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Biodiversity and Ecosystem Services Network

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Republic of North Macedonia
Ministry of Environment and Physical Planning

BESPIN

Regional Trialogue for Europe and Central Asia

Background Document

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IKI INTERNATIONAL CLIMATE INITIATIVE

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The BESPIN Regional Trialogue for Europe and Central Asia is a collaborative initiative between the Biodiversity and Ecosystem Services Network and the European Union-funded project REinforcing Science-Policy INterfaces for integrated biodiversity and climate knowledge and policies, implemented in collaboration with the Europe and Central Asia Network of organisations engaging in IPBES and held under the auspices of the Ministry of Environment and Physical Planning of the Republic of North Macedonia.

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Introduction

The BESPIN Regional Trialogue for Europe and Central Asia convenes policymakers, scientists and practitioners from Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kazakhstan, Moldova, Montenegro, North Macedonia, Slovenia, Tajikistan and Uzbekistan. The Trialogue provides a space to examine how convergent climate and biodiversity knowledge can be translated into policy-relevant action, identify institutional and governance barriers and explore pathways for more coordinated uptake across sectors and scales (see Table 1).

While the Trialogue is relevant to the wider Europe and Central Asia region, this Background Document focuses specifically on the participating countries. Its primary objectives are to: (i) distil convergent findings from recent assessments by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC); (ii) analyse enabling conditions and barriers for integrated uptake at the national and regional levels; and (iii) inform the co-development of practical action pathways during the Regional Trialogue.

Co-organizers of the BESPIN Regional Trialogue

The Biodiversity and Ecosystem Services Network (BES-Net):

- Aims to build capacity and commitment for biodiversity action across the world by translating the latest IPBES products into actions for biodiversity and conservation on the ground.
- Is jointly implemented by the United Nations Development Programme (UNDP), UN Environment Programme World Conservation Monitoring Centre (hosting the National Ecosystem Assessment Initiative) and the United Nations Educational, Scientific and Cultural Organization (providing technical support on Indigenous and local knowledge [ILK] since 2020).
- Is funded by the Government of Germany (through the International Climate Initiative) and SwedBio.

REinforcing Science-Policy INterfaces for integrated biodiversity and climate knowledge and policies (RESPIN):

- Aims to support the integrated provision and use of IPBES and IPCC processes and outputs.
- Facilitates the uptake of IPBES and IPCC outputs within the EU science service mechanism, as well as national and subnational decision-making processes. Measures for digital upscaling and dissemination, along with strategic collaborations, will ensure the availability and impact of the project's outputs beyond its duration.
- Is funded by the European Union (EU) (2024–2027).

The Europe and Central Asia Network of organisations engaging in IPBES (the ECA Network):

- Brings together IPBES national focal points and national biodiversity platforms working at the science–policy interface.
- Strives to connect the scientific community, administrative and political actors and other stakeholders across the region.

IPBES and IPCC assessments

IPCC is the United Nations body for assessing the science related to climate change. IPBES is an independent intergovernmental body for strengthening the science–policy interface for biodiversity and ecosystem services. Both IPCC and IPBES produce assessment reports that synthesize the best available knowledge to inform decision-making. It is worth noting that IPBES and IPCC co-sponsored a workshop biodiversity and climate change in 2021.

Detailed information about IPCC and IPBES assessment processes and engagement opportunities is available here. Short summaries of IPCC and IPBES assessments for the purpose of this Trialogue are provided below.

The IPBES Nexus Assessment (2024) demonstrates that biodiversity, climate, water, food and health challenges are intricately interlinked and influence each other (see Figure 1, from the Summary for Policymakers [SPM]). Addressing issues in isolation can create unintended trade-offs, whereas integrated, cross-sectoral approaches can effectively address them while maximizing synergies (co-benefits). The Nexus Assessment analysed 71 response options grouped into 10 broad categories (see Figure 1).

Figure 1. A diagram of the many response options that a range of actors can implement (source: IPBES Nexus SPM.7)

The IPBES Transformative Change Assessment (2024) focuses on "a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values" that deliberately contribute to achieving global sustainability and the 2050 Vision for Biodiversity. It highlights five strategies for transformative change and emphasizes that such change is urgent, necessary and challenging, yet possible. Transformative change is defined as fundamental, system-wide shifts in views, structures and practices. Deliberate transformative change for a just and

sustainable world shifts views, structures and practices in ways that address the underlying causes of biodiversity loss and nature's decline (IPBES Transformative Change SPM KM2).

The IPCC Working Group I report, Climate Change 2021: The Physical Science Basis, shows that human activities have already caused widespread and unprecedented warming of the atmosphere, oceans and land. This warming will continue to at least mid-century under all scenarios, bringing more frequent and overlapping climate hazards across all regions. The report highlights that climate risks are shaped by interactions among human influence, natural variability and different emissions pathways, and it makes clear that limiting future impacts depends on rapidly reducing emissions to reach net-zero CO_2 emissions.

The IPCC Working Group II report, Climate Change 2022: Impacts, Adaptation and Vulnerability, assesses the impacts of climate change on ecosystems, biodiversity and human communities, as well as climate-related vulnerabilities and adaptive capacities of the natural world and societies. It shows that climate change is already causing widespread harm to both people and nature, beyond the effects of natural variability. Additionally, it emphasizes that although adaptation and resilience are essential, delayed action limits opportunities for more transformative solutions. Finally, the report also stresses that achieving climate-resilient development is now more urgent than previously understood.

The IPCC Working Group III report, Climate Change 2022: Mitigation of Climate Change, shows that global greenhouse gas emissions have continued to rise across all major sectors, despite countries having made climate pledges. To limit warming, emissions need to peak immediately and decline rapidly, requiring major transformations across energy, land use and economic systems. The report emphasizes that effective climate action must be integrated across sectors and policy areas, linking mitigation, adaptation and sustainable development while ensuring coordination across national and local levels.

ILK and its role in transformative change

The term ILK is widely used by IPBES to denote dynamic, context-specific knowledge systems held by Indigenous Peoples and local communities, encompassing practices, beliefs and worldviews related to ecosystems and biodiversity.

Indigenous knowledge (IK) typically refers specifically to knowledge held by Indigenous Peoples, often emphasizing cultural identity, customary institutions and rights, whereas local knowledge (LK) highlights knowledge developed by non-Indigenous local communities through lived experience and interaction with their environments. In some contexts, the combined term "Indigenous knowledge and local knowledge" (IKLK) is used to explicitly recognize both knowledge systems.

Another commonly used term is traditional ecological knowledge, which refers to ecological knowledge, beliefs and values related to species, ecosystems and environmental management. The term Indigenous science is sometimes used to emphasize that these knowledge systems are systematic, empirical and adaptive, challenging the perception that they are merely anecdotal or informal.

Despite differences in terminology, these concepts share key characteristics: they are place-based, cumulative, transmitted across generations and embedded in cultural values and practices. Increasingly, global assessments and policy processes recognize their importance in complementing scientific knowledge and supporting more holistic and inclusive approaches to environmental governance.

