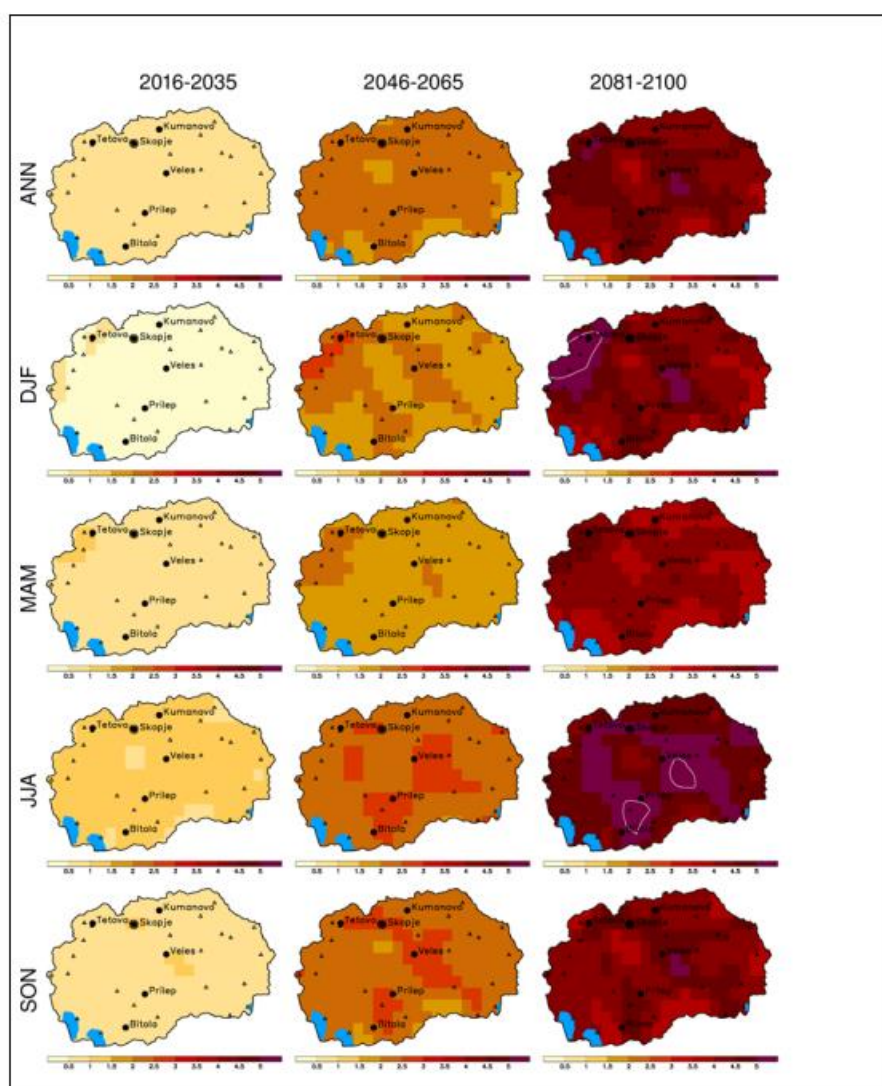


Figure 21. Future minimum daily temperature change, for three future periods with respect to the period 1986 – 2005, on annual level and for winter (DJF), spring (MAM), summer (JJA) and autumn (SON), for the RCP8.5 scenario (Source: Djurdjevic, 2020, [Report on Climate Change Projections and Changes in Climate Extremes for the Republic of North Macedonia](#))

For scenario RCP8.5, the minimum daily temperature will continuously increase, from about 1 °C soon to more the 5 °C by the end of the century. Again, summer is the season with the highest increase, and changes for the other three seasons, are similar to the change in mean daily temperature.

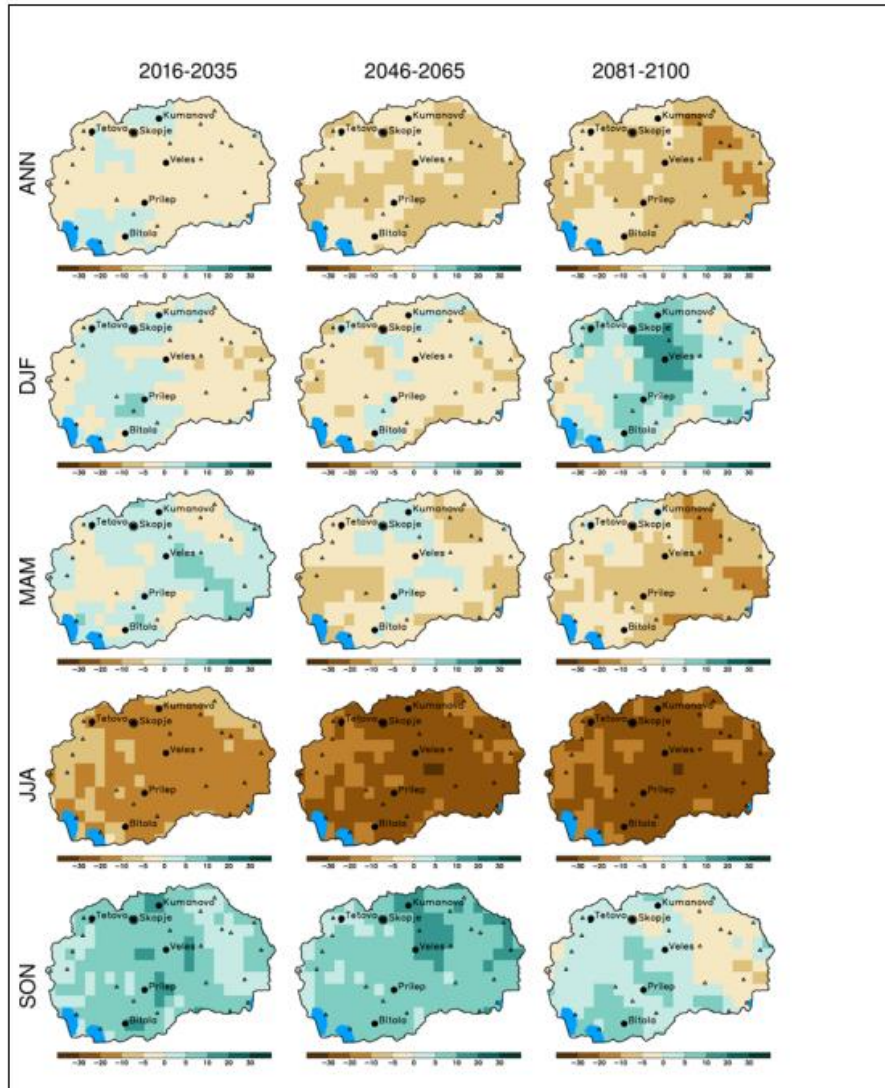


Figure 22. Future precipitation change, for three future periods with respect to the period 1986 – 2005, on annual level and for winter (DJF), spring (MAM), summer (JJA) and autumn (SON), for the RCP4.5 scenario (Source: Djurdjevic, 2020, [Report on Climate Change Projections and Changes in Climate Extremes for the Republic of North Macedonia](#))

In the case of the RCP4.5 scenario for all three future periods decrease in annual, spring and summer precipitation is expected, clearly pronounced for the summer season, with a decrease higher than 20%. For autumn, for the first two periods increase is expected over the majority of the territory, but for the last period, a decrease is projected. For winter there is no clear signal in change since that for all three periods +/-5% of change is dominant over the majority of the territory.

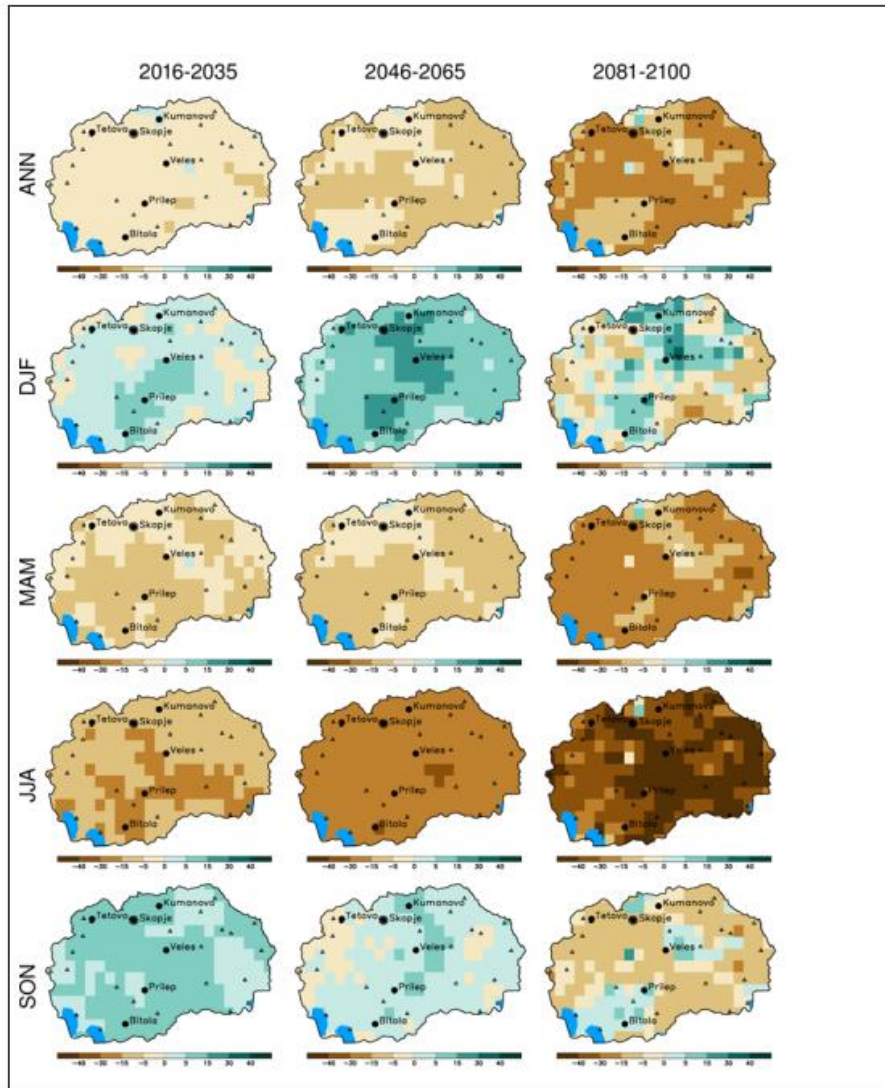


Figure 23. Future precipitation change, for three future periods with respect to the period 1986 – 2005, on annual level and for winter (DJF), spring (MAM), summer (JJA) and autumn (SON), for the RCP8.5 scenario (Source: Djurdjevic, 2020, [Report on Climate Change Projections and Changes in Climate Extremes for the Republic of North Macedonia](#))

Future precipitation change, for three future periods, 2016-2035, 2046-2065 and 2081-2100 concerning the period 1986-2005, on an annual level and for winter (DJF), spring (MAM), summer (JJ) and autumn (SON), for the RCP8.5 scenario. RCP8.5 and RCP4.5 scenarios have more similarities in terms of precipitation change in comparison with RCP2.6, which lead us to the conclusion that again, future concentrations of GHGs (stabilization scenario or non/stabilization), will play a major role in future precipitation change in the country.

Climate change is predicted to impact different geographic regions of North Macedonia slightly differently in terms of intensity, frequency and duration of rainfall; temperature

changes/variables in terms of duration, intensity⁶². “The various impacts from climate change for North Macedonia include the following:

1. Drought can result in loss of cultivable lands and changes in cultivation periods/seasons.
2. Drought can cause changes in sub-surface water levels especially water table. It can also affect ground water resources both un-confined and confined aquifers.
3. Changes in soil salinity, moisture and drainage capacity caused by drought.
4. Drought can also cause changes in shoreline of lakes and water-bodies. Perennial water bodies can see drying caused by lowering water tables. Non-perennial water bodies which are dependent on rainfall can also dry up due to extended dry spells, but at the same time cause flash floods when there are extreme rainfall events (The risk of such flash floods are higher in urban landscapes with non-permeable surfaces as this will result in increased run-off and reduced time of concentration).
5. Flooding of rivers and in long run change in river morphology in areas with predicted increase in rainfall.
6. Catchment capacity changes caused by increased run-off which can mean additional storage needs for Dams, possible risks of dam breach due to extreme precipitation events.
7. Flash floods and depending on where these flash floods happen there is additional erosion and landslide risks.
8. Water resource variabilities (changes in incident rainfall, seasonal changes in rainfall, extreme rainfall events leading to flash floods).
9. Glacial melting and snow destabilisation that may increase risks of avalanches in new areas.
10. Heat Waves can increase the risks of heat exhaustion especially for people in urban landscapes with added heat island effects, it can also affect the flora landscapes, plant health and cultivation.
11. Health risks and human fatality are some direct impacts. There is also greater risks of emergence of new diseases.
12. Reduced Frost days would mean arrival of early spring. This means plant blooms and other ecosystem life-cycle changes,
13. Changed cultivation periods and productivity due to drought (pH changes, nutrient losses/salinity) and redistribution of annual cycles of precipitation.
14. Increase in cases of pests and diseases (risks to humans and for agriculture).
15. Species migration changes in terms of both spatial and temporal shifts.

⁶² UNDP (2020). *Methodology for mainstreaming Climate Change consideration into spatial planning, with a focus on National Spatial Plan*. Skopje, North Macedonia: United Nations Development Programme.

16. Habitat regions can change with altering weather and shift in flora spread (new regions may become preferred habitats for different species, some other hot-spots and habitats may no longer be preferred habitats for species).

17. Disasters triggered by extreme events of floods, dam breach, landslides, glacier melts e.g; Leaching from mining lands caused by flash floods or altered river inundation. This can pollute productive lands, ground water etc.

18. New vulnerable zones may emerge with the changes in climate variables. Disasters related to leaks and failures of chemical and other high-risk industries which are located in landslide risk zones, seismic zones, dam breach zones etc. This can result in loss of life, loss of habitats, cause health hazards etc.”⁶³

Accordingly, based on these models, the Fourth National Report on Climate Change identified the most vulnerable sectors impacted by climate change, for the purpose of this study the most relevant are water sector, agriculture, forestry and biodiversity.

- *Water sector* – “With irrigation of less than 10% of agricultural land and climate change causing more frequent and intense heat waves and droughts, losses in agricultural production can be expected.”⁶⁴ Furthermore, following the decrease in precipitation, a reduction in surface waters is expected i.e., estimation for the Vardar River (decline of 7.6% in 2025 and 18.2% in 2100) and the Bregalnica River (decline of 10% in 2025 and 23.8% in 2100). Groundwater recharge to the Vardar River will also decrease (57.6% of existing recharge for 2100). Overall water availability in 2100 is expected to decrease by 18%.⁶⁵
- *Agriculture* – “A large proportion of crop production is exposed to open spaces and the impacts of weather and extreme weather events. Higher temperatures will more put more health stress on crops and higher maximum temperatures will be above optimal for photosynthetic activities, reducing the synthesis of organic matter. Prolonged periods of higher temperatures and heat waves will lead to greater yield losses, sun burns and discolouration of fruits, particularly on the west side of fields.”⁶⁶ Furthermore, prolonged droughts and extreme precipitations will additionally impact the productivity in this sector.
- *Forestry* - Climate change impact on the forests will be prominent and boreal forests may face dramatic changes. Potentially, water availability and natural disasters (increased number of wildfires) can decrease forest productivity.

⁶³ Ministry of Environment and Physical Planning (2022). [Fourth National Report on Climate Change](#). Skopje, North Macedonia: Ministry of Environment and Physical Planning.

⁶⁴ Ibid.

⁶⁵ Ministry of Environment and Physical Planning (2014). [Third National Report on Climate Change](#). Skopje, North Macedonia: Ministry of Environment and Physical Planning.

⁶⁶ Ibid., footnote 63

- *Biodiversity* – There is a potential appearance of invasive species, distribution changes, the disappearance of some habitats (lowlands wetlands) and species (plant and animal species living in the mountains, wetlands and riparian habitats).⁶⁷

Specific adaptation measures for each of these sectors were developed to ensure a timely adaptation to climate change, taking climate scenarios into account (Table 10). However, further research is needed, as is greater awareness of the benefits of cross-sectoral adaptation measures. Accordingly, the entry points for NbS can be identified in some of the adaptation practices.

Considering proven and evident benefits deriving from NbS for climate change adaptation and mitigation, one should take advantage of ongoing climate related policy updates in order to reinforce inclusion of the NbS approach within climate change related policies and programmes in North Macedonia.

Table 10. Potential adaptation measures for the three sectors and integration of actions (Source: Ministry of Environment and Physical Planning, 2014, see footnote 65)

Water resources	<ul style="list-style-type: none"> ✓ Increasing water storage capacities <ul style="list-style-type: none"> ✓ Removal of sediment from reservoirs for more storage ✓ Adaptive management of existing water supply systems ✓ Restoration of riparian forests ✓ Construction of flooding/torrential barriers and additional measures in river basins <ul style="list-style-type: none"> ✓ Implementation of retention areas ✓ Improved drainage possibilities ✓ Enhanced hydrological monitoring, data collection and early warning systems ✓ Creating, whenever possible, room for the river, by restoring wetlands, floodplains, and re-meandering ✓ River restoration ✓ Green drainage systems ✓ Green roofs
Forestry	<ul style="list-style-type: none"> ✓ Afforestation of new areas using traditional techniques and/or new technologies such as satellite imagery, mapping, and climate change adapted tree species ✓ Enhancement of forest management practices closer to the sustainable, natural forest management approach ✓ Adaptation of management plans in forestry practices following climate change trends ✓ Introduction of a “climate-smart” forestry approach ✓ Protection of erosion of forest land

⁶⁷ Ibid., footnote 65

Agriculture Food production	<ul style="list-style-type: none"> ✓ New irrigation systems construction and efficient use of existing ones ✓ Organic agriculture and grazing rotational movements ✓ Reducing soil disturbance and using crop rotation to maintain soil health ✓ Integrating native flora into cattle pastures, restoring habitats crucial to watershed health ✓ Multipurpose small accumulation lakes, ponds and reservoirs for water supply, irrigation, erosion control, ecosystem services ✓ Adaptation of cultivation technologies (selection of species and agrotechnical measures)
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In regards to agriculture, further analysis in the form of a report by the Food and Agriculture Organization of the United Nations (FAO)⁶⁸ indicated the disproportionate impact that the central and south-eastern parts of the country will feel from climate change. The degree of vulnerability is not just location dependent, but also differs in regards to crop type (Table 11).

Table 11. Degree of vulnerability per crop and agro-ecological zone and location (Source: FAO, 2018, see footnote 68)

Vulnerability	Agro-Ecological Zone and Location	Crop
Most Vulnerable	Mediterranean Zone: Povoardarie	Grape
Highly Vulnerable	Mediterranean Zone: Strumica	Tomato
	Mediterranean Zone – Gevgelija: southern Vardar valley	Tomato
	Mediterranean Zone – Skopje: Kumanovo valley	Winter Wheat
	Mediterranean Zone – Ovce Pole	Winter Wheat
Less Vulnerable	Continental Zone: Pelagonija valley	Alfalfa
	Continental Zone: Prespa/Ohrid region	Apple

3.11. Gender issues

Some of the above contexts, primarily demographic, socio-economic, DRR and CCA, cannot be viewed without taking a gender approach. This is also the case when investigating pressures on biodiversity and ecosystem services where gender may have different roles in both conservation, sustainable management and protection works, and in activities that threaten biodiversity and ecosystems such as some of the works in the infrastructure and agriculture sectors.

⁶⁸ Food and Agriculture Organisation (FAO) (2018). *Comprehensive analysis of the disaster risk reduction and management system for the agriculture sector The Former Yugoslav Republic of Macedonia*. Skopje, North Macedonia: FAO.

North Macedonia ranks 35 out of 189 countries in the Human Development Report Gender Inequality Index.⁶⁹ While there are certain strengths in gender equality in North Macedonia, such as in education, health, survival, and political empowerment, where it ranks above average, there are some weaknesses that could interact with the contexts that are relevant to CAA and DRR. For example, although North Macedonia has committed to the Convention on the Elimination of All Forms of Discrimination Against Women, aligning its legislation to achieving *de jure* and *de facto* gender equality, it still ranks below average on economic participation and opportunity for women.

This is especially evident in rural areas, where there are still significant discrepancies between the legal frameworks and their implementation.⁷⁰ There is high inactivity among rural and ethnic minority women in the labour-market activity exacerbated by the gender division of work (men spending more time in paid work while women spend more time performing domestic chores). Interestingly, in the rural agriculture sector, women work longer hours than men despite a larger percentage of women's work being unpaid. In the context of land use, it is relevant also to use gender data in terms of land ownership, as there is a significant gender gap in both ownership and control over assets. Women's participation in decision making is further limited even when they do have ownership over property and assets.

As women in North Macedonia are also disproportionately affected by gender-based violence (82% of domestic violence survivors are women, and men receive 93% of domestic violence convictions),⁷¹ and recent research has brought to light the linkages between gender-based violence and the environment,⁷² this also plays a role in the potential and sustainability of actions to address DRR and CCA. In 2019, North Macedonia published its Gender Equality Index allowing it to monitor its progress on gender equality.⁷³

⁶⁹ Sproule, K., Dimitrovska, N., Risteska, M. and Rames, V. (2019). [USAID/North Macedonia Gender Analysis Report](#). Skopje, North Macedonia: Banyan Global.

⁷⁰ Ibid.

⁷¹ Mirceva, S., Caceva, V., & Kenig H. (2014). *Voice for Justice, Assessment of the court procedures for domestic violence cases with special focus on the managing the cases from gender perspective*. Skopje, North Macedonia: Institute for Sociological, Political and Legal Research.

⁷² Castañeda Camey, I., Sabater, L., Owren, C. and Boyer, A.E. (2020). *Gender-based violence and environment linkages*. Gland, Switzerland: IUCN. [DOI:10.2305/IUCN.CH.2020.03.en](https://doi.org/10.2305/IUCN.CH.2020.03.en)

⁷³ EuroGender [website]. Available at: <https://tinyurl.com/2p8mfz7s>. Accessed on 28 December 2020.

4. Stakeholder analysis

The purpose of the stakeholder analysis is to provide insight into the importance and influence, interests, and potential roles of various stakeholder groups concerning NbS for CCA and DRR. The analysis strives to reveal the links relations between the various stakeholder groups at the national and local levels and how they may benefit from NbS.

To identify and analyse relevant stakeholders, one should take into account that NbS approaches could be applied among various sectors, penetrating many fields of actions, including water management, nature protection and biodiversity, forestry, urban development, spatial planning, infrastructure, etc. The formal competencies for policy development and implementation are held by various institutions (Government bodies, public utility companies, or public agencies) that are in charge of implementing some of the important policies closely related to NbS, DRR and CCA. Therefore, the plethora of stakeholder groups and/or various actors could potentially influence and contribute to the policymaking, promotion, knowledge building and application of NbS in North Macedonia.

The overview of the competencies of the relevant Macedonian institutions illustrates the **complexity of the current system relevant for the application of NbS, emphasising the need for coordination and collaboration among sectors and between various administrative and governance levels in North Macedonia**. It is also important to mention that due to the overarching and multidimensional nature of NbS, the competencies related to the application of, for example, some of the solutions, ecosystem restoration or ecosystem-based adaptation are not just divided between sectors, but also among various units within a single ministry.

To elaborate the interest and influence of the various stakeholder groups in the application of NbS, stakeholders were clustered into primary, secondary and other interest groups and a power-interest grid was used to identify the importance and influence of each group, as presented in the Table 12 and Table 13 below. Even though all interested groups and institutions could benefit from NbS, without additional analysis, it was not possible to provide a precise estimate of the scope of the impact or benefits of NbS for the local population affected by DRR and climate change. Therefore, further research among the identified interested groups including reflections on gender and vulnerable groups should be considered during the consultation process.

GROUP 1: Government bodies, primarily line ministries and directorates in charge of environment, climate change, forestry, water management, DRR and other complementary policies (MEPP, MAFWM, Ministry of Transport and Communications, CMC, Protection and Rescue Directorate, Agency for Spatial Planning, etc.) represent the most important stakeholder group in charge of both policy development, planning and close monitoring of its implementation, considering their role also in delegating tasks regarding, for example, flood protection or sustainable forest management, to local administrations or public enterprises (in charge of water or forestry management, respectively), monitoring and approving the operational plans of the public enterprises, etc.

GROUP 2: Local self-government units, public enterprises, due to their competencies representing the key spots for the application of the NbS approaches in the field. However, the interest among various local administration bodies varies across the country and as the risks from disasters increase, the interest for closer involvement and inclusion of local governments and local public enterprises also increases. Further, public enterprises managing forests and waters (public enterprise National Forests, JSC Water Economy of the Republic of North Macedonia) have clear mandates to manage and arrange services related to sustainable forest management, forest fires and forestation, illegal logging, water management, flood protection, watershed management, etc. and therefore represent the key operational institutions to be engaged in the implementation of NbS.

GROUP 3: Other important stakeholders, media, civil society organisations (CSOs), academic and scientific institutes and organisations, the donor community that has a relatively high interest in the topic, but do not have significant influence or power in developing policies or making decisions regarding NbS. This group also includes women, youth, people with disabilities and other vulnerable groups, who are particularly at risk of natural disasters and effects of climate change and should be given special attention. Local communities (formal and informal) are also part of this group since they are highly affected, but have little influence during the process and on a stand-alone basis, they can be a part of the policy development, decision-making process.

Table 12. Key stakeholders for the application of NbS in North Macedonia (Source: This table is created by the author of this study)

GROUP 1	GROUP 2	GROUP 3
MEPP	Local Self-government units	Research Institutes
MAFWM	public enterprise National Forests	Hydromet
Crisis Management Centre	JSC Water Economy of Republic of North Macedonia	Academia
Protection and Rescue Directorate.	Private companies (water, forestry)	CSOs
Agency for Spatial Planning	Public Enterprise National Pastures National Parks	Media
		Donor community
		Women, youth, people with disabilities and other vulnerable groups
		Local communities (formal and informal)

Table 13. Stakeholders power-interest grid analysis and primary roles (Source: This table is created by the author of this study)

Stakeholder	Importance (score 1 - 5)*	Influence (Score 1 – 5)*	Total score (Importance x interest)	Primary role in NbS application
MEPP	5	5	25	Policy development/NbS implementation
MAFWM	5	4	20	Policy development/NbS implementation
Crisis Management Centre	4	4	16	Policy development/ NbS implementation
Protection and Rescue Directorate	3	2	6	Policy development
Agency for Spatial Planning	3	3	9	Advocacy
Local Self-government units	5	4	20	Advocacy/Policy development/ Policy enforcement/implementation of NbS
public enterprise National Forests	4	4	16	Policy enforcement/Advocacy/NbS implementation
JSC Water Economy of Republic of North Macedonia	3	3	9	Policy enforcement/Advocacy/NbS implementation
PE National Pastures	2	3	6	Policy enforcement/Advocacy/NbS implementation
National Parks	3	3	9	Policy enforcement/Advocacy/NbS implementation

Private companies (water, forestry)	2	2	4	Policy development/research
Research Institutes	3	3	9	NbS implementation
Hydromet	3	3	9	Advocacy
Academia	2	3	6	Advocacy/NbS applicability
CSOs	4	2	8	NbS implementation /community engagement/Advocacy
Vulnerable groups	2	2	4	Advocacy/community engagement
Media	2	4	8	Advocacy/awareness raising
Donors	3	2	6	Advocacy
Local communities (formal and informal)	2	3	6	Advocacy/community engagement

*Score: 1 = very little importance or influence, to 5 = very great importance or influence.

4.1. Key stakeholders for NbS in North Macedonia

The competency of the institutions in this area is well described in the UNECE Third Environmental Performance Review.⁷⁴ Within this area, the main institutions are the following:

Ministry of Environment and Physical Planning - develops and implements national policies on nature protection, protection of biological and landscape diversity, and protection of natural heritage, as well as controls and supervises the enforcement of the provisions of the 2004 Law on Nature Protection. The main responsibility for protected areas and biodiversity conservation issues is delegated to the Department for Nature within the Environment Directorate. Other relevant units include the Department for Physical Planning, Department for Water, Department for Environment, Macedonian Environmental Information Centre, and Office for Spatial Information System. MEPP is also the designated National Focal Point for UNFCCC, the National Designated Authority for Clean Development Mechanism and the key governmental body responsible for policymaking concerning climate change issues. MEPP is also identified as the main institution responsible for coordinating inter-institutional cooperation for preparation of national plans on climate change and action plans, preparation of the GHG inventory and reporting obligations under the UNFCCC, and overall EU climate policy requirements. MEPP is also in charge of air protection issues, land management and drought, and acts as the focal point for the UNCCD, CBD, etc.

⁷⁴ United Nations Economic Commission for Europe (UNECE) (2019). [North Macedonia Environmental Performance Reviews Third Review](#). Geneva, Switzerland. UNECE.

Ministry of Agriculture, Forestry and Water Management (MAFWM) – Its competencies in the area can be summarised as: development and implementation of other important policies for biodiversity conservation, concerning, for example, agricultural land management, rural development, forestry (including the management, protection and use of forests, afforestation, reforestation), hunting and fishing, and melioration (which has a great influence on wetland ecosystem protection issues). In regards to CCA, MAFWM is responsible for:

- monitoring and studying the condition of waters, maintenance and improvement of water regimes;
- hydro-meliorative systems;
- hydrological and agro-meteorological measurements, and anti-hail protection;
- studying and research meteorological, hydrological and bio-meteorological events and processes.

For example, data from the Forest Information System and the Study on the development of the forest road network were used to inform the objective “Decreasing the damaged area by forest fires” in the UNFCCC Macedonian Second Biennial Update Report (BUR) on Climate Change in 2017.⁷⁵ MAFWM is the leading institution in agricultural policies and planning through its Programme for financial support for agriculture, Programme for financial support for rural development, and the Instrument for Pre-Accession Assistance in Rural Develop. It promotes the implementation of different measures that aim to reduce natural hazards like floods, soil erosion (landslides), droughts, such as usage of tilling techniques, drip irrigation, drainage systems and other measures, which are adopted and included in the Rulebook for Good Agricultural Practice and the Guide to Cross Compliance for the implementation of specific minimum requirements for Good Agricultural Practice and Environmental Protection.⁷⁶

Crisis Management Centre – plays a fundamental role in the country’s crisis management system and has responsibilities in prevention, early warning, crisis mitigation, recovery and coordination. It supports the works of two government bodies for crisis management: the Steering Committee, responsible for coordination and management of the system, and the Assessment Group that conducts continuous assessments of all risks and threats to the country. It incorporates 35 regional crisis management centres in the national territory. Recently, it has been engaged in coordinating the efforts for mainstreaming Eco-DRR solutions.

⁷⁵ Ministry of Environment and Physical Planning (MEPP) (2017). [Second Biennial Update Report on Climate Change](#). Skopje, North Macedonia: MEPP.

⁷⁶ Food and Agriculture Organization of the United Nations (FAO) (2018). [Comprehensive analysis of the disaster risk reduction and management system for the agriculture sector The Former Yugoslav Republic of Macedonia](#). Skopje, North Macedonia: FAO.

Protection and Rescue Directorate – responsible for coordinating protection and rescue activities between the civil protection and fire protection sectors. Its tasks are aimed at preventing and mitigating the impacts caused by natural disasters and other emergencies that endanger the population, flora and fauna, goods and facilities of general interest, etc. It is the operational part, resources of the national DRM system.

Ministry of Economy – responsible for the energy sector, among other matters, and as such is closely involved in climate-relevant issues.

Ministry of Health – responsible for climate change effects on human health and two commissions have been established: Commission for Monitoring Heat Health Consequences since 2007, and the Commission on Climate Change and Health since 2009. The Ministry of Health is represented on the National Climate Change Committee.

Local self-governments – Within their competencies, they have an obligation for their own needs, for effective prevention and early warning of a potential crisis, to monitor the conditions and phenomena that may lead to a crisis in their area; to assess the risks and dangers and perform a threat assessment; to adopt a programme for revitalisation of the municipality after elimination of the crisis; to determine the needs and plan the resources, as well as to implement the decisions of the Government, and to decide on the number of funds for crisis management from the municipal budget. Municipalities are responsible for the implementation of measures for protection and rescue and fire protection on their territories. Also, they have the competencies for environmental protection and can be involved in the management of protected areas (of categories other than national parks and multipurpose areas), based on the consent granted by the MEPP. For example, the Municipality of Resen has been mandated to manage two protected areas, the Ezerani Nature Reserve and the Lake Prespa Nature Monument. Other municipalities have been mandated to manage a protected area but have not yet established a special authority or ranger service within their structures. Other municipalities lack the capacities that would allow for the establishment within their administrative structure of a special authority or service for the management of protected areas, and have instead decided to delegate the management rights and duties to CSOs, e.g., the Municipality of Makedonski Brod concluded an agreement with the Ursus Speleus Speleological Society for the management of the Slatino Springs Nature Monument, and the Municipality of Kratovo transferred the management rights for the Kuklica Nature Monument to the CSO Izvor–Kratovo. Other protected areas (particularly smaller ones) do not have

dedicated management bodies. Furthermore, the legislation includes many optional competencies of local government bodies, including the establishment of local monitoring networks, or the preparation of local reports on the state of the environment. However, there are no examples of such activities.