Table 1. The main actions and interventions associated with six broad approaches to transformative change, and the role of ILK in each approach (IPBES Transformative Change SPM, p. 30)

APPROACHES	MAIN ACTIONS AND INTERVENTIONS ASSOCIATED WITH THE APPROACH	ROLE OF INDIGENOUS AND LOCAL KNOWLEDGE
System	Interventions that alter the relationships and feedback that block or can help to accelerate systemic change, including changes to the structure, rules and networks in a system, and the overall goals or underlying intent of the system.	Sharing and providing encompassing and interconnected views of human-nature relationships and complex relations among beings (material and non-material).
Structural	Altering economic, social, political and cultural rules, either through governance interventions or through communities reforming predominant rules.	Challenging colonial structures and institutionalizing local governance for promoting and enhancing sustainable practices associated with Indigenous and local knowledge.
Inner transformation	Relational activities that nurture relationships bewteen humans and other-than-humans; intra- and intergenerational relationships; self-other relationships and relationships with oneself leading to shifting inner beliefs, views and practices.	Highlighting spiritual, emotional, cultural, social and historical dimensions of self-other relationships to trigger and leverage inner potentials for transformative change.
Empowerment	Fostering social movements and building grass-roots networks, envisioning alternative pathways using critical tools, self-reflection and historically denied agency to gain recognition, representation, and rights in legal structures and other key arenas of power.	Asserting agency, power and rights of Indigenous Peoples and local communities to their Indigenous and local knowledge and overcoming historical legacies and marginalized situations.
Knowledge co-creation	Collaborative research-action interventions that build individual and collective capacities to promote desirable futures through visioning, dialogues, reflection and feedback sessions, including sharing knowledge in accessible ways.	Collaboratively generating knowledge and co-designing new products, practices and solutions through an interactive process of weaving knowledge systems.
Science & Technology	Use of new technologies and innovations, in conjunction with inclusive innovation processes; increased funding for research, education, outreach and science-policy interfaces.	Engaging as a source of knowledge for science, technology and innovation, which often draws on traditional knowledge, associated practices and biological resources that have been preserved and maintained through Indigenous and local knowledge.

Key messages for the Trialogue

Key message 1: Biodiversity and climate are one interdependent system. The IPBES and IPCC assessments emphasize that they amplify each other, and that addressing one without the other produces incomplete results. Countries stretching from the Balkans to Central Asia, with their climate-sensitive ecosystems and resource-dependent economies, stand to benefit significantly from approaches that treat them as one. Transformative change requires coherent governance, enabling policy frameworks, and the alignment of financial flows, incentives, investments, and market mechanisms with biodiversity, climate, and sustainability objectives. Reforming environmentally harmful subsidies, strengthening regulatory and fiscal instruments, and improving cross-sectoral coordination are important enabling conditions for long-term resilience and sustainability. Governments, businesses, private sector actors, and financial institutions all play a critical role in enabling transformative change through sustainable production practices, responsible investment, innovation, and the broader uptake of effective sustainability standards and tools. Countries with economies in transition within the ECA region may require enhanced financial, technical, and institutional support to implement integrated, inclusive, and socially equitable responses effectively.

Key message 2: Solutions that address the interdependent challenges across climate, biodiversity, water, food and health are available and proven. The empirical evidence demonstrates that the challenge ahead is less about developing new solutions and more about enabling the conditions (e.g. financial, institutional and political) needed to scale up what works while overcoming silos.

Key message 3: The values and principles guiding change matter. The IPBES and IPCC assessments emphasize that the values and principles of equity, just transition and inclusiveness are among the key determinants of whether transformative change succeeds and endures. Transitions that overlook diversity, or that fail to engage those most affected, risk being neither effective nor durable, whereas whole-of-society and whole-of-government approaches are instrumental for these transitions (IPBES Transformative Change Assessment SPM KM14). This key message includes the importance of implementing an approach based on diverse knowledge systems, or the Multiple Evidence Base approach in IPBES. This approach recognizes scientific knowledge and ILK as equally valid and complementary sources of evidence (e.g. IPBES Nexus Assessment SPM C3, IPBES Transformative Change Assessment SPM KM5; IPCC Synthesis Report SPM C.6.5).

Key message 4: Harmonious uptake of biodiversity and climate knowledge can unlock more effective action. Fragmented governance and siloed knowledge systems remain significant barriers across the countries represented at this Trialogue. Where biodiversity and climate knowledge are brought together across institutions, sectors and scales, the evidence suggests stronger, more coherent and more sustainable outcomes for transformative change regarding sustainability in Europe and Central Asia. However, harmonious uptake is slowed by persisting barriers across the region and globally:

- The IPCC Sixth Assessment Report (AR6), in SPM A3.6 (p. 9), states that 'key barriers to adaptation are limited resources, lack of private sector and citizen engagement, insufficient

mobilization of finance (including for research), low climate literacy, lack of political commitment, limited research and/or slow and low uptake of adaptation science, and low sense of urgency.'

- The IPBES Transformative Change Assessment, in Figure SPM 3, identifies practices related to knowledge uptake, which pose barriers to transformative change, including: Knowledge and innovation systems related to biodiversity management are not sufficiently coordinated and integrated among different stakeholders; There is limited and uneven attention to and investment in sustainability and biodiversity management knowledge and innovations across different sectors; and ILK about biodiversity-friendly actions and innovations is unrecognized, marginalized, disintegrated and not adequately supported.
- The IPBES Nexus Assessment, in Figure KM-D3, states that "nexus governance approaches, decision-making and capacity-strengthening can be enhanced through a series of deliberative steps and actions, informed by diverse evidence."

Key message 5: Dialogue across knowledge and policy communities accelerates change. Global assessments provide robust evidence, but translating that evidence into regional and national contexts, and further into concrete action, requires more than reports. It requires spaces where scientists, policymakers and practitioners can examine knowledge together, identify barriers specific to their contexts and co-develop pathways forward. Fora like the Trialogue are designed precisely to bring together actors from across the region, as the barriers to integrated climate and biodiversity action are not only technical; they are institutional, political and cultural. Dialogue that bridges these divides is itself a form of action.

Regional context: How are biodiversity and climate dynamics interlinked in the Trialogue countries across Europe and Central Asia?

Shared institutional characteristics

Most countries in Eastern Europe, the Caucasus and Central Asia have undergone post-socialist transitions that continue to shape governance systems, land use and policymaking. These legacies are reflected in planning, sectoral institutions and ongoing reforms. At the same time, countries follow different geopolitical trajectories that strongly influence their policy priorities. Many are oriented towards integration into larger regional frameworks such as the EU, the Eurasian Economic Union or other cooperation platforms that shape domestic reforms, regulatory alignment and investment decisions, including in climate and biodiversity policy.

Across the region, these alignment pathways create diverse but structured governance contexts. EU Member States and candidate countries align environmental policies with the EU frameworks, while others engage through Eurasian and Asian cooperation mechanisms, such as the Eurasian Economic Union and the Shanghai Cooperation Organization. Despite these differences, a common feature is that all countries are navigating broader processes of political and institutional alignment, which

shape how climate and biodiversity knowledge is translated into action. Understanding these trajectories is key to identifying realistic pathways for strengthening the uptake of IPCC and IPBES knowledge across the region.

At the global scale, all the Trialogue countries are actively engaged in major multilateral environmental agreements, science–policy platforms (see Table 2) and regional platforms. This engagement reflects a strong formal commitment to addressing climate change, biodiversity loss, land degradation and ecosystem conservation. Most countries are Parties to the major MEAs. While formal participation is broadly universal, differences remain in levels of engagement, implementation and institutional capacity, and in the extent to which these frameworks are translated into national policy and practice.