Public enterprise National Forests – responsible for the management of state-owned forests in line with the forest management plans adopted by MAFWM. The public enterprise issues permits for forestry activities conducted in privately owned forests that do not have management plans. It is virtually self-financed from the revenues from sales of timber and primary wood-processing. The exploitation of forest resources, and not the prevention functions of forests, remains the primary focus of the work of the public enterprise. Sustainable forest management is in its early stages and no PES is implemented for forest management services. The enterprise is responsible for protecting forests from wildfires through the implementation of dedicated policies and measures, i.e., prevention, monitoring and surveillance activities, fire response, immediate recovery and afforestation of burnt areas.

Public enterprise Macedonian Pastures – manages most of state-owned pasture lands and encourages and supports the cultivation (or reintroduction) of traditional agricultural and land-use practices in meadows and pastures (e.g., haymaking, sheep grazing). Such practices largely enhance the protection of biodiversity and the natural environment and prevent the natural succession of shrub and forest vegetation over the abandoned, previously grazed and mown meadows situated in remote rural areas (e.g., high mountain regions), which are rapidly depopulating due to extensive migration. Sustainable management of pastures and land degradation neutrality (LDN) is in the early stage of development.

Public institutions of national parks – separate public institutions under the supervision of MEPP responsible for the management and monitoring of park territories and natural resources, law enforcement, facilitation of scientific research and implementation of protective measures prescribed in national park management plans. Forests and land classified as forest land within the borders of protected areas are entirely managed by the entities responsible for protected area management. National Park administrations are mainly self-financed. As, generally, they do not receive funding from the state or local budgets, their operational capacities depend to a great extent on revenues from economic activities, including income from the use of natural resources, particularly forests (revenues from timber harvesting in the course of sanitary cutting), which is supplemented or superseded by growing incomes from the tourism services sector. Also, there is potential for the implementation of PES schemes.

Therefore, the vast majority of nature research and conservation projects in protected areas depend mainly on external funding sources (e.g., EU funds, foreign donors), while funding from the state or local budgets remains limited. The Government also established a public enterprise responsible for the management and protection of the Jasen multipurpose area (category VI).

Agency for Spatial Planning – responsible for the overall spatial development of the national territory and provides the framework for land protection and land use for the purpose of increasing disaster resilience and protection of nature and biodiversity.

Hydrometeorological Service – a legal entity within the MAFWM responsible for performing measurements, monitoring and research related to climate, meteorological and hydrological parameters in the country. It also provides early warnings of meteorological and hydrological hazards. The Hydrometeorological Service has been engaged in the elaboration of climate change scenarios, usually on a project basis.

Academic and scientific research institutions – Given that the national biodiversity monitoring system is not operational at present, the most valuable source of data and expertise on nature conservation issues are the academic and scientific research institutions, which gather biodiversity data acquired through field research and inventory work on selected priority natural species and ecosystems. The most important academic and/or research institutions include the Macedonian Academy of Sciences and Arts, Ss Cyril and Methodius University in Skopje (in particular, its Institute of Biology in the Faculty of Natural Sciences and Mathematics, Faculty of Forestry, and Institute for Agriculture), Hydrobiological Institute in Ohrid, and Macedonian Museum of Natural History in Skopje (established and funded by the Ministry of Culture), which is also involved in research on species taxonomy. *The Macedonian Academy of Sciences and Arts has been engaged in the development of GHG inventories in the country. This engagement, however, tends to be project-based, given that the country's reporting to UNFCCC has been supported by United Nations Development Programme (UNDP).*

Civil society organizations – A multitude of crucially important biodiversity monitoring and nature protection projects are implemented by several environmental CSOs, among which the most skilled, experienced and prominent is the Macedonian Ecological Society.

Citizens, citizens' associations, private sector entities, the Red Cross and other organisations – participate in prevention, early warning and crisis management under certain conditions. Key stakeholders also include affected communities, including vulnerable groups, the private sector, resource users and owners.

National Climate Change Committee – established in 2000 as an advisory body for policymaking related to national climate change issues. As such, it reviews and approves all components of the national plans. Consequently, the Committee has participated in the development of the three national communications and two biennial update reports submitted by the country to date. It consists of 32 representatives from state bodies (such as MAFWM, Ministry of Culture, Ministry of Economy, Ministry of Education and Science, Ministry of Finance, Ministry of Foreign Affairs, Ministry of Health, Ministry of Transport and Communications), public institutions, CSOs, and representatives of the business community, all appointed officially at the request of MEPP. While the existence of an interministerial advisory body on climate change issues is positive, participating ministries tend not to have units or departments dedicated to climate change, which translates into limited capacities. This can raise questions regarding the mechanism's effectiveness.

5. Policy context for the NbS approach in North Macedonia, focusing on the EbA and EcoDRR concepts

5.1. Global policies

NbS can be linked to a combination of global and regional frameworks and conventions that guide national actions. The past couple of years have particularly seen the adoption of major global agreements and the establishment of mechanisms that significantly recognise the importance of ecosystems in the overall DRR framework, as well as provide entry points to mainstream and upscale these approaches. Accordingly, the most relevant global frameworks are summarised below:

- **Convention on Biological Diversity (CBD)** – In 2014, during the *Twelfth Meeting of the Conference of the Parties to the CBD (COP12)*,⁷⁷ decision XII/20 titled “**Biodiversity and Climate Change and Disaster Risk Reduction**”⁷⁸ was adopted. The decision acknowledges that, while biodiversity and ecosystems are vulnerable to climate change, the conservation and sustainable use of biodiversity and the restoration of ecosystems can play a significant role in climate change mitigation and adaptation, combating desertification and DRR. Consequently, the decision *encourages Parties to promote and implement EbA to climate change and DRR*. The updated zero drafts of the post-2020 Global Biodiversity Framework (CBD/POST2020/PREP/2/1) are already aligned with NbS principles. Its goals and targets showcase NbS as a tool for addressing different societal challenges, including covering EbA, such as EbA and Eco-DRR. However, NbS could be further incorporated to be used as a baseline to assist Parties in addressing issues around implementation.
- **Sendai Framework for Disaster Risk Reduction 2015–2030**⁷⁹ – During the *Third UN World Conference on DRR* held in Sendai, Japan, the Sendai Framework was adopted on 18 March 2015. It aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health, the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over 15 years. This new framework *places a stronger emphasis on the importance of ecosystems and biodiversity and proposes a more rigorous monitoring framework*,

⁷⁷ Convention on Biological Diversity [website]. Available at: <https://www.cbd.int/meetings/COP-12>. Accessed on 04 January 2021.

⁷⁸ Convention on Biological Diversity (CBD) (2019). *Decision adopted by the Conference of the Parties to the Convention on Biological Diversity, XII/20. Biodiversity and climate change and disaster risk reduction*. Pyeongchang, Republic of Korea: CBD.

⁷⁹ United Nations (2015). *Sendai Framework for Disaster Risk Reduction 2015-2030*. Sendai, Japan: United Nations.

which strongly advocates for capacity development and knowledge transfers for risk management. It outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks: (i) Understanding disaster risk; (ii) Strengthening disaster risk governance to manage disaster risk; (iii) Investing in disaster reduction for resilience, and (iv) Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction. Environmental impacts assessments are also cited as important tools to achieve risk-sensitive public and private investments. The Sendai Framework further acknowledges the need to tackle environmental drivers of disaster risk, including ecosystem degradation and climate change, as well as the environmental impacts of disasters. Also in 2015, the Voluntary Commitments initiative, developed in response to the General Assembly resolution 68/211 (2013), was launched to support the development of partnerships at all levels to implement the Sendai framework.

- **Sustainable Development Goals (SDGs)**⁸⁰ – In September 2015, the UN General Assembly adopted the SDGs as the blueprints of how to achieve a better, more sustainable and resilient future for all. In total, 17 goals and 169 global targets are aiming to transform the world and address the current challenges of the modern world, including poverty, inequality, climate change, environmental degradation, peace and justice, and promoting prosperity while preserving the planet. Nevertheless, this development cannot be achieved without DRR and therefore it is reflected in the SDGs as a modus operandi for building a resilient global future and achieving the goals. In total, 25 targets are related to DRR in 10 of the 17 SDGs,⁸¹ firmly establishing the role of DRR as a core development strategy.
- **Paris Climate Agreement**⁸² – In December 2015, the Paris Agreement was adopted by 195 countries. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and at

⁸⁰ United Nations, Department of Economic and Social Affairs [website]. Available at: <https://sdgs.un.org/goals>. Accessed on 02 December 2020.

⁸¹ United Nations Office for Disaster Risk Reduction (UNISDR) (2015). Disaster Risk Reduction and Resilience in the 2030 Agenda for Sustainable Development. New York, USA: UNISDR.

⁸² United Nations Framework Convention on Climate Change [website]. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement>. Accessed on 02 December 2020.

making finance flows consistent with low GHG emissions and climate-resilient pathway.

- **IUCN WCC** – During this congress held in Hawaii, USA in September 2016, IUCN Members adopted a resolution (WCC-2016-Res-069)⁸³, which for the first time, defined the use of nature for simultaneous benefits to biodiversity and human well-being. According to this resolution, NbS are defined as “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.” However, at the IUCN WCC held from 3 to 10 September 2021 in Marseille, France, it was noted that the IUCN will, among other topics, “include financial risks linked to biodiversity loss in economic and financial analyses and strengthen investments favourable to biodiversity, particularly NbS”.
- **Ramsar Convention** – During the *13th Meeting of the Conference of the Contracting Parties to the Ramsar Convention on Wetlands*⁸⁴ held in Dubai, United Arab Emirates, the *Ramsar Convention Decision XXII.13* was adopted on 29 October 2018. It recognises that peatland restoration can contribute to the fulfilment of multiple obligations or commitments under different multilateral environmental agreements, including as appropriate, climate change mitigation and adaptation, DRR, biodiversity, conservation, better water regulation, mitigation of water runoff, and support to the SDGs. Accordingly, it could be promoted as a cost-effective tool with cross-cutting benefits.
- **United Nations Convention to combat desertification (UNCCD)** – Established in 1994, it is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In North Macedonia, it was ratified in 2002 and consequently, it has committed to set the LDN targets, establish an LDN baseline and formulate associated measures to achieve LDNs.⁸⁵

⁸³ IUCN, Members' Assembly (2016). Resolution 069: *Defining Nature-based Solution*, WCC 2016 Res 069. <https://portals.iucn.org/library/node/46486>

⁸⁴ Ramsar [website]. Available at: <https://www.ramsar.org/about/cop13-resolutions>. Accessed on 28 October 2020.

⁸⁵ Global Mechanisms of United Nations Convention to Combat Desertification (UNCCD) (2018). *Country Profile of the former Yugoslav Republic of Macedonia – Investing in Land Degradation Neutrality: Making the Case – An Overview of Indicators and Assessments*. Bonn, Germany: Global Mechanism of the UNCCD

Table 14. Relevant global policy agreements (Source: This table is created by the author of this study)

Policy Agreement	Description
Sendai Framework on Disaster Risk Reduction (Sendai DRR Framework)	The Sendai DRR Framework is the global framework on DRR with seven targets and four Priorities Reduction – for Action. It seeks to prevent new and reduce existing disaster risk through the mainstreaming of DRR across all development sectors, programmes and policies. While the Framework is a voluntary, non-binding agreement, it calls for an all-of-society engagement, with governments having the primary role of reducing disaster risk.
Sustainable Development Goals (SDGs) (2015–2030) and 2030 Sustainable Development Agenda	With a total of 17 goals and 169 targets, the SDGs focus on three main areas: (i) eradication of poverty; (ii) protecting the planet from degradation, while ensuring that economic, social and technological progress occurs in harmony with nature; and (iii) promoting universal peace and just and inclusive societies. While the SDGs are not legally binding, governments are expected to take ownership and establish national frameworks for the achievement of the 17 Goals
United Nations Framework Convention on Climate Change (UNFCCC)	UNFCCC provides the global framework to cope with the adverse effects of climate change. The ultimate objective is to stabilise GHG concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.
UNFCCC 21 st Conference of Parties – Paris Agreement on Climate Change	The Paris Agreement seeks to significantly scale up climate actions and deal more comprehensively with climate change impacts to safeguard development and eliminate poverty. Countries committed to hold the global average temperature to well below 2°C above pre-industrial 30 levels (and to pursue efforts to limit the increase to 1.5°C). It specifically aims to “significantly reduce the risks and impacts of climate change and foster climate resilience”.
Convention on Biological Diversity (CBD)	The CBD recognised for the first time in international law that the conservation of biological diversity is a universal concern for humankind and is integral to sustainable development. It covers all ecosystems, species and genetic resources. The CBD is a legally binding agreement.
UN Convention to Combat Desertification - UNCCD	The UNCCD provides the global framework for tackling the issue of land degradation and desertification. It is the only legally binding international agreement with a focus on sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as drylands. It seeks to improve the living conditions for people on drylands, maintain and restore land and soil productivity, and mitigate the effects of drought.
Ramsar Convention (formally the Convention on Wetlands of International Importance)	The Ramsar Convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It is an international non-binding agreement. The Convention uses a broad definition of wetlands. It includes all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fishponds, rice paddies, reservoirs and saltpans.

Concerning the topic of the analysis and the overall aspects of this Study, in particular, the Sendai DRR Framework, SDGs and Paris Agreement are of great importance for the country’s advancement in these areas, and in meeting the global objectives and targets.

In this context, we review the SDGs and global targets, as instruments to integrate ecosystem management, climate change and DRR. Accordingly, inputs from UNDRR, Partnership for Environment and Disaster Risk Reduction and PES related goals are presented in the table below. These major international agreements clearly illustrate that ecosystems and ecosystem services are recognised at the global level as critical for DRR, sustainable development and climate change mitigation and adaptation (Figure 24).⁸⁶

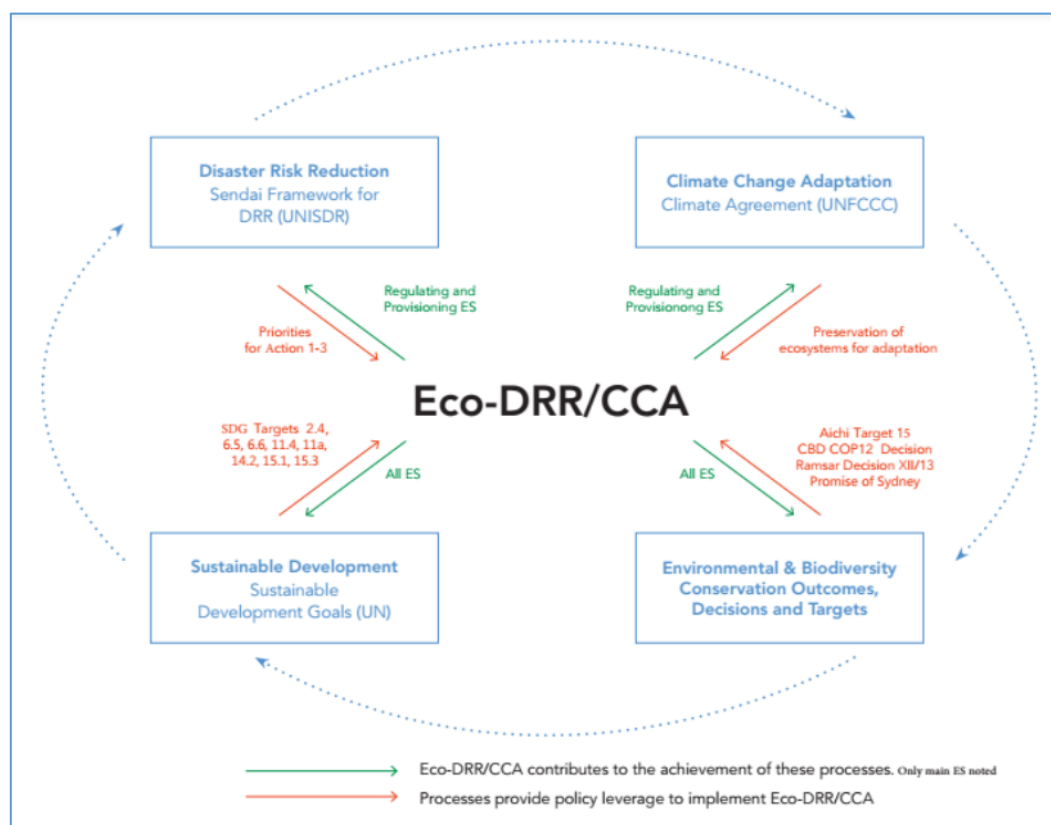


Figure 24. Linkages between major international agreements and Eco-DRR/CCA. ES refers to ecosystem services involved (Source: CBD, 2018, [Guidelines for Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction](#))

Since North Macedonia has adopted all the global agreements above and other global policies of relevance for Eco-DRR/CCA, there is great potential for the country to start investing in these approaches to meet these global commitments. It is especially important to emphasise that of the 17 SDGs, the Government of North Macedonia has prioritised the SDGs 1, 4, 8, 13 and 16.⁸⁷ Furthermore, as part of the Rapid Integrated Assessment performed within the

⁸⁶ Renaud, F.G., Sudmeier-Rieux, K. & Estrella, M. (2016). Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice. Springer. DOI:10.1007/978-3-319-43633-3

⁸⁷ United Nations North Macedonia (2020). Sustainable Development Goals Voluntary National Review North Macedonia. Skopje, North Macedonia: United Nations North Macedonia

framework of the Voluntary National Reviews of SDGs, all development policy planning documents and legislative acts were mapped against the SDGs, the role of state institutions in strategic policy planning through the lens of SDGs was reviewed, the EU Acquis requirements through the lens of alignment with SDGs were assessed, and the donor financial contributions for the SDGs between 2016 and 2020 were estimated. Accordingly, it was concluded that 83% of the planning documents were aligned with the SDGs (Figure 25). Full compliance was found for SDGs 4 (Education), 6 (Water), 7 (Energy), 9 (Infrastructure and Industrialisation) and 16 (Inclusive governance). The least degree of alignment – about 50% was found for SDG 10 (Inequalities between and within countries).⁸⁸

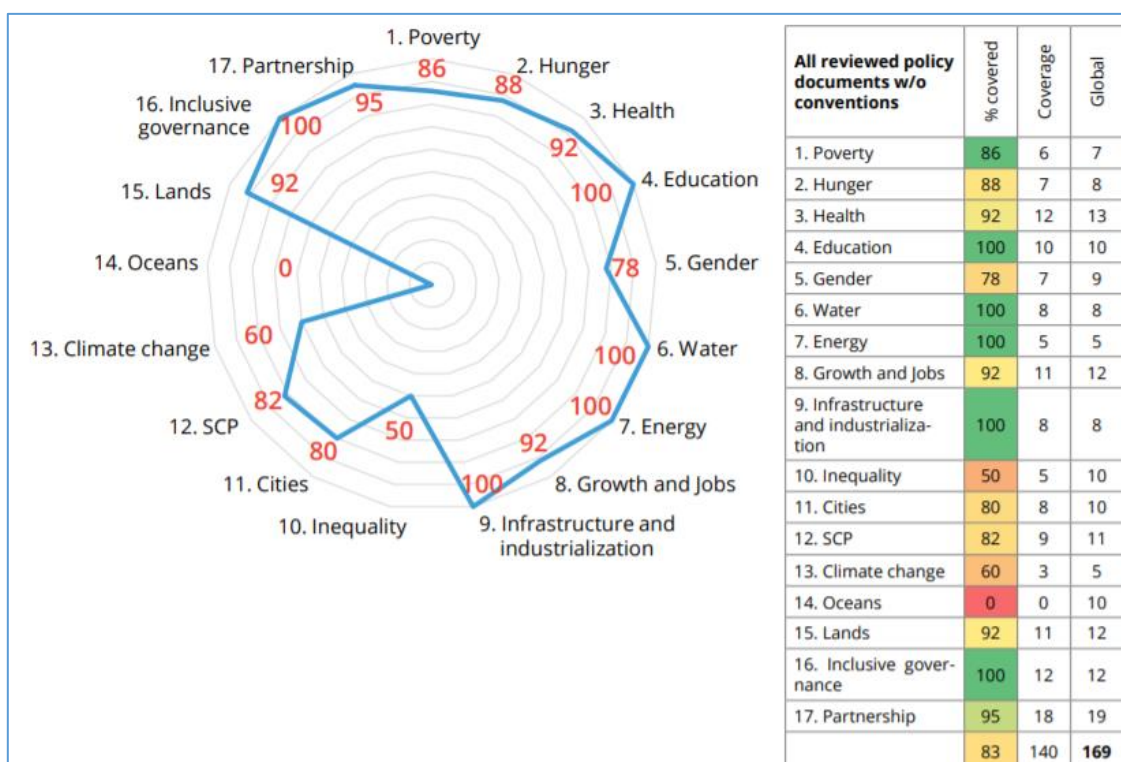


Figure 25. Overall alignment with national SDGs and Agenda 2030 profile in North Macedonia (Source: [Sustainable Development Report](#))

On track or maintaining the SDG achievement are the following goals: 1, 6, 8, 10 and 12, whether moderately improving with significant challenges remained are 2, 3, 5, 15, 16 and 17. Scores stagnating or increasing at less than 50% of the required rate are identified in the scope of goals 4, 7, 9 and 11, but Goal 13 on Climate Action is with a decreased score.

It is of note that the preliminary mappings of NbS linkages to SDGs by IUCN indicate that NbS can contribute to SDGs 1, 2, 3, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16 and 17. Therefore, there may

⁸⁸ Ibid.

be scope for NbS to contribute to improving compliance for several SDGs in North Macedonia, such as SDG 13 (Climate change), SDG 5 (Gender) and SDG 11 (Cities).

The status of North Macedonia as a candidate for EU accession since 2005 has influenced the country's progress in terms of participation in and implementation of international agreements and commitments. As of 2019, the country has ratified nearly all relevant global and regional environmental agreements. However, some challenges remain in terms of effective implementation and compliance with the obligations under Multilateral Environmental Agreements (MEAs) in the country. Table 15 lists the major global frameworks and agreements of relevance for EbA and Eco-DRR and their status of adoption by North Macedonia.

Table 15. Policy Agreements and their status of adoption by North Macedonia (Source: This table is created by the author of this study.)

#	Policy Agreement	Status
1	Ramsar Convention	Ratification 1977 ⁸⁹
2	Convention Concerning the Protection of the World Cultural and Natural Heritage	Ratification 1974 ⁹⁰
3	Convention on Biological Diversity (CBD)	Ratification 1997 ⁹¹
4	United Nations Framework Convention on Climate Change (UNFCCC)	Ratification 1997 ⁹²
5	Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)	Ratification 1999
6	Convention on the Protection and Use of Transboundary Watercourses and International Lakes	Ratification 1999
7	United Nations Convention to Combat Desertification (UNCCD)	Ratification 2002
8	Sendai DRR Framework	Adopted 2015
9	Sustainable Development Agenda (2015–2030)	Adopted 2015
10	UNFCCC 21st Conference of the Parties – Paris Climate Agreement on Climate Change	Adopted 2015 Ratification 2017 ⁹³

⁸⁹ Law on Ratification of the Convention for the Protection of Aquatic Habitats of International Importance for the Protection of Waterfowl (Ramsar) Ratification Decree. Official Gazette Socialist Federative Republic of Yugoslavia (SFRY) 9/77.

⁹⁰ Law on Ratification of the Convention Concerning the Protection of the World Cultural and Natural Heritage. Official Gazette SFRY 56/74.

⁹¹ Law on Ratification of the Convention on Biological Diversity. Official Gazette of Republic of Macedonia, 54/97.

⁹² Law on Ratification of the Convention on Climate Change. Official Gazette of Republic of Macedonia, 61/97.

⁹³ Law on Ratification of the Paris Agreement. Official Gazette of Republic of Macedonia, 161/17.

5.2. International policies

In addition to global policies, North Macedonia has adopted various regional frameworks and agreements in the field of environment and nature conservation, as well as DRR, including:

- Bern Convention 1979 For the Protection of Flora and Wildlife Fauna of the Natural Environment in Europe, ratified in 1997.
- European Landscape Convention 2000, ratified in 2003.
- Multilateral agreement among the countries of South-Eastern Europe for implementation of the Convention on Environmental Impact Assessment in a Transboundary Context (Bucharest), ratified in 2008.

In terms of nature conservation, relevant policies include the ***EU Biodiversity strategy to 2030⁹⁴ and the associated Action Plan***. The main elements of the strategy are the establishment of a large EU-wide network of protected areas, restoration of the degraded ecosystems through the EU Nature Restoration Plan, defining a set of measures to enable the necessary transformative change, and measures to tackle the global biodiversity challenge.

The need for harmonisation and transposition of national legislation with EU legislation is the key to successful protection of nature and natural assets, a fact recognised by the institutions and translated into the National Strategy with an Action Plan for the period 2018–2023. The above mainly includes the EU Habitats Directive (92/43/EEC), Birds Directive (2009/147/EC), and Council Regulation EC (338/97) on International Trade of Endangered Species of Wild Fauna and Flora. The EU nature protection legislation is implemented nationally through the relevant legislative acts.

A significant part of the EU environmental legislation (comprising over 200 legal acts) refers to nature protection, and its fulfilment does not have a transition period and requires a great deal of time and resources for their fulfilment. The main obligations derive from the two most important directives – the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC), which are the basis for the establishment of the Natura 2000 network.

In addition to these two main directives, the EU Acquis in the field of nature protection deals with the following acts:

⁹⁴ European Commission [website]. Available at: <https://tinyurl.com/y3kufa82>. Accessed on 30 October 2020.

- The Timber Regulation (EU 995/2010) is linked to the implementation of the EU Forest Law Enforcement, Governance and Trade Action Plan as a first step to tackle the illegal logging and timber trade. It provides for the establishment of an appropriate licensing scheme for the import of timber and timber products. It regulates that only logs can be used that are provided from forests that are grown in a sustainable way and are so certified. The Timber Regulation regulates the obligations of operators offering timber and timber products on the internal market and the obligations of traders. It prescribes the criteria for the establishment of a European network of tracing the origin of logs and the method of certification of logs and forests, but it is a voluntary network.
- Regulation (EU) No. 511/2014 establishes rules governing compliance with access and benefit-sharing to genetic resources and traditional knowledge associated with genetic resources in accordance with the provisions of the Nagoya Protocol on Access to Genetic Resources and equitable and equal sharing of benefits arising from their use of the Convention on Biological Diversity. The regulation aims to contribute to the conservation of biological diversity and the sustainable use of its components.

Furthermore, North Macedonia is transposing the EU directives in the field of DRM. For instance, the EU Flood Directive (2007/60/EC) and Water Framework Directive (2000/60/EC) are two water policies aiming at protecting the water quality of rivers, lakes, groundwater and sea. The requirements of both directives have been met, but they are still not fully transposed into the relevant national legislation.

Concerning DRM, North Macedonia is a member of the EU Civil Protection Mechanism (since 2012), a member of the Disaster Preparedness and Prevention Initiative (DPPI) for Southeast Europe, as well a member of the European Forum for DRR. North Macedonia is also impacted by the Green Agenda for the Western Balkans (where GHG emissions sink balance out emission sources by 2050) and the South East Europe 2020 Strategy's (SEE 2020) environment division. More information on the DPPI, Green Agenda for the Western Balkans and the SEE 2020 can be found in Annex III.

5.3. Priorities and challenges for North Macedonia at the regional and global level

As a candidate country for EU membership, North Macedonia has made efforts to align its national policies and legislation with the European Acquis, including in Chapter 27:

Environment and Climate Change. Accordingly, the most recent EU Progress Report 2022⁹⁵ note in Chapter 27, “the country has some level of preparation in this area. Some progress was made in nature protection and in climate change, including by the preparation and adoption of the management plan for Galichica National Park. However, implementation remains a concern in all sectors. The country needs to considerably step-up ambitions regarding the green transition, notably in the context of the Green Agenda for the Western Balkans.” It further reads that the country needs to “implement the Paris Agreement, including by adopting a climate Law, consistent with the EU 2030 framework”.⁹⁶

The main findings in the area of **environment – horizontal level** are that the administrative capacity at all levels remains weak and financial resources are still insufficient to implement and enforce legislation, performed inspections have little impact, there is no improvement in environmental impact assessments with weak public consultations, and the quality of reports and the lack of transparency and access to information continues to be an issue.⁹⁷

In **air quality**, despite the progress made, air quality remains a major concern in large cities. In the **water quality management area**, work to align with the EU Acquis has continued and limited progress was made towards implementing and enforcing existing legislation, with the groundwater cadastre in the final stage of development. However, the River Basin Councils are still not operational and no tangible progress has been made in the finalisation of river basin management. Concerning **nature protection**, good progress has been made with the preparation of the draft law on nature protection, an increase in the total percentage of protected areas to 13.9% of the territory, and in the valorisation studies, management plans and development of national red lists. Lake Ohrid together with Studencisko Blato were included in the List of the Ramsar Convention. Activities to re-proclaim the status of Mavrovo National Park needs to be accelerated. Regarding **climate change**, the long-term strategy on climate action was adopted in 2021, though a law on climate action has not yet been adopted. Several documents were developed as a supporting tool for the implementation of enhanced nationally determined contributions. Work continued to update the GHG inventory, along with activities to develop the platform for monitoring, reporting and verification. Capacity remains weak, in terms of both human and financial resources, despite the efforts undertaken. Finally, within the **civil protection area**, the new national strategy for protection and rescue for the period 2022–2025 was finalised, the national risk assessment was submitted to Union Civil

⁹⁵ European Commission (2022). [Commission Staff Working Document, North Macedonia 2022 Report](#). Brussels, Belgium: European Commission.

⁹⁶ Ibid.

⁹⁷ Ibid.

Protection Mechanism, further steps were taken to finalise the connection to the Commission's common Emergency Communication and Information System and wildfires, and the COVID-19 crisis highlighted the need to strengthen the legal framework and institutional capacities of the civil protection authorities.⁹⁸

According to the *Third Environmental Performance Review of North Macedonia* conducted by the UNECE in November 2019, since 2012, the country has taken important steps to improve its environmental performance. It has reduced its dependence on fossil fuels for the generation of electricity in favour of renewables and improved the management of waste and chemicals. However, several challenges remain to be addressed, such as greening the economy, environmental monitoring, public participation and education for sustainable development. Improving air quality and waste management remain two areas of pressing concern for the country. The policy framework in this area, among others, includes the National Strategy for Nature Protection (2017 – 2027) aimed at protecting the country's biodiversity and geological heritage, as well as the Climate Action Law and Strategy. Key priorities in this area include the strengthening of national capacities for environmental impact assessments, integrating environmental requirements into sectoral policies and enhancing reporting on implementation.⁹⁹ Still, the investment in environmental protection and natural infrastructure remains insufficient, despite increased spending in recent years.¹⁰⁰ For example, in 2018 this totalled EUR 181.9 million, or an increase of EUR 19 million. The greatest share went to waste management (64.2%), followed by education, training and other activities (9.7%), and expenditures on wastewater management (9.4%).

5.4. Key national policies

5.4.1 Biodiversity and protected areas

National Strategy for Nature Protection 2017–2027¹⁰¹

The Strategy lists seven national strategic objectives related to the protection of geodiversity, heritage, and biological and landscape diversity, including their protection and conservation, monitoring, research and inventory, incorporation of the nature conservation policy into strategies, programme and plans of other sectors, improvement of alignment of the legislative framework with the EU legislation and relevant international treaties, provision of an appropriate institutional framework and strengthening administrative capacities, with

⁹⁸ Ibid.

⁹⁹ United Nations North Macedonia (2020). *Sustainable Development Goals Voluntary National Review North Macedonia*. Skopje, North Macedonia: United Nations North Macedonia.

¹⁰⁰ Balkan Green Energy News [website]. Available at: <https://balkangreenenergynews.com/north-macedonia-spends-eur-182-million-on-environmental-protection-in-2018/>. Accessed on 27 October 2020.