Table 2. Year of participation of each country in the international climate and biodiversity frameworks*

Country	IPCC	IPBES	UNFCCC**	CBD**	Ramsar	CITES**	CMS**	UNCCD**
Armenia	1993	2012	1993	1993	1993	2008	2002	1997
Bosnia and Herzegovina	2000	2012	2000	2002	2001	2009	2012	2002
Bulgaria	1988	2012	1995	1996	1976	1991	2000	2001
Croatia	1992	2012	1996	1996	1991	2000	2000	2000
Greece	1988	2012	1994	1994	1975	1992	1991	1997
Kazakhstan	1992	2012	1995	1994	2007	2000	2005	1997
Moldova	1995	2012	1995	1995	1999	2001	2006	1998
Montenegro	2006	2012	2006	2006	2006	2006	2008	2007
North Macedonia	1993	2022	1997	1997	1995	2000	2001	2002
Slovenia	1992	2012	1995	1996	1992	1999	2000	2001
Tajikistan	1992	2012	1998	1997	2000	2016	2001	1997
Uzbekistan	1992	2012	1993	1995	2002	1997	1998	1995

* Years may vary slightly depending on ratification and accession distinctions.
** Acronyms:

- UNFCCC: United Nations Framework Convention on Climate Change
- CBD: Convention on Biological Diversity
- CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora
- CMS: Convention on the Conservation of Migratory Species of Wild Animals
- UNCCD: United Nations Convention to Combat Desertification

Examples of regional cooperation frameworks that strive to overcome silos

International Fund for Saving the Aral Sea (IFAS)

- IFAS was established in 1993 by the five Central Asian states in response to the severe ecological and socioeconomic crisis of the Aral Sea. Following decades of unsustainable water diversion for irrigation, the Aral Sea dramatically shrank, leading to ecosystem collapse, loss of livelihoods and major public health impacts. IFAS was created as a regional platform to coordinate collective action and mobilize international support.
- **Mandate and activities:**
    - IFAS serves as the intergovernmental mechanism for cooperation on water resources, environmental restoration and sustainable development in the Aral Sea basin. Its activities include coordinating basin-level water management, implementing regional environmental programmes (such as the Aral Sea Basin Programme), supporting afforestation and land restoration, and facilitating dialogue among riparian states. It also plays a role in engaging international donors and aligning regional priorities with global environmental agendas.
- **Successes:**
    - Established a sustained platform for regional dialogue on a politically sensitive transboundary issue
    - Mobilized significant international funding and partnerships
    - Supported partial ecological restoration, particularly in the North Aral Sea (Kazakhstan)
    - Increased global awareness of the Aral Sea crisis
- **Challenges:**
    - Persistent tensions over water allocation between upstream and downstream countries
    - Limited enforcement capacity and reliance on voluntary cooperation
    - Fragmentation between national priorities and regional strategies
      Difficulty integrating climate change, biodiversity and socioeconomic development into a unified framework

International Commission for the Protection of the Danube River (ICPDR)

- ICPDR was established in 1998 to implement the Danube River Protection Convention (signed in 1994). It brings together 14 countries and the EU to manage the Danube River basin, one of the most international river basins in the world, spanning Central and Southeastern Europe.
- **Mandate and activities:**
    - The ICPDR coordinates transboundary water management, focusing on water quality, ecosystem protection, flood risk management and implementation of EU directives such as the Water Framework Directive and Floods Directive. Its activities include basin-wide monitoring, data sharing, joint planning (e.g. Danube River Basin Management Plans), pollution reduction initiatives and public participation mechanisms.
- **Successes:**
    - Significant improvements in water quality across the Danube basin

  - Strong institutional framework with clear mandates and regular coordination mechanisms
  - Effective data sharing and monitoring systems
  - Alignment with EU policies, enabling regulatory coherence and funding access
- **Challenges:**
  - Uneven implementation capacity among member countries
  - Ongoing pressures from agriculture, industry and infrastructure development
  - Need for stronger integration of biodiversity and climate adaptation into water management
  - Coordination complexities due to the large number of participating countries

Shared ecological and climate characteristics, and their socioeconomic implications

Eastern Europe, the Caucasus and Central Asia encompass a diverse yet interconnected set of ecological systems, including mountain ranges, forests, drylands, wetlands and coastal zones. Economies across the region remain closely tied to natural resources such as agriculture, water, forestry and energy, making them highly sensitive to environmental change and reinforcing strong links between ecosystem health and economic stability.

Major mountain systems, including the Carpathians, Caucasus, Balkans, Pamirs and Tien Shan, act as critical water towers but are increasingly affected by glacier retreat, changing snowpack and extreme events. At the same time, steppe and dryland areas face growing risks of drought, desertification and land degradation, while forests are under pressure from heat, pests and wildfires. Transboundary rivers such as the Amu Darya, Danube, Dniester and Syr Darya further highlight the region's ecological and political interdependence, especially under increasing water stress.

Countries across Eastern Europe, the Caucasus and Central Asia face compounding climate and biodiversity pressures that are tightly interlinked and increasingly systemic. These challenges are not isolated environmental issues; they directly affect development, livelihoods and regional cooperation, particularly in sectors such as agriculture, water, energy and tourism. For example, mean temperature and heat extremes have increased in Europe with above-global-average warming (AR6 Working Group II [WGII] Ch. 13), which is likely to increase agriculture stress, wildfire risk and water scarcity. Decreased precipitation and increased evapotranspiration in Central Asia contribute to drought, water stress and land degradation (AR6 WGII Ch. 10), which is likely to cause stress along the water-energy-food-environment nexus. These shared environmental characteristics create a common context of vulnerability, reinforcing the need for integrated approaches to climate and biodiversity governance. IPCC Working Group I (WGI) factsheets for Europe and Asia provide useful summaries of expected climate impacts (see Figures 2 and 3).

Interlinked climate- and biodiversity-related pressures

Across this diverse region, climate change is already manifesting through intensifying extremes and growing variability:

- Rising temperatures and heatwaves are increasing stress on ecosystems, agriculture and urban systems, particularly in Southern Europe and Central Asia.
- Drought and water scarcity are becoming more frequent and severe, especially in continental and arid zones, affecting irrigation systems, hydropower generation and drinking water supply.
- Flooding and extreme precipitation events are increasing in parts of the Balkans and Eastern Europe, causing infrastructure damage and ecosystem degradation.
- Glacier retreat and snowpack loss in mountain systems (e.g. Caucasus, Pamirs and Tien Shan) are altering seasonal water flows, with long-term implications for water security.

Biodiversity across the region is under pressure from both climate- and human-driven factors:

- Land degradation and desertification are reducing ecosystem productivity, particularly in Central Asia and parts of Eastern Europe.
- Forest degradation, driven by climate stress, fires and unsustainable use, is weakening carbon sinks and ecosystem resilience.
- Habitat fragmentation and land-use change (e.g. infrastructure, agriculture intensification) are reducing species diversity and ecosystem connectivity.
- Wetland and freshwater ecosystem decline is affecting water quality, biodiversity and natural flood regulation.
- Coastal and marine ecosystem degradation in Southern Europe is threatening fisheries and tourism.

SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis

ipcc INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Regional fact sheet - Europe

Common regional changes

- Regardless of future levels of global warming, temperatures will rise in all European areas at a rate exceeding global mean temperature changes, similar to past observations (*high confidence*).
- The frequency and intensity of hot extremes, including marine heatwaves, have increased in recent decades and are projected to keep increasing regardless of the greenhouse gas emissions scenario. Critical thresholds relevant for ecosystems and humans are projected to be exceeded for global warming of 2°C and higher (*high confidence*).
- The frequency of cold spells and frost days will decrease under all the greenhouse gas emissions scenarios in this report and all time horizons, similar to past observations. (*high confidence*)
- Despite strong internal variability, observed trends in European mean and extreme temperatures cannot be explained without accounting for anthropogenic factors. Before the 1980s, warming by greenhouse gases was partly offset by anthropogenic aerosol emissions. Reduced aerosol influence in the recent decades has led to an observable positive trend in shortwave radiation. (*high confidence*)
- Observations have a seasonal and regional pattern consistent with projected increase of precipitation in winter in Northern Europe. A precipitation decrease is projected in summer in the Mediterranean extending to northward regions. Extreme precipitation and pluvial flooding are projected to increase at global warming levels exceeding 1.5°C in all regions except the Mediterranean. (*high confidence*)
- Regardless of level of global warming, relative sea level will rise in all European areas except the Baltic Sea, at a rate close to or exceeding global mean sea level. Changes are projected to continue beyond 2100. Extreme sea level events will become more frequent and more intense, leading to more coastal flooding. Shorelines along sandy coasts will retreat throughout the 21st century (*high confidence*).
- Strong declines in glaciers, permafrost, snow cover extent, and snow seasonal duration at high latitudes/altitudes are observed and will continue in a warming world (*high confidence*).
- Multiple climatic impact-drivers have already changed concurrently over recent decades. The number of climatic impact-driver changes is expected to increase with increasing global warming (*high confidence*).

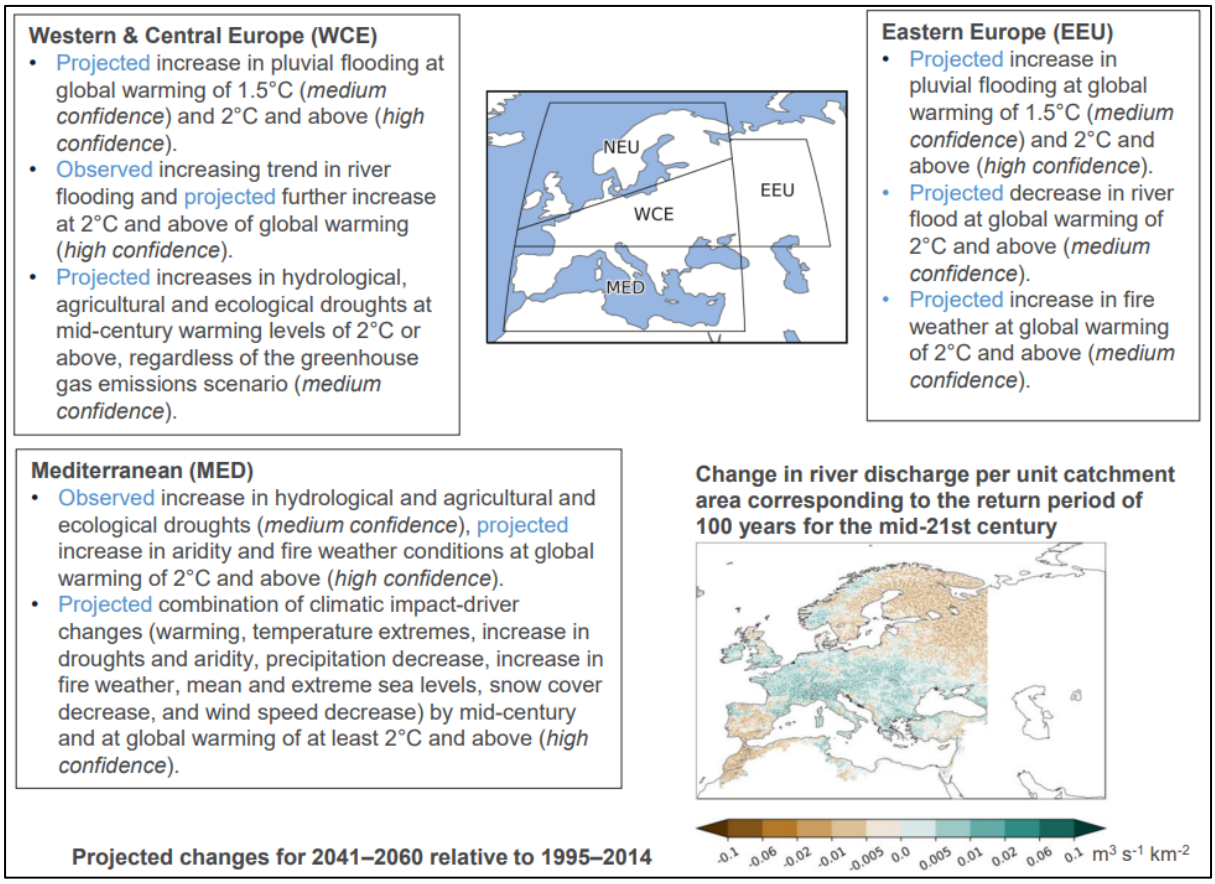


Figure 2. IPCC WGI regional fact sheet - Europe

SIXTH ASSESSMENT REPORT
Working Group I – The Physical Science Basis

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Regional fact sheet - Asia

Common regional changes

The observed mean surface temperature increase has clearly emerged out of the range of internal variability compared to 1850-1900. Heat extremes have increased while cold extremes have decreased, and these trends will continue over the coming decades (*high confidence*).

Marine heatwaves will continue to increase around Asia (*high confidence*).

Fire weather seasons will lengthen and intensify, particularly in North Asia regions (*medium confidence*).

Average and heavy precipitation will increase over much of Asia (*high* to *medium confidence*).

Mean surface wind speeds have decreased in Asia (*high confidence*) and will continue to decrease in central and northern parts of Asia (*medium confidence*).

Glaciers are declining and permafrost is thawing. Seasonal snow duration, glacial mass, and permafrost area will decline further by the mid-21st century (*high confidence*).

Glacier runoff in the Asian high mountains will increase up to the mid-21st century (*medium confidence*), and subsequently runoff may decrease due to the loss of glacier storage.

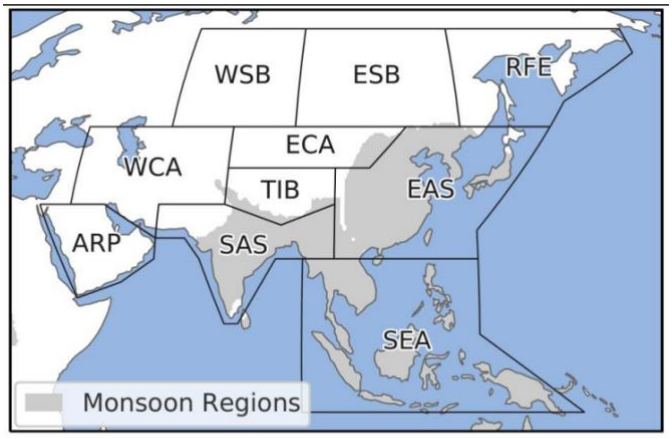
Relative sea level around Asia has increased faster than global average, with coastal area loss and shoreline retreat. Regional-mean sea level will continue to rise (*high confidence*).

North Asia (WSB, ESB, RFE)

- Permafrost has thawed, its temperature increased, and seasonal snow duration and extent decreased while maximal snow depth has increased over the past 3 to 4 decades (*high confidence*). It is *virtually certain* that permafrost extent and volume will shrink with further global warming.
- Annual precipitation has increased since the mid-1970s (*very high confidence*), and rising heavy convective showers caused more intense floods (*medium confidence*). Projected increase in precipitation almost doubles the annual maximum river discharge, with increased flooded area in major Siberian rivers by mid-21st century (*medium confidence*).
- The number of dry days has decreased for much of the region but increased in south-western parts, where total soil moisture will decline and the fire season will lengthen (*medium confidence*).

South West Asia (WCA, ARP)

- Anthropogenic warming has amplified droughts since the 1980s (*high confidence*).
- An increase in extreme precipitation has been observed, mostly in elevated areas.
- Mountain permafrost degradation at high altitudes has increased the instability of mountain slopes in the past decade (*medium confidence*). Reduction of the annual maximum amount of snow increases with elevation in mountain areas.
- Annual precipitation totals and intensity and frequency of heavy precipitation are projected to increase with increasing warming levels. Strong spatiotemporal differences with overall decreasing precipitation are projected in summer, with the opposite tendency in winter in WCA.



East Asia (EAS, ECA)

- Daily precipitation extremes have increased over parts of the region (*high confidence*). Heavy precipitation will increase in frequency and intensity (*high confidence*), leading to more frequent landslides in some mountain areas.
- Droughts have become more frequent in much of continental East Asia, while arid Eastern Central Asia has become wetter (*medium confidence*).
- The rate of intensification and number of strong tropical cyclones have increased (*medium confidence*), and tropical cyclone tracks *likely* migrated poleward.