¹⁰¹ Ministry of Environment and Physical Planning (MEPP) (2018). *National Strategy for Nature Protection (2017–2027)*. Skopje, Macedonia: MEPP.

continuous and ever-increasing funding. The Action Plan accompanying the Strategy lists actions (19 actions concerning geology, geomorphology and hydrology, 29 concerning biological diversity, 5 concerning landscape diversity and 6 for development of the geographic information system) and indicates the responsible body and timeline for implementation of each. For instance, the development of management plans for the most important landscape types is to be completed by 2027, preparation of red lists and red books of species by 2023, development and implementation of red species conservation plans between 2024 and 2027, the establishment of a state monitoring system for the Balkan lynx by 2027, and the identification of potential Natura 2000 sites by 2022.

Furthermore, the establishment of PES is considered one of the priorities of this strategic document: “National Target 3 - To embed the nature protection policies into the strategies, plans and programme of other sectors by 2020”. The Strategy refers mainly to protected areas and therefore PES is considered a source of financing (from fees). PES is the implementation of the “user pays” principle and has two main objectives: mobilisation of funds for entities in charge of protected area management, and providing financial incentives for landowners to engage in the preservation of ecosystems. To ensure efficient and sustainable financing of protected areas, it is necessary to introduce the following additional financial instruments:

- payments for carbon emissions,
- establishment of a renewable nature fund,
- various types of trusts,
- redistribution of existing revenues from taxes, fees and payments from the production and trade in fossil fuels, from the registration of vehicles, water management, etc.,
- public-private partnership,
- compensation for damage caused to ecosystems in protected areas,
- fees for bioprospecting, i.e., for the use of resources, paid by companies that cultivate wild species, intended for commercial purposes, etc.,
- and using funding opportunities from the Prespa-Ohrid Nature Trust.

In the Action Plan of the Strategy, ecosystem services are integrated into the National Target 3 – “To embed the nature protection policies into the strategies, plans and programme of other sectors by 2020”, in the relevant actions:

- 3.1 Drafting a study on the economic values of ecosystem values of protected areas in the Republic of North Macedonia;

- 3.2 Introduction of procedures for the assessment of ecosystem services within individual sectors and their implementation in the process of adopting strategies, plans and programmes;
- 3.3 Incorporation of procedures for the assessment of ecosystem services in the legislation, which is also a part of the actions 4.3 Incentives for sustainable use of nature and 7.1 Continuous increase of financial assets for nature protection from the Budget of the Republic of North Macedonia, budgets of the units of local self-government and various donations.

National Biodiversity Strategy and Action Plan for the Period (NBSAP) 2018–2023¹⁰²

The 2018 NBSAP for the period 2018–2023 defines 19 national strategic targets, corresponding to the CBD Aichi Biodiversity Targets. Among these 19 targets, most relevant are those directly related to biodiversity conservation and the development of protected area networks, e.g., national strategic target 10 concerning habitats, target 11 concerning protected areas, target 12 concerning protected species, and target 15 concerning the protection of species and ecosystems in a cross-border context (in cooperation with neighbouring countries). The Action Plan part of the 2018 NBSAP details the extensive set of planned actions related to each of the 19 national targets, also indicating the responsible bodies and timeline for their implementation. For example, the designation of new protected areas, stipulated by the 2004 Spatial Plan, other strategic documents and relevant studies are planned for the period 2018–2023. The national wetlands policy or programme for wetlands conservation (which is obligatory for the parties to the Ramsar Convention) has not yet been developed and no measures for their protection and sustainable use has been included in the national spatial plans (however, such provisions are sometimes present in protected area management plans, e.g., for the Nature Reserve Ezerani).¹⁰³

PES are integrated into National Target 3: “Introduction of positive incentives for conservation and sustainable use of biological diversity following the Convention and EU related obligations and identification and correction of incentives that are harmful to affect biological diversity components” within the Action 3.1.2. Analysis and introduction of incentive measures, including PES towards poverty reduction through sustainable use of biological diversity and ecosystem services.

¹⁰² Ministry of Environment and Physical Planning (MEPP) (2018). [National Biodiversity Strategy and Action Plan \(For the period 2018-2023\)](#). Skopje, North Macedonia: MEPP.

¹⁰³ United Nations Economic Commission for Europe (UNECE) (2019). [North Macedonia Environmental Performance Reviews Third Review](#). Geneva, Switzerland: UNECE.

5.4.2 Climate change

At the national level, the Long-Term Strategy on Climate Action and Action Plan was adopted in 2021.¹⁰⁴ It defines the national contribution to the global effort, through a pathway towards green, low carbon and climate resilient development, based on the best available information and in the context of the country's accession to the EU. Additionally, other strategic and key policy documents can be identified. They are divided into two groups, national and local. National strategic and key policy documents related to this topic are:

- National Strategy for Sustainable Development (2010–2030) - identifies climate change as a key challenge and as a cross-cutting issue relevant for a range of sectors from energy to rural development, with the key objective of limiting climate change and its costs and negative effects on society and the environment;
- Energy Development Strategy for the period 2008–2020 with Vision until 2030;
- Strategy for the Use of Renewable Energy Sources until 2020;
- Climate Change Health Adaptation Strategy and Action Plan;
- Strategy for Waste Management for the period 2008–2020;
- Energy Efficiency Strategy until 2020.

At the local level, the document Resilient Skopje – Climate Change Strategy indicates that water, health and DRR sectors are most vulnerable to climate change impacts and an action plan has been developed, along with other municipal climate change strategies.

Furthermore, based on the responsibilities for reporting to UNFCCC, North Macedonia has adopted the following documents:

- First National Communication on Climate Change (2003);¹⁰⁵
- Second National Communication on Climate Change (2008);¹⁰⁶
- Third National Communication on Climate Change (2014);
- Fourth National Communication on Climate Change (in preparation);¹⁰⁷
- Macedonian Intended Nationally Determined Contributions (2015);¹⁰⁸

¹⁰⁴ Ministry of Environment and Physical Planning (MEPP) (2021). [Long-Term Strategy on Climate Action and Action Plan](#). Skopje, North Macedonia: MEPP.

¹⁰⁵ Ministry of Environment and Physical Planning (MEPP) (2003). [First National Communication on Climate Change](#). Skopje, North Macedonia: MEPP.

¹⁰⁶ Ministry of Environment and Physical Planning (MEPP) (2003). [Second National Communication on Climate Change](#). Skopje, North Macedonia: MEPP.

¹⁰⁷ Ministry of Environment and Physical Planning (MEPP) (2022). [DRAFT Fourth National communication on climate Change](#). Skopje, North Macedonia: MEPP.

¹⁰⁸ Ministry of Environment and Physical Planning (MEPP) (2015). [Intended Nationally Determined Contribution](#). Skopje, North Macedonia: MEPP.

- Enhanced Nationally Determined Contribution – Submission of the Republic of North Macedonia (2021);¹⁰⁹
- First Biennial Update Report on Climate Change (2015);¹¹⁰
- Second Biennial Update Report on Climate Change (2017);¹¹¹
- Macedonian Third Biennial Update Report (2021)¹¹².

5.4.3 Spatial plan of the North Macedonia

The spatial plan of North Macedonia was in force until 2020. It represents an integral document for the country's spatial development, providing guidelines for the purpose, use, protection, organisation, planning and management of the country's space (according to the Law on Spatial and Urban Planning, Article 8). In addition, a new Sectoral Study for Natural Heritage should be prepared, for the requirements of the new Spatial Plan of the State (since the existing study from 1999 is outdated) and will contain all previous analyses/documents related to the natural Heritage, and will take into account European and global goals for the protection of biological diversity.

5.4.4 Disaster risk management

Concerning DRM, North Macedonia was one of 187 countries that adopted the Sendai Framework for DRR during the Third World UN Conference on Disaster Risk Reduction held in Sendai, Japan in March 2015. Accordingly, efforts are being invested to meet the objectives, and to mainstream the Sendai Frameworks priorities in the national and local contexts and policy and normative frameworks. It is the main driver for the development of national DRM. Nevertheless, the country has not officially submitted reports on the progress of the achievement of the targets.¹¹³ Also, “the country lacks a national disaster-risk strategy in line with the Sendai Framework, and there are significant challenges in complying with European Union legislation and standards.”¹¹⁴ Considering the Sendai Framework Targets, no official reports have been submitted and there are no data on the Sendai Framework Monitor. In country, there is no strategic document at the national level, instead there is only the National Strategy for Protection and Rescue (2014–2018), which has expired and its revision for the following period is ongoing with drafting of a new version for the period 2021–2025.

¹⁰⁹ Ministry of Environment and Physical Planning (MEPP) (2021): [Enhanced Nationally Determined Contribution – Submission of the Republic of North Macedonia](#). Skopje, North Macedonia: MEPP.

¹¹⁰ Ministry of Environment and Physical Planning (MEPP) (2015). [First Biennial Update Report on Climate Change](#). Skopje, North Macedonia: MEPP.

¹¹¹ Ministry of Environment and Physical Planning (MEPP) (2017). [Second Biennial Update Report on Climate Change](#). Skopje, North Macedonia: MEPP.

¹¹² Ministry of Environment and Physical Planning (MEPP) (2021). [Third Biennial Update Report on Climate Change](#). Skopje, North Macedonia: MEPP.

¹¹³ UNDRR [website]. Available at: <https://sendaimonitor.undrr.org/>. Accessed on 30 March 2021.

¹¹⁴ UNDP North Macedonia (2021). [Country programme document for the Republic of North Macedonia \(2021–2025\)](#). Skopje, North Macedonia: UNDP North Macedonia.

Nevertheless, this document was more an action plan for the protection and rescue system, rather than the strategical framework for its development. Also, it is important to mention that during 2019, the revised National DRR Platform was established. The Platform was given political impetus, guaranteeing the national ownership and leadership of the DRR process. The National Platform for DRR has some activities in all phases of DRR and crisis management in general.

Concerning the risk multi-hazard, multi-risk and multi-sector approach to DRR in the country, in 2019 the Government adopted the first-ever National Assessment of security threats of the Republic of North Macedonia from all risks and hazards. Further, during the period 2014–2015, all 80 municipalities and the City of Skopje adopted similar local assessments, and they are regularly updated.

Within the efforts to attain and monitor the implementation of the Sendai Framework objectives and the SDGs, especially SDG 13: Climate Action, a new module within the E-platform managed by the CMC was developed aimed to support regular reporting towards the Sendai Monitoring Framework (as per the "Technical Guidance for Monitoring and Reporting on Achieving Global Targets of the Sendai Framework for Disaster Risk Reduction"¹¹⁵), DesInventar and SDG13.¹¹⁶ Accordingly, they are used to record events, occurrences, conditions and data on past disaster events, and to contribute to systematic and better data collection and reporting on damages and losses.

Furthermore, the CMC has established the most comprehensive and systematized ICT system in the country for support of the DRR consisting of various web applications and databases of all risk elements, i.e., inventory of the critical infrastructure and other elements at risk, demographic data (population), registry of capacities and resources of the CMC, Information and Documentation Database, Eco-DRR Module, NbS module (including risks from erosions, landslides, torrents).

¹¹⁵ United Nations Disaster Risk Reduction (UNDRR) (2018). *Technical guidance for monitoring and reporting on progress in achieving the global targets of the Sendai Framework for Disaster Risk Reduction (New edition)*. New York, USA: UNDRR

¹¹⁶ United Nations Statistics Division [website]. Available at: <https://unstats.un.org/sdgs/metadata/?Text=&Goal=13&Target=>. Accessed on 30 March 2021.

5.5. Key legislative framework

5.5.1 Biodiversity and nature protection

Law on Nature Protection¹¹⁷

The Law regulates the protection of natural, biological and landscape diversity, inside and outside protected areas, also as “natural rarities”. It determines the competencies of authorities, general measures to be undertaken (including restrictions and prohibitions on, e.g., land use, use of the natural environment, exploitation of natural resources). It contains provisions on the protection and conservation of wild species of plants, fungi and fauna (including provisions on the Red List and Red Book of threatened species); introduction and reintroduction of species; control of alien species; CITES-related provisions on trade in endangered species; breeding of animal species; lists of protected species and measures for their protection; and the protection of habitats and ecosystems and monitoring of their status. The Law provides for the establishment of the national ecological network, including ecological corridors; defines protected area categories; provides a legal basis for mutual agreements on harmonised management plans for transboundary protected areas; determines the legal protective regime in protected areas of all management categories and the procedure for their proclamation; indicates the possible functional zoning pattern of protected areas, including an outer buffer zone; defines procedures related to protected area management planning, and determines the competences of the guard service. The Law contains provisions on the proclamation, protection and management of “natural rarities”, i.e., rare, endangered and endemic species, plant communities, relief forms, or speleological objects, which are not a protected area category. It also contains provisions on the protection of landscape diversity, valuation of landscapes and monitoring of their state, with a view to their possible proclamation as protected areas. Also, the Law provides the legal basis for the establishment of a public institution for national park and its bodies, the establishment of cadastres of protected areas and natural heritage, keeping records on protected species, the establishment of the national biodiversity information system, and monitoring of the state of nature, including monitoring of species, habitats, ecosystems and landscapes. It also requires the adoption and implementation of a national strategy for nature protection, indicates possible funding sources for implementation of the Law, including various fees and other payments for ecosystem services, and determines the misdemeanour sanctions for the infringement of provisions of the Law. According to the Gap Assessment Report of September 2016, only 22 (approximately one third) of more than 60 required bylaws were in force at that time, while the 2018 NBSAP

¹¹⁷ Law on Nature Protection. Official Gazette of the Republic of Macedonia 67/04, 14/06; 84/07; 35/10; 47/11; 148/11, 59/12 and 13/13.

mentions around 50 by-laws prescribed but only 17 (approximately one third) have been adopted.¹¹⁸

Nevertheless, the most prominent elaboration of the concept of ecosystem services is stipulated in this Law is contained in the Definitions in Article 6, paragraph 1, items 61–63. The main consideration of ecosystem services in this act related to nature protected areas but refers also to all other areas and related services. Accordingly, ecosystem services are services that are provided and available to all entities considering the natural characteristics of an area, which especially means the following groups of services:

- a) Support services – necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production, nutrient circulation and water circulation;
- b) Supply services – products obtained from ecosystems, including food, cellulose fibres, fuel, genetic resources, natural medicines and spices, raw materials for the pharmaceutical and biochemical industry and drinking water;
- c) Regulatory services – all benefits derived from the regulation of ecosystem processes including air quality regulation, water purification, climate regulation, regulation and protection against natural hazards (floods, erosion, drifts and landslides), pest control and infectious diseases and pollination, and
- d) Cultural services – as the intangible benefits of ecosystems - cultural, intellectual and spiritual benefits (through spiritual enrichment, cognition, inspiration and reflection), recreational tourism and aesthetic values, in a way that takes into account the values of the landscape. PES is an operationalisation of the "user pays" principle and implies payment of fees or other payments determined through voluntary negotiation to reach a binding agreement by users of ecosystem services on the one hand and entities that manage ecosystems on the other, to maintain, protect and manage ecosystems in the territory by the entities entrusted with their management. Users of ecosystem services are legal or physical entities that perform an activity outside the protected area, but which due to the ecosystem services provided by it enjoy an advantage over other legal or physical entities that perform the same or similar activity but do not have benefit from the ecosystem services of the protected area.

Furthermore, in the same Law, Article 54 – Forest habitats and ecosystems, paragraph 1, item 3 stipulates that the “preservation and protection of forest habitats and ecosystems in

¹¹⁸ United Nations Economic Commission for Europe (UNECE) (2019). [Environmental Performance Reviews – North Macedonia – Third Review](#). Place, Country: UNECE.

protected areas are provided according to the principles of sustainable development, preservation and maintenance of the natural composition of the species and their natural renewal, as well as provision and maintenance of ecosystem services and the conditions for a favourable state of conservation of species and habitats.” PES is one of the resources for funding of the national parks (Article 141, paragraph 1, item 10) and nature protection (Article 161, paragraph 1, item 12).

Other laws related to biodiversity and nature protection

In regard to NbS, two other laws are relevant: **the Law on Forests**¹¹⁹ does not directly stipulate the ecosystem services or payment of these services. There are only two aspects that refer to the mentioned topic, the use of the forest and the rights of entities managing state-owned forests. The former refers to the harvesting of timber and production of forest products, use of debris and other forest products (forests fruits, herbal plants, mushrooms, lichens, moss, seeds, resin, stone, etc.), trade-in wood and other forest products, as well as the use of forests for tourism, hunting and recreation. The latter enables the entities to make gains through the collection and sale of forest products; collection, production and sale of forest fruits, mushrooms and herbal plants, snails and turtles; exploitation of stone, sand, gravel, hummus, etc. **The Law on Waters**¹²⁰ provides the general framework for the protection and sustainable management of water resources. It has environmental provisions and includes the transposed provisions of the EU Water Framework Directive (WFD) 2000/60/EC, Directive 1976/160/EC, Directive 91/676/EC, Directive 98/83/EC, Directive 98/83/EC, Directive 91/271/EC, Directive 1976/ 464/EC and Directive 75/440/EC. Nevertheless, it does not directly stipulate the ecosystem services related to water or payment of those services. Indirect payment of water services relates to the use of the water as stipulated in Article 207. Economic instruments with environmental impact incorporated into the Law include user charges for water supply and consumption, sewage and wastewater charges, and penalties.