Figure 3. IPCC WGI regional fact sheet - Asia

Climate change risks (adapted from the IPCC WGII fact sheet for Europe)

Four key risks have been identified for Europe, with most becoming more severe at 2°C global warming levels (GWL) than at 1.5°C GWL in scenarios with low to medium adaptation (high confidence) (see Table 3). At 3°C GWL, even with high adaptation, severe risks remain for many sectors in Europe (high confidence).

Table 3. Key climate change risks for Europe

Risk	Description
Mortality and morbidity of people and changes in ecosystems due to heat	The number of deaths and people at risk of heat stress will increase two- to threefold at 3°C compared to 1.5°C GWL (high confidence). Above 3°C GWL, there are limits to the adaptation potential of people and existing health systems (high confidence). Warming will decrease suitable habitat space for current terrestrial and marine ecosystems and irreversibly change their composition, increasing in severity above 2°C GWL (very high confidence). Fire-prone areas are projected to expand across Europe, threatening biodiversity and carbon sinks (medium confidence).
Heat and drought stress on crops	Substantive agricultural production losses are projected for most European areas during the twenty-first century, which will not be offset by gains in Northern Europe (high confidence). While irrigation is an effective adaptation option for agriculture, the ability to adapt using irrigation will be increasingly limited by water availability, especially in response to GWL above 3°C (high confidence).
Water scarcity	In Southern Europe, more than a third of the population will be exposed to water scarcity at 2°C GWL; at 3°C GWL, this risk will double, and significant economic losses in water- and energy-dependent sectors may arise (medium confidence). For Western, Central and Southern Europe, and for many cities, the risk of water scarcity will increase significantly at 3°C GWL.
Flooding and sea level rise	Above 3°C GWL, damage costs and people affected by precipitation and river flooding may double. Coastal flood damage is projected to increase at least tenfold by the end of the twenty-first century, and even more or earlier with current adaptation and mitigation (high confidence). Sea level rise represents an existential threat to coastal communities and their cultural heritage, particularly beyond 2100.

Barriers

Key barriers are limited resources, lack of private-sector and citizen engagement, insufficient mobilization of finance, lack of political leadership and low sense of urgency. Most adaptation options for the key risks depend on limited water and land resources, creating competition and trade-offs; the same applies to the available mitigation and socioeconomic development options (high confidence).

Climate change impacts (adapted from the IPCC WGII fact sheet for Asia)

Table 4. Main impacts of climate change on sectors in Asia

Impact	Description
On ecosystems	Models indicate that future climate change would cause biodiversity and habitat loss in many parts of Asia (high confidence). Future climate change would reduce the suitable habitat of certain protected plants.
On health	Climate change is increasing vector-borne and waterborne diseases, undernutrition, mental disorders and allergy-related illnesses in Asia by increasing hazards such as heatwaves, flooding and drought, and air pollution, in combination with more exposure and vulnerability (high confidence). In addition to all-cause mortality, deaths related to circulatory, respiratory, diabetic and infectious diseases, as well as infant mortality, increase with high temperatures (high confidence).
On water and the cryosphere	By mid-century, the international transboundary river basins of Amu Darya, Ganges and Indus could face severe water scarcity challenges due to climatic variability and changes that act as stress multipliers (high confidence). Due to global warming, Asian countries could experience an increase in drought conditions (5–20%) by the end of this century (high confidence). Glacier lake outburst floods will threaten the security of local and downstream communities in High Mountain Asia.
On energy	Asian countries are experiencing, on average, a hotter summer climate, as well as population growth, resulting in rapidly increasing energy demands for cooling (high confidence). A decrease in precipitation is also influencing energy demand, as well as demand for desalination, groundwater pumping and other energy-intensive methods increasingly used for water supply (high confidence).
On migration	There is robust evidence, with medium agreement, that increased climate variability and extreme events are already driving migration. There is medium evidence, with medium agreement, projecting that longer-term climate change will increase migration flows across Asia. Despite methodological disagreement on detection and attribution of migration due to climate change, there is medium confidence that higher warming and associated changes in frequency and intensity of slow-onset events (such as drought and sea level rise) and rapid-onset events (such as cyclones and flooding) will increase involuntary displacement in the future, especially under SSP3* and SSP4 pathways. *Shared Socio-economic Pathways (SSPs): A core set of five SSP scenarios, namely SSP1–1.9, SSP1–2.6, SSP2–4.5, SSP3–7.0 and SSP5–8.5, was selected in the AR6 WGI report.

Barriers

Key barriers include fragmented, reactive governance; inadequate evidence on which actions to prioritize and how to sequence them; and finance deficits.

What the assessments tell us: Convergent messages from IPBES and IPCC

Table 5 distils the converging messages from the IPBES Nexus Assessment SPM, the IPBES Transformative Change Assessment SPM, and the IPCC AR6 Synthesis report and three Working Groups reports (see Annex II for a more comprehensive table).

Table 5. Converging messages from the IPBES assessments and the IPCC report (a fact sheet version of the table is available here for download)

Converging message	**References to specific messages** (the full table is available in Annex II)			**What this means for potential actions**
	IPBES Nexus Assessment	**IPBES Transformative Change Assessment**	**IPCC AR6**	
Nature and climate are inseparable	A1: "Biodiversity loss and climate change are interdependent …"	KM1: "…the global interconnected crises related to biodiversity loss, nature's decline…"	A2.2 Introduction: "This report recognizes the interdependence of climate, ecosystems and biodiversity, and human societies."	Climate and biodiversity should be addressed together, not separately.
Siloed governance is a major barrier	C2: "Response options can facilitate or impede each other, leading to potential synergies and trade-offs among them."	A3.3: "Most observed adaptation responses are fragmented, incremental, sector-specific and unequally distributed across regions."	C1.2: "Climate resilient development is enabled when governments, civil society and the private sector make inclusive development choices that prioritize risk reduction, equity and justice, and when decision-making processes, finance and actions are integrated across governance levels, sectors, and timeframes"	Fragmented institutions and actions that focus on a single nexus element reduce effectiveness and create trade-offs. Integrated approaches create synergies.

Many solutions already exist	C1: "Numerous highly synergistic response options are already available to actors in multiple sectors for sustainably managing biodiversity, water, food, health and climate change."	KM7: "Five key strategies and associated actions have complementary and synergistic effects and substantial potential to advance deliberate transformative change for global sustainability."	C3: "Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all."	Proven solutions exist; the challenge is implementation at scale.
Local and traditional knowledge is instrumental	B3: "Policies that support sustainable healthy diets, sustainable resource use and waste reduction and that consider multiple actors and their values and knowledge systems play a critical role in scenarios that successfully achieve sustainable futures."	KM5: "Weaving together insights from diverse approaches and knowledge systems, including ILK, enhances strategies and actions for transformative change."	C6.5: "Drawing on diverse knowledges and cultural values, meaningful participation and inclusive engagement - processes - including Indigenous knowledge, local knowledge, and scientific knowledge - facilitates climate resilient development, builds capacity and allows locally appropriate and socially acceptable solutions."	Diverse knowledge systems improve legitimacy, resilience and relevance.
Justice and inclusion are foundational	C2: "Ensuring the full and effective participation of a wide range of actors, including	KM3: "Four key principles are responsive to and address the underlying causes of biodiversity	C5: "Prioritising equity, climate justice, social justice, inclusion and just transition processes can	Fairness is essential for durable and politically viable transitions.

	Indigenous Peoples and local communities, in the co-design, coordination and implementation of bundles of response options can help to increase the magnitude and equity of benefits as well as to facilitate the emergence of new options from collaborative contexts."	loss and nature's decline and guide the process of deliberate transformative change. These principles are equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action."	enable adaptation and ambitious mitigation actions and climate resilient development."	
Urgency: the window for action is narrowing, but change is possible	C10: "Many response options will be less effective or impossible to implement if climate change is not urgently addressed."	KM1: "Transformative change for a just and sustainable world is urgent and necessary…"	C1: "There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all."	Delay increases risks and costs, but rapid action can still deliver results.

Readiness for synergistic uptake: Regional trends

Despite differences in ecological conditions, governance systems and levels of economic development, there are remarkably consistent structural patterns in how climate and biodiversity knowledge is produced, interpreted and applied in the Trialogue focus countries. For example, across all countries, a clear asymmetry exists in the uptake of global climate and biodiversity knowledge:

- Climate knowledge (largely informed by IPCC methodologies) is:
  - Widely institutionalized
  - Embedded in national policy frameworks (e.g. Nationally Determined Contributions [NDCs], adaptation plans)
  - Supported by standardized tools and reporting systems
- Biodiversity knowledge (associated with IPBES) is:
  - Less systematically integrated
  - Often reflected indirectly through international commitments
  - Rarely translated into operational policy frameworks

This pattern is generally consistent across subregions:

- EU member countries (e.g. Bulgaria, Croatia, Greece and Slovenia) show relatively stronger integration but still exhibit gaps between climate and biodiversity policy domains.
- Eastern Europe and Western Balkans (e.g. Bosnia, Herzegovina, Moldova and North Macedonia) demonstrate moderate uptake with persistent fragmentation.
- The Caucasus and Central Asia (e.g. Armenia, Kazakhstan, Tajikistan and Uzbekistan) show increasing climate policy alignment but weaker biodiversity integration.

Parallel knowledge systems

A defining feature across countries is the coexistence of parallel knowledge systems rather than integrated ones.

In general, climate knowledge systems are:

- Based on standardized methodologies and models
- Supported by strong international reporting obligations
- Linked to policy instruments such as NDCs and adaptation plans

In general, biodiversity knowledge systems are:

- Based on monitoring, indicators and project-based data
- Fragmented across institutions
- Less consistently linked to decision-making processes

This structural divide results in:

- Limited integration of ecosystem considerations into climate policy
- Insufficient incorporation of climate risks into biodiversity strategies

Across all countries, integration of the knowledge systems tends to occur on a high level and episodically (e.g. through projects or donor initiatives) rather than systematically. The country profiles highlight some examples of processes, policy cycles, projects and initiatives that can be seen as windows of opportunity or entry points for IPCC and IPBES knowledge uptake.

In addition to the biodiversity–climate divide, a third layer of fragmentation emerges through the limited inclusion of ILK. Across the region, ILK is rarely woven into policy processes in a systematic way and instead occupies a peripheral position relative to formal scientific and technical knowledge systems. In most countries, ILK is integrated at the lower levels of the knowledge-weaving spectrum (see Box 1):

- **Data level**: ILK is collected through consultations, case studies or field observations
- **Information level**: knowledge is documented in reports or databases, often in the context of specific projects

Only in a limited number of cases does ILK reach the knowledge level, where it contributes to analysis or policy design, for example, through community-based natural resource management or localized adaptation practices. Evidence of ILK informing governance at the wisdom level, where it shapes decision-making principles, institutions or long-term strategies, remains rare across the region. Thus, the weaving of ILK into policy and action mostly takes place as:

- **Procedural inclusion**: ILK is often included through consultations or stakeholder engagement processes, but without significant influence on outcomes.
- **Project-based integration**: ILK is more visible in donor-funded initiatives (e.g. ecosystem restoration, adaptation projects), but these efforts are rarely scaled or institutionalized.
- **Sectoral disconnect**: ILK is more commonly associated with biodiversity or land-use management and is seldom integrated into climate policy frameworks.
- **Limited recognition in governance**: Formal policy frameworks rarely recognize ILK as a distinct and legitimate knowledge system alongside scientific expertise.

Box 1. Indigenous and local knowledge weaving ladder

The background document uses a layered approach to understanding how diverse knowledge systems contribute to action. It loosely uses a classic data-information-knowledge-wisdom framework, which has been extensively used within information science and knowledge management (e.g. Frické, 2019).

- **Data** refers to observations, indicators, and documented evidence.
- **Information** emerges when data are organized and interpreted within a context.
- **Knowledge** develops through experience, practice, science, and Indigenous and local knowledge systems that explain relationships and guide decisions.
- **Wisdom** involves the ethical, relational, and long-term capacity to apply knowledge for just and sustainable futures.

The lack of ILK–science–policy interaction reinforces the broader pattern of fragmented knowledge systems in the region. As a result:

- Opportunities to bridge climate and biodiversity policies through locally grounded knowledge are underutilized.
- Policy responses risk overlooking context-specific adaptation and management practices.
- The science–policy interface remains technocratic and top-down, limiting inclusivity and legitimacy.

ILK holds significant potential to act as a connecting layer between climate and biodiversity knowledge systems. Because local knowledge systems inherently reflect integrated understandings of ecosystems, livelihoods and environmental change, they can support more holistic problem framing, context-specific solutions and improved implementation at local levels. At the same time, there are notable examples of ILK documentation in the region. For example, the State of Traditional Knowledge of Biodiversity in Bosnia and Herzegovina aims to analyse "the scientific literature on traditional and local knowledge related to the biodiversity in BiH [Bosnia and Herzegovina]", which "can give insights into the richness of traditional and local knowledge, and also into the range of values and services associated with biodiversity" (Barudanović et al., 2024, p. 17) (see Box 2).

Box 2. *The State of Traditional Knowledge of Biodiversity in Bosnia and Herzegovina* (2024) provides a comprehensive assessment of traditional knowledge related to biodiversity in the country, developed as part of the national ecosystem assessment process. The report highlights that traditional knowledge has long played a central role in shaping relationships between people and nature, supporting livelihoods, cultural practices and the sustainable use of ecosystems. This knowledge has historically been transmitted orally across generations and is deeply embedded in everyday practices such as the use of medicinal plants, food preparation, animal husbandry and natural resource management.

The study documents the richness and diversity of this knowledge through a combination of methods, including direct-to-digital mapping, surveys, interviews and community dialogues, covering different regions and socioeconomic groups. It demonstrates that traditional knowledge systems in Bosnia and Herzegovina are highly localized, empirically grounded and closely linked to specific ecosystems and cultural contexts. At the same time, the report identifies significant risks to the continuity of these knowledge systems, driven by urbanization, industrialization, demographic change and the decline of rural livelihoods. Through the research, it was found that local communities and holders of traditional knowledge have the most comprehensive understanding of the state of nature in their surroundings. Among the key issues they highlighted, climate change and institutional responsibility were particularly emphasized, which were subsequently corroborated by other environmental status reports in Bosnia and Herzegovina.

Traditional and local knowledge related to biodiversity conservation, food systems, medicinal plants, and sustainable resource use remains important in Bosnia and Herzegovina, but is

increasingly threatened by demographic change, rural depopulation, migration, and declining intergenerational knowledge transfer.

Country profile: Armenia

Key data snapshot

- **Country:** Republic of Armenia
- **Location:** South Caucasus; landlocked; mountainous terrain between Europe and Asia
- **Land area:** 29,743 km²
- **Population (2025):** 3.0 million (64% urban, 36% rural)
- **Human Development Index (2023):** 0.786 (high human development)
- **Gross domestic product (GDP) per capita (2024):** US$ 8,000
- **Main economic sectors:** services, industry, agriculture, mining, energy
- **Protected area coverage:** 12–13% of territory
- **Biodiversity:** 3,800 plant species; high endemism; diverse mountain ecosystems
- **Iconic landscapes:** Lake Sevan, Lesser Caucasus mountains, Ararat Valley
- **Iconic species:** Caucasian leopard, Armenian mouflon, bezoar goat, brown bear

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: Armenia's biodiversity is under pressure from land degradation, overgrazing, deforestation, mining, water stress and climate change. Mountain and freshwater ecosystems are especially vulnerable (Convention on Biological Diversity [CBD] Country Profile).