5.5.2 Climate change

North Macedonia does not have a climate action law. Within the framework of an EU twinning project, there is an ongoing intervention for support of the MEPP for the preparation of this kind of law.¹²¹ The three main objectives of the legislation on climate action currently under development are the full transposition and implementation of the EU climate acquis, achieving a low-carbon economy and achieving a more “climate-resilient” society. Consequently, the

¹¹⁹ Law on Forests. Official Gazette of the Republic of Macedonia 64/09, 24/11, 53/11, 25/13, 79/13, 147/13 and 43/14.

¹²⁰ Law on Waters. Official Gazette of the Republic of Macedonia No. 4/98, 19/2000.

¹²¹ EU-funded project: Preparation of Long-term Strategy and Law on Climate Action [website]. Available at: <https://climateaction-ipaproject.mk/links/>. Accessed on 30 April 2021.

new law is expected to encompass the EC's long-term low-carbon strategy, Energy Roadmap 2050.

The **Law on Environment**¹²² prescribes the institutional arrangements for climate change issues, as well as the development and adoption of a national plan for climate change for a six-year period, and an action plan for prevention of the causes and mitigation of the negative effects of climate change. It does not however reflect on potential effects specifically concerning ecosystems. Other legislative acts do not directly prescribe climate actions but refer indirectly to certain competencies and activities. For example, the Law on Waters (2008) stipulates the “protection and improvement of environment and nature, aquatic ecosystems and biological diversity and protection of human health”, the 2004 Law on Waste Management lists human life and health while protecting the environment as one objective, and the 2004 Law on Ambient Air Quality sets a framework for the avoidance, prevention and reduction of harmful effects of ambient air pollution on the environment and human health to “prevent and reduce pollution that may lead to climate change”. Finally, the 2018 Law on Energy incorporates climate considerations by listing a decrease in the use of fossil fuels, an increase in the share of renewable energy, and climate change mitigation as goals of the country's energy policy.

5.5.3 Disaster risk management

The following legislative acts are considered to be key for the area of DRM. Nevertheless, biodiversity and ecosystems services are not mainstreamed within their texts.

Law on Crisis Management (2005 with amendments in 2014, 2015 and 2021)¹²³

Regulates the crisis management system in the Republic of North Macedonia, particularly the organisation and functioning, decision-making and use of resources, communication, coordination and cooperation, assessment of the threat to the security of the Republic, planning and financing, and other issues related to the crisis management system. Further, the most important bylaws and other acts in the field of crisis management include the Decree on the type of data and information and the modality and procedure for their submission to the CMC (2007); Decree on the organization, planning and implementation of trainings and exercises within the Crisis Management System (2010); Decree on the methodology for the preparation of the assessment of the security threat to the Republic of Macedonia from all risks and dangers, its content and structure, the manner of storage and updating, as well as

¹²² Law on Environment. Official Gazette of the Republic of Macedonia 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11, 123/12, 93/13, 44/15.

¹²³ Law on Crisis Management. Official Gazette of the Republic of Macedonia_29/05, 41/14, 104/15, 215/21.

the designation of entities in the crisis management system to which full or excerpt from the assessment (2011); Decree on warning signs, modality and procedures for warning and actions of the population (2018); Decree on defining the operational procedures for joint communication, coordination, cooperation and activities of the entities in the crisis management system (2018); Standard operating procedures for communication, coordination and cooperation between the entities of the crisis management system in a declared state of crisis (2016), and Rules of procedure of the Regional Headquarters for Crisis Management.

***Law on Protection and Rescue (2016)*¹²⁴**

Regulates the system for protection and rescue of people, environment, material goods, natural resources, flora and fauna and cultural heritage from natural disasters and other disasters in peace, state of emergency and martial law in the Republic of North Macedonia. By-laws from this area relate to various aspects in the field of protection and rescue.

***Law on Firefighting (2017)*¹²⁵**

Regulates the establishment, organisation and operation of firefighting units, voluntary firefighting associations, firefighting, as well as the conditions for production, commissioning and maintenance of devices, firefighting equipment and equipment.

***Law on Local Self-Government (2002)*¹²⁶**

Regulates the following areas (Article 1): competencies of municipality; direct participation of citizens in decision-making; organisation and work of municipal bodies; municipal administration; acts of bodies; property owned by the municipality; supervision over the work of the municipal bodies; dissolution of the municipal council; mechanisms of cooperation between the municipalities and the Government of the Republic of North Macedonia; local self-government; protection of the local self-government; establishment of official languages in the municipalities, and other issues of local self-government.

5.5.4 Other sectors

Other legal acts relevant to NbS include the Criminal Code, 1998 Law on Pastures, 2007 Law on Agricultural Land, 2008 Law on Fishery and Aquaculture, 2009 Law on Hunting, 2009 Law on Organic Production, 2010 Law on Agriculture and Rural Development, 2012 Law on Tourism Development Zones, 2012 Law on Mineral Resources, 2014 Law on Spatial and

¹²⁴ Law on Protection and Rescue. Official Gazette of the Republic of Macedonia 36/04, 49/04, 86/08, 85/09, 114/09, 124/10, 18/11, 41/14, 129/15, 71/16, 106/16, 83/18, 215/21).

¹²⁵ Law on Firefighting. Official Gazette of the Republic of Macedonia 168/17, 152/19.

¹²⁶ Law on Local Self-government. Official Gazette of the Republic of Macedonia 05/2002.

Urban Planning, and 2014 Law on Mountain Trails.¹²⁷ The entry points for NbS into legal acts in other sectors is usually through a CCA or DRR angle.

Agriculture

The National Strategy for Agriculture and Rural Development 2014–2020 outlines measures and reforms aimed at increasing food production, supporting young farmers and rural women, restoring agricultural machinery and growing livestock. The adoption of the EU's Agriculture Acquis is at the core of all initiatives of the MAFWM sector and sub-sector development. A new Programme and Action Plan for Irrigation Development was adopted in 2015 for the period 2015–2020 and envisaged total investments of EUR 323 million for the rehabilitation and upgrading of the existing irrigation system.

The **2013 Law on Agriculture and Rural Development** determines the key objectives of the national agricultural policy but does not mainstream DRR or link it to climate change. It mainly refers to adverse weather conditions that can affect the agricultural sector. On the other hand, it refers to protecting agricultural assets from disasters, provision of compensation to the affected farmers from natural disasters, and provision of investments in the agricultural infrastructure that can protect the assets from the natural disasters. The current National Strategy for Agriculture and Rural Development 2014–2020, in contrast to the previous Agriculture Strategy of 2007–2013, recognises the increased risk of extreme weather events and views climate change as a threat to the sector. It also acknowledges its adverse impact on agriculture subsectors, particularly crops, livestock and forests. It envisages support for measures for reducing vulnerabilities of smallholder farmers, although not many measures are listed. It mainly mentions the need to enhance awareness and sustainable resource management as well as pledging support for climate change adaptation and mitigation. The strategy lacks systematic DRR mainstreaming, which as a specific structure is absent, in particular in assigning responsibilities to certain stakeholders. It also fails to set up a monitoring structure for DRR as a clear goal to be achieved or measured as well as mentioning specific agriculture prevention and mitigation measures that can reduce the adverse impacts of natural hazards and climate change.¹²⁸

¹²⁷ United Nations Economic Commission for Europe (UNECE) (2019). [North Macedonia Environmental Performance Reviews Third Review](#). United Nations. Geneva, Switzerland. UNECE.

¹²⁸ Food and Agriculture Organization of the United Nations (FAO) (2018). *Comprehensive analysis of the disaster risk reduction and management system for the agriculture sector, The Former Yugoslav Republic of Macedonia*. Skopje, North Macedonia: FAO.

Climate change is projected to have a significant impact on irrigation and crop yields. Farmers are vulnerable due to the low adaptive capacity caused by a set of factors, including limited awareness of ongoing and future impacts, lack of funding for testing and demonstration of adaptive practices, underdeveloped irrigation systems in terms of capacity and water-saving techniques, and so on. Detailed information on post-disaster damages, losses and needs disaggregated by sex, age and other social determinants are often lacking or inadequate. Small-scale farmers, even under current agro-climatic conditions, use suboptimal seeds and production methods that limit their adaptation capacity. There is no standardised system for managing information on land resources and land suitability that could better inform policymakers. Therefore, there is a need to strengthen the collection, analysis, and dissemination of information on crop and land resources management and land suitability.

Forestry

As per the Third National Communication,¹²⁹ the key findings of the assessment review several major impacts of climate change on forest ecosystems in the country: impact on the health condition of forests, crown transparency, water availability, forest fires, impact on forest ecosystem services, productivity, carbon storage and sequestration, and impact on forest management i.e., forest management planning, forest utilisation, forest protection, land-use changes, etc. Therefore, an appropriate strategic and normative framework is needed to ensure sustainable forest management.

The main policy in the area of forestry is characterised by a lack of a strategic framework for sector development as it faces the effects of climate change, unsustainable management practices, and increased illegal logging. The only strategic document is the National Strategy on Forestry adopted in 2006 for a 20-year period. In that sense, the main focus is to increase the contribution of the forestry sector in the national economy, based on sustainable forest management and increased investments in afforestation activities. Nevertheless, after 15 years it can be seen that this is not a case given illegal logging operations and the still predominant view of the forest as the production of trees for various purposes. Additionally, pressures on forests are increasing due to the difficult economic conditions of the forest management units, high demand for wood mass, and absence of adequate policy and normative framework, etc.

¹²⁹ Ministry of Environment and Physical Planning (MEPP) (2014). [Third National Communication on Climate Change](#). Skopje, North Macedonia: MEPP.

Although the country has great potential for forestry development, there main limiting factors are the large percentage of degraded forests and shrubs and the poor quality of wood mass, due to which it is used more as firewood, and very little as a technical tree. The wood industry is facing a shortage of modern equipment and automation systems that are not manufactured in the country. The level of investment is very low, especially foreign direct investment. The main threats and problems in forest management are illegal logging and other illegal activities, forest fires on an annual basis (1998 –2012) with an average area of about 10,344 ha burned, forest drying caused by climate change or attacks by harmful insects and diseases. In conjunction, this has led to massive economic and environmental losses in the forestry sector.¹³⁰

The **Law on Forests**¹³¹(³⁷) does not directly stipulate the ecosystem services or payment of these services. Only two aspects refer to these topics, i.e., the use of the forest, and the rights of entities managing state-owned forests. The former refers to the harvesting of timber and production of forest products, use of the debris, other forest products (forests fruits, herbal plants, mushrooms, lichens, moss, seeds, resin, stone, etc.), trade-in wood and other forest products, as well as the use of forests for tourism, hunting and recreation. The latter enables entities to make gains through the collection and sale of forest products; collection, production and selling of forest fruits, mushrooms and herbal plants, snails and turtles; exploitation of stone, sand, gravel, hummus, etc.

The main challenge in the area of forestry is the transformation of the entire forestry sector, primarily the public enterprise National Forests. The Government has tasked the Ministry of Agriculture, Forestry and Water Economy to set up a working group to oversee the transformation of the sector. Accordingly, new and revised legislation for the entire forestry sector needs to be adopted.

Water management

The main legislation in the area of water consists of the **Law on Water**, **Law on Environment** and **Law on Nature Protection**. The **Law on Water** has transposed the requirements of many EU directives in the domain of water resource management. It provides the legal basis for water protection and management and regulates the use and exploitation of water resources, protection against harmful effects of water, protection of water against exhaustive extraction

¹³⁰ Ministry of Agriculture, Forestry and Water Economy (MAFWM) (2014). National Strategy for Agriculture and Rural Development for the period 2014-2020. Skopje, Republic of Macedonia: MAFWM.

¹³¹ Law on Forests. Official Gazette of the Republic of Macedonia 64/09, 24/11, 53/11, 25/13, 79/13, 147/13, 43/14, 160/14, 33/15, 44/15, 147/15, 07/16 and 39/16.

and pollution, water resources management, financing of water management activities, transboundary water resources, and other issues related to water use regime. The **Law on Water** specifies the development of the National Water Strategy for a 30-year period, Water Management Plan for a 20-year period, and River Basin Management Plans every ten years. In 2012, a **Water Strategy** was adopted. It analyses in detail the status of surface and groundwaters and identifies key goals and measures. A new approach to water management set out in the EU Water Framework Directive and the EU Flood Directive requires that waters be assessed and managed at the watershed level, rather than geographically or politically. The Government has defined the boundaries of the river catchments. River Basin Management Plans have been prepared for the Vardar Watershed and the Strumica Watershed. The management plan for the Black Drin Watershed is under development. All management plans have been prepared with the support of international partners.¹³²

Priorities: Establishing a system for flood assessment, protection and preparedness, handling and developing flood risk management plans; Establishment of river basin management and improvement of the state of the environment, and the preservation of human health by improving water quality; Establishment of a comprehensive water monitoring system; Completion of river basin management plans.¹³³

The Law on Waters provides the general framework for the protection and sustainable management of water resources. It includes environmental provisions and has transposed the provisions of the EU Water Framework Directive (WFD) 2000/60/EC, Directive 1976/160/EC, Directive 91/676/EC, Directive 98/83/EC, Directive 98/83/EC, Directive 91/271/EC, Directive 1976/ 464/EC and Directive 75/440/EC. Nevertheless, it does not directly stipulate the ecosystem services related to water or payment of those services. Indirect payment of water services relates to the use of the water as stipulated in Article 207. Economic instruments with environmental impact incorporated into the Law include user charges for water supply and consumption, sewage and wastewater charges, and penalties.

¹³² United Nations North Macedonia (2020). [Sustainable Development Goals Voluntary National Review North Macedonia](#). Skopje, North Macedonia: United Nations North Macedonia

¹³³ Ibid.

6. Opportunities for mainstreaming of Nature-based Solutions in climate change adaptation and disaster risk reduction

The implementation of NbS for CAA, DRR, and overall resilience would be enabled by mainstreaming the concept of ecosystem services into relevant sector plans and policies. This can be done in several ways: through integrating environmental principles and EbAs into relevant sector policies (including climate change, DRR) and vice versa, by integrating climate change and DRR principles into the main environmental policies (such as water and forest).

At the global level in respect to DRR, the mainstreaming of ecosystem services can be observed. For example, *the Sendai Framework for Disaster Risk Reduction 2015-2030* recognises and promotes the role of ecosystem management in DRR and for the first time highlights the role of ecosystems and the environment as a cross-cutting issue to be addressed for DRR. Nevertheless, at the moment there is no strategic framework document for DRM in North Macedonia. Besides, there is an ongoing initiative for reform of the DRM system in the country through the integration of the CMC and the Protection and Rescue Directorate. Since this exercise will result in legislative reform, there is a great opportunity to mainstream Eco-DRR as a tool for sustainable DRR.

In respect to climate change adaptation, there have been concrete acknowledgements for the role nature can play, not just in CCA but also in climate change mitigation. Despite the predictions for the potential of NbS, such as the extent to which afforestation can help reach the mitigation goals needed to reach the global goals for the Paris Climate Change Agreement, misunderstandings and mis-labelling of interventions threatens to nullify the potential of the NbS contributions. To ensure both nature and people are protected, while also enabling the scaling up and design of strong NbS, it will be necessary to rely upon a global understanding, shared language and robust facilitative framework for NbS. To ensure that any steps North Macedonia takes towards addressing climate change with NbS are sustainable steps, building capacities and identifying entry points specifically for frameworks such as the IUCN Global Standard for NbS will be necessary.

In order to improve the capacities of the state to strengthen climate finance, the Green Climate Fund has allocated resources within the framework of its Preparedness and Support Programme, which will help states to improve information, develop capacities and engage all relevant stakeholders at the national and local levels.