Key message 2: IPCC uptake is stronger than IPBES uptake and is visible through NDC planning, climate risk analysis and adaptation measures. Armenia submitted its NDC 3.0 for 2026–2035 in 2025 (NDC Partnership Country Profile).

Key message 3: Biodiversity–climate integration is emerging through NDC implementation, protected area expansion, pasture management and biodiversity mainstreaming efforts.

Key messages expanded

Key message 1 expanded

Armenia's ecosystems are highly climate-sensitive due to the country's mountainous terrain, limited forest cover and dependence on water resources from snow and rainfall. Climate change is intensifying drought, heat stress, erosion and water scarcity, while land degradation and overgrazing reduce ecosystem resilience. Forests, mountain pastures and Lake Sevan are particularly important for adaptation because they regulate water, reduce erosion and support rural livelihoods.

The impact of climate change on the water and agriculture sectors alone could shrink the country's economy by up to 3 per cent by 2060 and increase poverty by as much as 2.7 per cent by 2030. By 2050, climate change could cut crop and livestock yields by up to 37 per cent, resulting in over US$ 363

million in lost agricultural productivity. Strengthening water management, enhancing agricultural resilience and tackling land degradation are instrumental for climate adaptation (World Bank Group [WBG] Armenia Country Climate and Development Report [CCDR], 2025).

Key message 2 expanded

IPCC knowledge is reflected in NDC planning, vulnerability assessments and adaptation measures, supported by international partners and national coordination processes. IPBES uptake is weaker, though biodiversity mainstreaming is gaining visibility, especially ahead of Armenia's hosting of the CBD 17th Conference of the Parties in 2026 and through recent work on biodiversity mainstreaming and Nagoya Protocol ratification.

Table 6. Armenia's focal points for IPCC and IPBES

Platform	Responsible institution
IPCC	Ministry of Environment
IPBES	Ministry of Environment

Table 7. Overview of climate and biodiversity policies in Armenia

Document/policy	Focus area	Biodiversity–climate integration
NDC 3.0, 2025	Climate mitigation/adaptation	Includes 2026–2035 climate commitments
NBSAP, 2015	Biodiversity	Increasing ecosystem and climate linkages
NAP and the List of Measures for 2021-2025	Climate adaptation	Explicitly mentions climate change impacts on biodiversity and ecosystem-based adaptation (EbA)

Key message 3 expanded

Table 8. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters

National Forest Monitoring and Assessment System in Armenia, 2026	A project to address the lack of reliable, up-to-date forest data	FAO, Government	Links biodiversity and climate
NBSAP Accelerator Partnership, 2022 - ongoing	Supports countries in accelerating the implementation of National Biodiversity Strategies and Action Plans	63 countries, 14 institutions, 34 non-state actors	Links with Kunming-Montreal Global Biodiversity Framework

Country profile: Bosnia and Herzegovina

Key data snapshot

- **Country:** Bosnia and Herzegovina
- **Location:** Southeast Europe/Western Balkans
- **Land area:** 51,209 km²
- **Population (2025):** 3.2 million (50–55% urban, 45–50% rural)
- **Human Development Index (2023):** 0.780 (high human development)
- **GDP per capita (2024):** US$ 8,500
- **Main economic sectors:** services, industry, agriculture, forestry, energy
- **Protected area coverage:** 3–5% of territory (relatively low)
- **Biodiversity:** high species richness; Dinaric karst ecosystems; important freshwater biodiversity
- **Iconic landscapes:** Dinaric Alps, Una and Neretva rivers, Sutjeska National Park
- **Iconic species:** brown bear, wolf, Balkan lynx, chamois

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: Key drivers of biodiversity decline in Bosnia and Herzegovina include: (1) floods, droughts and torrents, (2) wildfires and overexploitation of forests, (3) population migration and rural depopulation leading to increased urbanization and land use changes, (4) limited implementation of regulations and measures for land protection, (5) industrialization and expansion of areas for mineral exploitation, (6) illegal felling of trees in forests and (7) pollution and soil contamination (BES-Net BiH, n.d).

Key message 2: IPCC knowledge is more visible in climate adaptation planning than IPBES knowledge. The National Adaptation Plan (NAP) aims to integrate adaptation into social, economic and environmental policies.

Key message 3: Integration is constrained by complex governance structures, but promising entry points include NAP implementation, strengthening protected area networks, improving their management effectiveness, recognising OECMs, forest certification, river basin management and EU alignment.

Key messages expanded

Key message 1 expanded

Biodiversity and ecosystems support climate change adaptation locally (National Ecosystem Assessment, 2024). Climate change is an increasingly important driver of biodiversity loss and ecosystem degradation in Bosnia and Herzegovina. Rising temperatures, changing precipitation patterns, droughts, floods, wildfires, and other extreme weather events are already affecting ecosystems, species, and ecosystem services, while further impacts are expected throughout the 21st century. At the same time, significant knowledge and monitoring gaps continue to limit understanding of climate change impacts on ecological processes, ecosystem functioning, and biodiversity, highlighting the need for long-term integrated monitoring and research systems.

Floods and landslides are intensified where forests and river floodplains are degraded, while drought and heat increase fire risk and affect rural livelihoods. The 2014 floods alone affected one million people and caused damage equivalent to 15 per cent of GDP. Climate-related damages could reduce GDP by up to 14 per cent by 2050 without adaptation (WBG BiH CCDR 2025). River ecosystems are especially sensitive to hydropower, pollution and altered flows.

Significant gaps remain in biodiversity inventories, ecosystem assessments, long-term ecological monitoring, climate impact research, and data availability in Bosnia and Herzegovina. Existing biodiversity data are often fragmented, geographically uneven, outdated, or incomplete, limiting evidence-based decision-making.

Key message 2 expanded

Bosnia and Herzegovina's policy landscape is fragmented because responsibilities are distributed across state, entity, cantonal and local levels. Climate policy is increasingly structured through United Nations Framework Convention on Climate Change processes and the NAP, while biodiversity policy relies on NBSAP processes and entity-level implementation. IPBES concepts are present indirectly through ecosystem services, protected areas and biodiversity planning, but systematic uptake remains limited. At the same time, climate change components are increasingly being incorporated into protected area management planning (including through GEF-supported initiatives such as the SPA projects), as well as through ongoing activities under BES-Net and related science-policy projects.

Bosnia and Herzegovina does not yet have a dedicated Climate Law in place, and climate policy is currently in development and mainly guided through UNFCCC processes and the National Adaptation Plan (NAP). In contrast, biodiversity governance is already supported by an established legal framework, including the Nature Protection Law, which is implemented at the entity level (Federation of BiH, Republika Srpska, and Brčko District). Furthermore, biodiversity-related programs are also guided through CBD and NBSAP. Bosnia and Herzegovina has initiated steps towards establishing an

IPBES national platform for biodiversity, which further supports strengthening the science-policy interface.