7. NbS for CAA and DRR: projects in North Macedonia

Several initiatives that link directly with Eco-DRR and ecosystem services, thus showing solid potential to be strong NbS, have been or are being implementing in North Macedonia, and from these lessons can be derived and future opportunities for replication or scaling-up recognised. These initiatives were identified during the desk review phase of the assignment and will be verified during the stakeholder's consultation meetings. Essential information on these project interventions is presented in Annex I.

8. Conclusions

According to this extensive desk study, it follows that in North Macedonia there is a great potential for the establishment of NbS from the aspect of biodiversity protection, but also from the aspect of DRR. The wealth of biodiversity puts the country among the top ten hotspots in Europe, which on the one hand gives us a unique position to have such a range of flora, fauna, fungi and geodiversity, but on the other hand gives us a great responsibility for the protection and preservation of this Macedonian, European and world natural heritage.

NbS are a relatively new approach, promoted during recent decades by the international community to address climate change issues, natural disasters and other societal challenges. As per its definition, NbS can be applied in numerous fields and through various approaches (ecosystem-based adaptation, green infrastructure, ecological/environmental engineering, forest landscape restoration, etc.).

It is this new approach that allows for the integrated involvement of stakeholders, local communities, vulnerable groups of citizens in active protection of nature through information and involvement in direct or indirect implementation *in situ*.

Hence, general situations that can be encountered in the field indicate that there are locations where NbS are still necessary to prevent the loss of diversity by enabling the restoration of already destroyed habitats. This is one of the main goals of the latest NBSAP for 2018–2023.

This document will certainly provide a basis for the establishment of NbS activities in the country, which in turn will enable, both directly and indirectly, North Macedonia to keep in line with the modern ways of protecting of biodiversity and ensuring its favourable status for survival.

Annex I: NbS for CAA and DRR: projects in North Macedonia

Project 1: Capacity building for Ecosystem-based Disaster Risk Reduction (Eco-DRR) through sustainable forest management in the Republic of North Macedonia¹³⁴

Time framework: 2017–2023

Status: ongoing

Funded by: JICA¹³⁵

Implementing agency/ies: CMC¹³⁶ with close cooperation of the public enterprise National Forest

Beneficiaries: Municipalities of Radovish, Chashka, Veles, Sveti Nikole and Skopje and their citizens; Faculty of Forestry, University of St. Cyril and Methodius; MAFWM

Societal challenges addressed: DRR

Approaches taken: Sustainable Forest Management

Ecosystem/s: Forests

Objectives: The objective is to develop an Eco-DRR model project against flood, landslides, soil erosion, and forest fires by utilising multiple forest functions and enhancing sustainable forest management. Accordingly, four outcomes with more relevant activities are identified:

1. Update and expand of function of system development for disaster prevention and information dissemination;
2. Enhancement of Forest management and Planning capacity (application of the protective function of the forest for disaster prevention);
3. Enhancement of capacity to carry out Eco-DRR related activities (Application of forest conservation activities by plantation and civil engineering works - synergy between grey and green engineering);
4. Public awareness and results in dissemination (Local and public awareness for the application of sustainable and effective Eco-DRR measures).

Locations: Radovish, Chashka, Sveti Nikole, Skopje (Vodno Mountain).

¹³⁴ Macedonia Eco-DRR Project Facebook Group [website]. Available at: <https://www.facebook.com/MacedoniaEcoDRR/>. Accessed on 30 September 2020.

¹³⁵ JICA [website]. Available at: https://www.jica.go.jp/project/english/north_macedonia/001/index.html. Accessed on 30 September 2020.

¹³⁶ Crisis Management Centre [website]. Available at: www.cuk.gov.mk. Accessed on 30 September 2020.

Project 2: Promoting Sustainable Land Management through Strengthening Legal and Institutional Framework, Capacity Building and Restoration of the Most Vulnerable Mountain Landscapes¹³⁷

Time framework: 2019–2023

Status: ongoing

Funded by: GEF and MEPP

Implementing agency/ies: MEPP in coordination with UNEP.

Beneficiaries: Municipalities of Arachinovo, Gazi Baba, Lipkovo, Jegunovce, Zhelino and Saraj, MAFWM, public enterprise National Forests, National Association of Private Forests Owners, University of St. Cyril and Methodius, Faculty of Forestry and Faculty of Agriculture and Food science, local communities and farmers, Institute of Agriculture.

Societal challenges addressed: Ecosystem degradation and biodiversity loss, DRR, CAA and mitigation

Approaches taken: Sustainable land management, sustainable forest management

Ecosystem/s: Mountain

Objectives: The objective is to develop and strengthen national policy and institutional capacity for sustainable land management and to contribute to achieving the national LDN target with integrated landscape management in the north-western mountainous ecosystems of North Macedonia. Current land-use practices in Macedonia are contributing to severe land degradation, which is exacerbated by climate change and extreme weather events such as flooding. The expected positive impacts in terms of risk reduction include:

- 1) Strengthening legal and institutional framework and capacity building for sustainable land management and sustainable forest management;
- 2) Implementing sustainable land and forest management practices to reduce the effects of land degradation in three pilot sites in the most vulnerable mountainous region;
- 3) Implementing knowledge management and raising public awareness.

Location: Municipalities of Arachinovo, Gazi Baba, Lipkovo, Jegunovce, Zhelino and Saraj.

Project 3: Programme for nature conservation in Macedonia – Phase II¹³⁸

Time framework: 2017–2023

Status: ongoing

¹³⁷ GEF [website]. Available at: <https://www.thegef.org/project/promoting-sustainable-land-management-slm-through-strengthening-legal-and-institutional>. Accessed on 30 September 2020.

¹³⁸ Swiss Development Cooperation (SDC) (2020). Selection of ecosystem services, assessment and mapping of the capacity for their provision. Skopje, North Macedonia: SDC.

Funded by: Swiss Development Cooperation

Implementing agency/ies: Pharmachem – Skopje and HELVETAS Swiss Intercooperation with the participation of the Macedonian Ecological society.

Beneficiaries: MEPP, MAFWM, municipalities, regional development centres, CSOs, etc.

Societal challenges addressed: Ecosystem degradation and biodiversity loss

Approaches taken: conservation, sustainable management

Ecosystem/s: Forests

Objectives: The objective is to strengthen and facilitate the transfer of international and Swiss expertise and knowledge on new approaches of integrative forest management to the forestry sector in North Macedonia adapted to local conditions.¹³⁹ To assist the Republic of North Macedonia in the conservation of its outstanding biodiversity and natural ecosystems through the promotion of their sustainable use and management, while meeting the NATURA 2000 requirements (one of the conditions for EU accession). In particular, the project acts in the following areas:

- 1) Capacity strengthening at all levels for efficient implementation of national legislation for nature conservation and integrated management of natural resources;
- 2) Applying a regional approach for nature conservation and sustainable management with natural resources in the Bregalnica region;
- 3) Supporting citizens and SMEs from the Bregalnica region and SMEs of the Bregalnica region to develop an offer for environment-friendly tourism activities and services, and to sell sustainably produced goods in a socially inclusive way.

Furthermore, it supports MEPP in developing an ecosystem service payment mechanism, including a methodology and guidelines for implementing the PES mechanism.

Location: Bregalnica watershed, nationally.

Project 4: Improving Resilience to Floods in the Polog Region¹⁴⁰

Time framework: 2017–2023

Status: ongoing

Funded by: State Secretariat for Economic Affairs, Government of Switzerland, and Government of North Macedonia

Implementing agency/ies: UNDP with support of MEPP

¹³⁹ Bern University of Applied Science [website]. Available at: <https://www.bfh.ch/de/forschung/forschungsprojekte/2017-247-358-402/>. Accessed on 30 September 2020.

¹⁴⁰ UNDP North Macedonia [website]. Available at: <https://www.undp.org/north-macedonia/projects/improving-resilience-floods-polog-region>. Accessed on 30 September 2020.

Beneficiaries: Municipalities in the Upper Vardar Basin (Tetovo, Gostivar, Bogovinje, Tearce, Jegunovce, Zelino, Mavrovo-Rostushe, Brvenica and Vrapciste), Water Management Organisation, MAFWM, Hydro-meteorological Service, Development Centre of the Polog Planning Region, CSOs).

Societal challenges addressed: DRR

Approaches taken: Eco-DRR

Objectives: To instigate transformational change in managing flood risk in the region, accelerating the shift from purely reactive responses to floods to integrated systems to manage hazards, vulnerabilities and exposure of communities and assets to prevent and mitigate losses and alleviate the impact of future floods. In particular, the expected positive impacts include:

- 1) Improved understanding of flood risks in the Polog region and the capacity to manage them in an informed manner.
- 2) Enhanced disaster preparedness of institutions and communities in the Polog region for effective response, recovery, rehabilitation and reconstruction.
- 3) Implementation of priority flood risk mitigation measures informed by international best practices to effectively reduce future risks in the Polog region, and
- 4) Improvement of the national legal and regulatory framework for DRR in line with the Sendai Framework and the EU Floods Directive and conceptualisation of risk financing and risk transfer mechanisms.

Furthermore, within the framework of the flood protection approach, the beneficial values of ecosystem-based flood protection measures are demonstrated and serve as a basis for national scaling-up. NbS are sustainable solutions for flood risk reduction.

Location: Municipalities in the Upper Vardar Basin (Tetovo, Gostivar, Bogovinje, Tearce, Jegunovce, Zhelino, Mavrovo-Rostushe, Brvenica and Vrapciste).

Project 5: Project for agriculture modernisation¹⁴¹

Time framework: 2020–2024

Status: ongoing

Funded by: World Bank

Implementing agency/ies: MAFWM

¹⁴¹ Ministry of Agriculture, Forestry and Water Economy [website]. Available at: https://www.mzsv.gov.mk/CMS/Upload/docs/AMP_ESMF_06.11.19_mk.pdf. Accessed on 30 September 2020.

Beneficiaries: MAFWM, Ministry of Finance, Agency for Financial support of the Agriculture and the Rural Development, Food and Veterinary Agency, Agency for Property Cadastre, public enterprise Pasture Management.

Societal challenges addressed: Food security

Approaches taken:

Ecosystems: Agriscapes

Objectives: To improve the competitiveness of the agricultural sector in North Macedonia and to strengthen public institutions within the country's EU accession process. The proposed goal for project development is to improve competitiveness in selected sub-sectors and to strengthen public institutions in the agricultural sector by implementing the following components:

- 1) Improving competitiveness of the agricultural sector at the farm level and encouraging the aggregation of agricultural products and market integration;
- 2) Strengthening institutional capacity to support the public sector, and
- 3) Supporting complete coordination and implementation of project activities (Platform for agricultural food in Skopje, collection and cooling station in Resen, collection and cooling station in Strumica and animal by-products processing system and their safe removal.

The ecosystem principle is part of the assessment process for financing the pilot projects through the "change of ecologically important areas, including wetlands, natural forests, pastures" and others, as well as "critical" natural habitats and ecosystem services.

Project 6: Integrated climate-resilient transboundary flood risk management in the Drin River basin in the Western Balkans

Time framework: 2019 - 2024

Status: Ongoing

Funded by: Adaptation Fund

Implementing agency/ies: UNDP, Global Water Partnership

Beneficiaries:

Societal challenges addressed: DRR

Approaches taken: Flood risk management

Ecosystem/s: Drin River Basin

Objectives: To assist riparian countries in the implementation of an integrated climate-resilient river basin flood risk management approach to improve their existing capacity to manage flood risk at regional, national and local levels and to enhance the resilience of vulnerable communities in the Drin River Basin to climate-induced floods. The

countries will benefit from a basin-wide transboundary flood risk management framework based on improved climate risk knowledge and information; improved transboundary cooperation arrangements and policy framework for flood risk management and specific management interventions. The project will contribute to strengthening the current flood forecasting and early warning system by increasing the density of the hydrometric network, and by digitising historical data for stations not currently in the existing forecasting model. The project will develop and implement transboundary integrated flood risk management strategies providing the national authorities with robust and innovative solutions for flood risk management, DRR and climate adaptation, including ecosystem-based gender-sensitive participatory approaches. The project will also develop the underlying capacity of national and regional institutions to ensure sustainability and to scale up the results. It will support stakeholders by providing guidance, sharing climate information, knowledge and best practices. The project will also invest in the priority structural and community-based non-structural measures. Importantly, the project is aligned with and will support the implementation of the EU Floods Directive in Drin River Basin countries.

Location: Crn Drim River Basin

Project 7: Improved Implementation of the EU Floods Directive through Harmonisation of National Legislation and Preparation of Flood Risk Management Plans

Time framework:

Status: to be initiated

Funded by: EU IPA Mechanism

Implementing agency/ies: MEPP

Beneficiaries: MEPP, JSC Water Economy; River Basin Councils; Ministry of Health; Crisis Management Center; Protection and Rescue Directorate; Local Self Government Units; Hydro-Meteorological Service.

Societal challenges addressed: DRR

Approaches taken: Flood risk management

Ecosystem/s: River basins

Objectives: To contribute to the harmonisation of flood risk management in the beneficiary country with the EU Floods Directive, thereby increasing environmental protection and protecting human life, health and property from adverse effects of floods by the production of planning documents related to flood risk management and strengthening capacities for its implementation. Results to be achieved are the following:

- 1) Completion of the legal framework for flood risk management in line with the requirements of the EU Floods Directive 2007/60/EC;
- 2) Strengthening the capacity for implementation of the EU Floods Directive 2007/60/EC;
- 3) Prepared Preliminary Flood Risk Assessments of all (10) river sub-basins, following the requirements of the EU Floods Directive 2007/60/EC, Articles 4 and 5;
- 4) Prepared Flood Hazard Maps and Flood Risk Maps for all river sub-basins in line with the requirements of the EU Floods Directive 2007/60/EC, Article 6;
- 5) Mapping of torrents and landslides;
- 6) Prepared Flood Risk Management Plans for all river sub-basins following the requirements of the EU Floods Directive 2007/60/EC, Article 7;
- 7) Prepared Implementation plan for Flood Early Warning System.

Project 8: Restoration of Strumica River Basin¹⁴²

Time framework: 2014–2020

Status: Finalized

Funded by: Government of Switzerland & UNDP

Implementing agency/ies: UNDP with support of MEPP

Beneficiaries: River basin municipalities (Strumica, Vasilevo, Bosilovo, Novo Selo, Radovish, Konche), River Basin Management Council, Development Centre of the Southeast Planning Region, MAFWM, monitoring institutions, farmers associations, CSOs, public enterprise National Forests, Forest Management Units in Belasica, Strumica, etc.

Societal challenges addressed: CCA

Approaches taken: Integrated Water Resources Management

Ecosystem/s: River basins

Objectives: The overall objective of this project is to introduce a set of comprehensive measures that will help restore the Strumica River Basin's socio-ecological functions and its overall resilience against the complex pressures resulting from human activities and global changes.¹⁴³ Aligned with the key principles of the EU Water Framework and Floods Directives and the underlying concept of Integrated Water Resources Management, this project aims to address the main types of pressures in the basin (point

¹⁴² UNDP North Macedonia [website]. Available at: <https://www.undp.org/north-macedonia/projects/restoration-strumica-river-basin>. Accessed on 30 September 2020.

¹⁴³ UNDP North Macedonia [YouTube]. Available at: <https://www.youtube.com/watch?v=itwSQtZIJko&list=ULSoQ1589xJf8&index=96>. Accessed on 21 September 2020.

source and diffuse pollution, as well as hydro-morphological modifications), while also maximising the possibilities for mitigating flooding risk. It also supports livelihoods by introducing better resource management practices and increasing the resilience of communities to water-related risks. Furthermore, within the framework of the flood protection approach, the beneficial values of the ecosystem-based flood protection measures are demonstrated and serve as a basis for national scaling-up. NbS is a sustainable solution for flood risk reduction. The achieved results are the following:

1. Reduced pressures on water bodies and enhanced resilience of the Strumica River Basin to flooding hazards;
2. Strengthened municipal capacities for environmental permitting by introducing the principles of integrated pollution prevention and control;
3. Support to the municipalities in identifying the most feasible wastewater management approaches;
4. Piloting a small-scale decentralised wastewater treatment system in selected rural communities;
5. Reduced use of agrochemicals and modified irrigation practices to reduce agricultural runoff and ensure more sustainable use of water resources;
6. Basin-scale analysis of flood risk and identification of feasible short- and long-term (systemic) flood risk mitigation options;
7. Optimised operating regimes of the existing reservoirs and other water structures and introduced flood early warning system;
8. Strengthened legal and regulatory environment for integrated flood risk management.

Location: Basin municipalities (Strumica, Vasilevo, Bosilovo, Novo Selo, Radovich, Konche).

Project 9: Improving protected area management

Time framework: 2017–2020

Status: Finalized

Funded by: EU & UNDP

Implementing agency/ies: UNDP with support of MEPP

Beneficiaries: MEPP, Ministry of Local Self-government, MAFWM, local governments, protected areas management authorities, CSOs

Societal challenges addressed: Ecosystem degradation and biodiversity loss, economic and social development

Approaches taken: Sustainable land management

Ecosystem/s: Protected areas

Objectives: The overall objective of this project is to assist the country in addressing priority needs in improving the management of natural resources within protected areas, promoting more sustainable use of natural resources thus demonstrating through practical examples that nature protection and the economic development of communities can go hand in hand. The central feature of the project is a grant scheme for up to 20 grants for nature protection projects. Given the wide variation in management structures for protected areas and their varying capabilities, the grant scheme consists of two separate mechanisms: one for larger protected areas with established management structures; and one for smaller, less developed protected areas, where a management authority has not yet been created. Results can be summarised as follows: With the implementation of the capacity building program of potential grantees and application of a multicriteria selection procedure, eight large protected areas were selected for grant funding: National Parks Pelister, Mavrovo and Galichica, Multipurpose area Jasen, Prespa, Dojran and Ohrid Lakes nature monuments, and Vodno and Matka protected areas, with 17 small and less developed protected areas also selected. In addition to the grants scheme, the project will support piloting at least two wastewater treatment facilities in or around protected areas. Building on successful models, these facilities will demonstrate the environmental and economic benefits of community-based wastewater treatment technologies. In the competitive multicriteria selection procedure, the municipalities of Bitola and Vevchani were selected for piloting wastewater treatment facilities.

Location: Eight large protected areas: National Parks Pelister, Mavrovo and Galichica, Multipurpose area Jasen, Prespa, Dojran and Ohrid Lakes nature monuments, Vodno and Matka protected areas, and 17 small and less developed protected areas.

Project 10: GEM Balkans - Creating conditions for the development of forest and catchment areas in the Balkans¹⁴⁴

Time framework: 2019–2020

Status: Finalized

Funded by: Deutsche Bundesstiftung Umwelt

Implementing agency/ies: Research Institute for Forest Ecology and Forestry as the leading partner and the Connecting Natural Values and People Foundation as the project coordinator

¹⁴⁴ GEM Balkans [website]. Available at: <https://bit.ly/2T1mzGp>. Accessed on 30 September 2020.

Beneficiaries: The public enterprise National Forests from the Republic of North Macedonia, the public enterprise Forest Management Srbijashume from the Republic of Serbia, and the Directorate for Forest Protection and Treatment from Albania, relevant institutions responsible for water management in those countries, i.e., MAFWM of North Macedonia, Ministry of Agriculture, Trade, Forestry and Water Economy of Serbia, subsidiaries and regional water companies, as well as farmers living near forest areas.

Societal challenges addressed: DRR

Approaches taken: Sustainable Forest management

Ecosystems: Forests

Objectives: To improve the existing practices in forest management planning in terms of improving forest hydrology planning within the management plans in North Macedonia and Albania. The main activities are:

- 1) Establishment of two pilot areas, one in North Macedonia and one in Albania, where the proposed measures for flood and erosion control will be tested as part of integrated forest management in catchment areas;
- 2) Harmonisation of forest and catchment management measures with EU standards;
- 3) Strengthening the capacities for planning in forestry concerning the aspects related to the protection of water resources, as well as protection from floods and erosion;
- 4) Raising awareness in society to increase understanding of the ecosystem services provided by forests concerning water resources.

Project 11: Restoration of Prespa Lake Ecosystem¹⁴⁵

Time framework: 2012–2018

Status: completed

Funded by: Government of Switzerland & UNDP

Implementing agency/ies: UNDP with support of MEPP

Beneficiaries: River basin municipalities (Strumica, Vasilevo, Bosilovo, Novo Selo, Radovish, Konche), River Basin Management Council, Centre for the Development of the Southeast Planning Region, MAFWM, monitoring institutions, farmers associations, CSOs, public enterprise National Forests, Forest Management Unit Belasica, Strumica, etc.

Societal challenges addressed: Ecosystem degradation and biodiversity loss

¹⁴⁵ UNDP North Macedonia [website]. Available at: <https://www.mk.undp.org/content/north-macedonia/en/home/projects/Restoration-of-the-Prespa-Lake-Ecosystem.html>. Accessed on 20 September 2020.

Approaches taken: Watershed management

Ecosystem/s: Freshwater Lake

Objectives: The Prespa Lake Basin is over 5 million years old – one of the most ancient freshwater lakes in the world. The lake region is home to more than 2,000 species of fish, birds, mammals and plants and the largest breeding colony of Dalmatian pelicans in the world. Many of these species are unique and many are in danger of dying out if their habitat is not protected. Therefore, the project aimed to improve improving Prespa Lake's overall health, strengthen its resilience and ensure, in the long run, control of the eutrophication processes. This was achieved through the implementation of a set of comprehensive measures aimed at reducing the pressures from agriculture, forest land, polluted rivers, wastewaters and solid waste while creating sustainable monitoring and watershed management capacities at the local level. Aligned with the key principles of the EU Water Framework Directive and the underlying concept of the Integrated Water Resource Management, the ultimate impact of the project was to contribute to the improvement of the Prespa Lake's ecological condition and resilience. The expected positive impacts include:

- 1) Improvement of water and soil quality in the Prespa Lake watershed including control of erosion processes and reduction of sediment load in the lake;
- 2) Reduction of the adverse apple farming processes;
- 3) Ensuring of flood control, retention and filtering of polluted tributaries and upgrade of the existing wastewater treatment technology for enhanced nutrient removal;
- 4) Wetlands restoration including the establishment of the Ezerani Nature Park;
- 5) Development of environmental infrastructure;
- 6) Improvement of waste management practices;
- 7) Sustainable watershed management practices at the local level;
- 8) Establishment of a Lake Monitoring System and Management Service, and
- 9) Public awareness activities.

Location: Prespa Lake Region

Project 12: Strengthening the capacities for implementation of NATURA 2000

Time framework: 2016–2017

Status: completed

Funded by: EU

Implementing agency/ies: Partizip GmbH and its consortium partners

Beneficiaries: MEPP

Societal challenges addressed: Ecosystem degradation and biodiversity loss

Approaches taken: Protected area management

Ecosystem/s: Protected areas

Objectives: To increase the effectiveness of North Macedonia's preparation for EU accession, in the area of nature protection and establishment of the Natura 2000 network. Results achieved were the following:

- 1) Harmonisation of the national legislation with EU directives related to nature protection;
- 2) Prepared draft amendments to the Law on Nature Protection and other relevant implementing (primary and secondary) legislation, Prepared plan for implementation of the Birds and Habitat Directives;
- 3) Assessment at the national level of potential sites, according to Birds and Habitat Directives, for NATURA 2000 Network and at least seven potential Natura 2000 sites proposed that correspond to the requirements of Birds and Habitats Directives;
- 4) Development of the GIS system for NATURA 2000;
- 5) Strengthened administrative capacity for implementation of nature protection legislation, and
- 6) Executed public awareness campaign for NATURA 2000.

Project 13: Private Forests for Positive Changes in the Polog Planning Region (5P)

Time framework: 2019

Status: completed

Funded by: EU project "Strong civil society organizations for positive social change" implemented by the Foundation for the development of the local community – Shtip, Institute for the community development – Tetovo, and the Centre for sustainable development – Alka from Skopje.

Implementing agency/ies: Regional Centre for Forestry and Rural Development and National Association of private forest owners.

Beneficiaries: Local CSOs and private forest owners

Societal challenges addressed:

Approaches taken: Sustainable Forest management

Ecosystem/s: Forests

Objectives: To achieve increased involvement of local CSOs in decision-making processes at the local level to conserve forest resources and their ecosystem services in the Polog region. Accordingly, the achieved results were the following:

- 1) Identified level of cooperation between private forest owners and local/national institutions;
- 2) Established municipal branch of private forest owners from Vrapchiste, Tearce and Jegunovce within the CSO Private Forests for joint action in areas of interest to private forest owners and the wider community;
- 3) Increased knowledge of private forest owners of their rights and responsibilities for participation in policy-making and decision making at the local level; and
- 4) Established cooperation and responsibility between private forest owners and local governments in the Polog planning region.

Aspects of the environmental services were also covered within the field survey with the owners of private forests and the municipal authorities.

Location: Municipalities of Vrapchiste, Tearce and Jegunovce.

Project 14: Integrated Water Resource Management at Dojran Lake in Macedonia¹⁴⁶

Time framework: 2014–2016

Status: completed

Funded by: Critical Ecosystem Partnership Fund

Implementing agency/ies: Euro-Mediterranean Centre on Climate Change, Regional Environmental Centre, and the Macedonian Ecological Society

Beneficiaries: MEPP, Municipality of Dojran

Societal challenges addressed:

Approaches taken: Integrated Water Resource Management

Ecosystem/s: Freshwater Lake

Objectives: The main outputs of this project were: i) Framework for Development of an Adaptive Integrated Water Resource Management Plan, ii) Comparative Regional Study on the Role of PES in Environmental Conservation in the Balkans, iii) Framework Proposal for Development and Implementation of a PES Scheme at Dojran Lake, and iv) Valorisation Study of the Dojran Lake Nature Monument.

Location: Municipalities of Vrapchiste, Tearce and Jegunovce.

¹⁴⁶ CEPF [website]. Available at: <https://www.cepf.net/sites/default/files/final-report-63842.pdf>. Accessed on 21 September 2020.

Annex II: Full list of key terms and definitions

Adaptation	Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, e.g., anticipatory and reactive, private and public, and autonomous and planned.
Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity).
Climate change	Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity.
Climate change adaptation (CCA)	Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploit beneficial opportunities is known as climate change adaptation.
Climate change impacts	The effect of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts.
Climate hazard	The harmful effect of climate change on livelihoods and ecosystems is known as climate hazard. They can be caused by gradual climate variability or extreme weather events. Some hazards are continuous phenomena that start slowly, such as the increasing unpredictability of temperatures and rainfall. Others are sudden but relatively discrete events such as heatwaves or floods.
Disaster	A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources
Disaster risk	The potential loss of life, injury, destroyed or damaged assets that could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazards, exposure, vulnerability and capacity.
Disaster risk reduction (DRR)	Aims to reduce the damage caused by natural hazards, such as earthquakes, floods, droughts and cyclones, through an ethic of prevention.
Ecosystem	According to the Convention on Biological Diversity, an ecosystem is understood as a dynamic complex of plant, animal and microorganism communities and their non-living environment that interact as a functional unit. Ecosystems may be small and simple, like an isolated pond, or large and complex, like a specific forest or a mangrove in a coastal area.
Ecosystem approach	A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.
Ecosystem benefits	Ecosystems provide benefits to communities that have economic value, including protection, food security, shelter and income.
Ecosystem restoration	The process of assisting the recovery of the structure, function and processes of an ecosystem that has been degraded, damaged or destroyed. See also: http://www.onebigrobot.com/IUCN/decade-landscape/

<i>Ecosystem-based adaptation (EbA)</i>	The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to climate change, maintain and increase resilience as well as reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change. See also: https://www.iucn.org/theme/ecosystem-management/our-work/ecosystem-based-approaches-climate-change-adaptation
<i>Ecosystem-based disaster risk reduction (Eco-DRR)</i>	The sustainable management, conservation and restoration of ecosystems provide services that reduce disaster risk by mitigating hazards and by increasing livelihood resilience. See also: https://www.iucn.org/id/node/19177
<i>Forest landscape restoration (FLR)</i>	The ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes. FLR is more than just planting trees – it is restoring a whole landscape to meet present and future needs and to offer multiple benefits and land uses over time. FLR can take many forms, such as new tree plantings, managed natural regeneration, agroforestry, or improved land management to accommodate a mosaic of land uses. See also: https://infoflr.org/index.php/what-flr/types-flr
<i>Hazard</i>	A potentially damaging physical event, phenomenon or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
<i>Nature-based Solutions (NbS)</i>	Actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits. See also: https://www.iucn.org/sites/dev/files/iucn_issues_brief_-_nbs_standard_eng.pdf
<i>Resilience (of ecosystems)</i>	Their ability to function and provide critical ecosystem services under changing conditions.
<i>Risk</i>	Risk is the probability that a situation will produce harm under specified conditions. It is a combination of two factors: the probability that an adverse event will occur, and the consequences of the adverse event. Risk encompasses impacts on human and natural systems and arises from exposure and hazard. Hazard is determined by whether a particular situation or event has the potential to cause harmful effects.
<i>Sustainable management</i>	Management through which the present potential of the resources is used in the best possible way, and does not reduce the availability of the resources.
<i>Sustainable use</i>	The use of an organism, ecosystem or any other renewable resource at a rate within the bounds of its capacity for renewal.
<i>Vulnerability</i>	A set of conditions and processes resulting from physical, social, economic and environmental factors, indicating the susceptibility of a community to the impact of hazards.

Annex III: European and regional policies relevant for NbS application

Green Agenda for Western Balkans

The EU aims to reduce its GHG emissions to net-zero — where GHG emissions sink balance out emission sources — by 2050 as part of the EC's 2050 long-term strategy. In 2019, the new Commission also published its vision for a European Green Deal, highlighting specific actions to achieve a climate-neutral EU and, as a follow-up, proposed a new climate law. The law should stipulate the 2050 climate-neutrality target and related trajectory as well as establish a framework for actions to enhance certainty for society. Interim targets for 2020 and 2030 should help realise the vision for a GHG emission neutral EU by 2050. In its Europe 2020 strategy, the EU committed to reducing its GHG emissions by 20% compared with 1990, improving energy efficiency by 20% and increasing the share of renewables in final energy consumption to 20%. The 2030 Climate and Energy Framework includes 2030 targets for GHG emissions, renewable energy and energy efficiency. The EU increased the ambition of the latter two targets in 2018, which are now reflected in the revised Renewable Energy Directive and the revised Energy Efficiency Directive. The targets commit the EU to cut GHG emissions by at least 40% (from 1990 levels), achieving a minimum 32% share for renewable energy, and improving energy efficiency by at least 32.5% (compared with a projected business-as-usual scenario for 2030).

In its European Green Deal, the Commission also proposed to increase the ambition of the 2030 GHG emission target to at least 50% and towards 55% compared with 1990 levels. The Energy Union further supports the shift towards a resource-efficient, low carbon economy to achieve sustainable growth through legal frameworks and related initiatives, highlighting renewables as a key element of decarbonization. Finally, the EU cohesion policy (2014–2020) sets aside EUR 29 billion for sustainable energy programmes and initiatives, including energy efficiency, renewable energy, smart energy infrastructure and low-carbon research and innovation. The new cohesion policy (2021–2027) includes a 'greener, carbon-free Europe' as one of its five main objectives.

SEE 2020

During the Conference of Parties 23 in Bonn, ministers from the Western Balkans responsible for the environment and climate change signed a Ministerial Declaration on the 2nd High-Level Panel on Environment and Climate Action in the Western Balkans, under the framework for the implementation of the SEE 2020 and its Environment Dimension. The ministers reaffirmed

their commitment to strengthen regional cooperation, joint efforts and concrete common action in addressing the existing environmental and climate challenges together with preventing and mitigating the future ones. The declaration calls for further strengthening of synergies and regional cooperation for the implementation of the environment and climate change priorities in the region, as well as for strengthened high-level policy dialogue between the Western Balkans and the EU. Concerning climate change, the accession of the Western Balkan countries to the EU remains a key driver in improving environmental legislation and policy.

The SEE 2020 of the Regional Cooperation Council provides a unique opportunity to mainstream and communicate the results of the project at the regional level. The SEE 2020 Pillar 3: Sustainable Growth aims to "Increase adaptive capacity through awareness-raising and education on climate change adaptation (knowledge and best practice transfer, experimental showcase projects and awareness-raising in the fields of agriculture, forestry, water usage, energy usage for individual farmers, cooperatives, public and private companies and operators, local municipalities, community-based organizations and associations, media)."

DPPI SEE

Another major regional programme is the Disaster Preparedness and Prevention Initiative. Launched in 2000 to assist partners to prevent and deal with the impacts of natural disaster, it has ever since continuously provided a framework for South East European countries to develop joint activities, programme and projects leading to strengthened capacity in preventing and responding to natural disasters. DPPI, as an umbrella regional network for developing programme and projects to prevent and respond to natural and human-made disasters and as such, represents one of the major regional processes on DRR and CCA.



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