Table 9. Bosnia and Herzegovina's focal points for IPCC and IPBES

Platform	Responsible institution
IPCC	Faculty of Science, University of Banja Luka
IPBES	Federal Ministry of Environment and Tourism

Table 10. Overview of climate and biodiversity policies in Bosnia and Herzegovina

Document / policy	Focus area	Biodiversity–climate integration
NAP, 2021 - 2030	Adaptation	Integrates climate adaptation into sectoral policy
NBSAP, 2015 - 2020	Biodiversity	Recognizes ecosystem services and sectoral mainstreaming
NDC2.0, 2021	Climate	Mentions biodiversity and sensitive ecosystems as sectors most vulnerable to climate change
BiH National Ecosystem Assessment, 2024	Biodiversity	Explicitly links ecosystems and climate change adaptation
Sustainability of Protected Areas (SPA Project), 2022-2027	Biodiversity and climate	Strengthens the resilience of the protected areas to the climate change threats

Key message 3 expanded

Table 11. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters
NDC3.0	Developing NDC 3.0 and fully operationalizing the Environmental Information System (EIS)	Government, UNDP	Strong climate-biodiversity links

Global Biodiversity Framework Early Action Support (Central and Eastern Europe), 2024-2027	Alignment with GBF	UNEP, GEF	Opportunity for IPBES–IPCC alignment
Via Dinarice (iii phase), 2023-ongoing	Sustainable tourism based on nature, gender-responsive green development, and the development of livelihoods, enhanced by technology and innovations.	UNDP	Links biodiversity and climate resilience to sustainable tourism
Catalyzing the Green Transition in BiH, ongoing	Green Transition. Key priorities: nature protection, improved quality of life for citizens, and tangible contributions to climate resilience.	UNDP	Mainstreams biodiversity and climate considerations in the Green Transition

Country profile: Bulgaria

Key data snapshot

- **Country:** Bulgaria
- **Location:** Southeast Europe; Balkan Peninsula; Black Sea coastline; bordered by Romania, Serbia, North Macedonia, Greece and Türkiye
- **Land area:** 110,994 km²
- **Population (2026):** 6,667,659 (75% urban, 25% rural)
- **Human Development Index (2022):** 0.845 (very high human development)
- **GDP per capita (2024):** US$ 17,596
- **Main economic sectors:** services, industry, agriculture
- **Protected area coverage:** 35–40% of terrestrial area when including Natura 2000 sites; 8% of marine area
- **Biodiversity:** 3,900 plant species; 428 birds; 95 mammals; 1,300 endemic species
- **Iconic landscapes:** Danubian Plain, Balkan Mountains, Rila and Pirin, Thracian Plain, Black Sea coast
- **Iconic species:** brown bear, Balkan chamois, imperial eagle, Dalmatian pelican, red deer, European ground squirrel

Sources: WBG, CBD, IMF

Key messages

Key message 1: Main drivers of biodiversity loss are habitat fragmentation, pollution, overexploitation of resources, invasive species and climate change. Climate risks include rising temperatures, droughts, floods, extreme weather events and water scarcity, affecting key sectors such as agriculture, water, energy, tourism and health.

Key message 2: IPCC knowledge is strongly integrated into climate policy, particularly through EU-driven frameworks. IPBES uptake remains more indirect and largely embedded in biodiversity and conservation policies rather than cross-sectoral planning.

Key message 3: EU frameworks, Natura 2000 and nature-based solutions projects are key drivers of biodiversity–climate integration, though implementation remains constrained by institutional fragmentation and sectoral silos.

Key messages expanded

Key message 1 expanded

Observed climate impacts on biodiversity and ecosystems: Climate change in Bulgaria is intensifying biodiversity loss through rising temperatures, more frequent heatwaves, droughts, floods and extreme rainfall events. Forest ecosystems are increasingly affected by drought stress, pest outbreaks and wildfires. Wetlands and freshwater systems are experiencing altered hydrological regimes, while water scarcity is already affecting approximately 8 per cent of the population seasonally (Bloomberg,

2026). Coastal ecosystems along the Black Sea face erosion and ecosystem degradation. These pressures interact with human drivers such as habitat fragmentation, pollution and overexploitation, accelerating ecosystem degradation.

Projected climate risks: Climate projections indicate warming of up to 3°C under business-as-usual scenarios, with significant reductions in rainfall (often exceeding 20% in summer) and increased drought risk. More frequent extreme weather events including floods, heatwaves, and wildfires are expected to impact ecosystems, agriculture, and water systems, with projected economic losses of 1–3% of GDP by 2050 (EEA, 2025).

Role of ecosystems in adaptation and resilience: Ecosystems play a critical role in climate adaptation. Forests provide carbon sequestration, soil stabilization and erosion control. Wetlands and floodplains regulate water flows and reduce flood risks, particularly along the Danube. Coastal ecosystems buffer storm surges and erosion, while mountain ecosystems regulate water supply. Afforestation efforts have increased forest cover and enhanced resilience, but ongoing climate and land-use pressures threaten these benefits.

Key message 2 expanded

Bulgaria's policy landscape shows strong EU-driven integration, with climate and biodiversity frameworks aligned but not fully operationally integrated.

IPCC uptake is strong:

- Climate risk assessments rely on IPCC concepts (i.e. risk, resilience, scenarios).
- IPCC is being integrated into national adaptation strategies and sectoral planning.
- The uptake is strongest in water, agriculture, energy and urban sectors.

However:

- Integration remains largely sectoral and technical.
- Limited cross-sectoral application of ecosystem-based approaches.

IPBES uptake is more indirect:

- Reflected through EU biodiversity frameworks (Natura 2000, ecosystem services)
- Strong in conservation but weaker in economic and development planning
- Limited incorporation of transformative change and participatory approaches

Table 12. Bulgaria's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Environment and Water (MoEW)	Climate Change Directorate; Adaptation units
IPBES	MoEW	Biodiversity Directorate; Natura 2000 units

Table 13. Overview of climate and biodiversity policies in Bulgaria

Document/policy	Focus area	Biodiversity-climate integration
Strategic National Development Programme (Bulgaria 2030), 2020	Development, green transition	Moderate integration of ecosystems and climate
Climate Change Mitigation Act, 2014	Climate governance	Ecosystems recognised as carbon sinks; limited biodiversity integration
National Climate Change Adaptation Strategy & Action Plan, 2019 - 2030	Adaptation	Strong integration; ecosystems used as adaptation tools
National Energy and Climate Plan (NECP), 2021 - 2030	Mitigation	Aligns with EU goals to achieve a 34.96% renewable energy share by 2030
EU NDC3.0, 2025 - 2035	Adaptation, mitigation	Bulgaria has endorsed the Coalition for High Ambition Multilevel Partnerships for Climate Action, a global coalition promoting a multilevel climate governance model.

Key message 3 expanded

Table 14. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration, often driven by EU funding and regional cooperation

Title	Short description	Lead actor(s)	Why it matters
LIFE Programme Projects (2020 - present)	Nature-based solutions and ecosystem restoration	MoEW, municipalities	Supports NbS and ecosystem resilience
National Afforestation Program (ongoing)	Forest restoration and carbon sequestration	Ministry of Agriculture	Supports mitigation and biodiversity

SELINA (2022 - 2027)	Science-policy integration for biodiversity and climate	Research institutions	Builds on IPBES, IPCC, CBD findings
Green Talent Project (2023- 2026)	Capacity building for climate-biodiversity integration	EU partners	Bulgaria as a demonstration hub to support climate–nature synergies

Country profile: Croatia

Key data snapshot

- **Country:** Republic of Croatia
- **Location:** Southeast/Central Europe; Adriatic coastline
- **Land area:** 56,594 km²
- **Population (2025):** 3.9 million (58% urban, 42% rural)
- **Human Development Index (2023):** 0.889 (very high human development)
- **GDP per capita (2024):** US$ 20,000
- **Main economic sectors:** tourism, services, industry, agriculture
- **Protected area coverage:** 38% terrestrial (Natura 2000 included); significant marine coverage
- **Biodiversity:** 37,000 species; karst ecosystems; high freshwater and cave biodiversity
- **Iconic landscapes:** Adriatic coast, Plitvice Lakes, Dinaric karst, Danube wetlands
- **Iconic species:** brown bear, wolf, lynx, griffon vulture, Mediterranean monk seal

Sources: WBG, CBD, IMF

Key messages

Key message 1: Croatia's biodiversity is strongly linked to its karst, freshwater, forest, coastal and marine ecosystems. Main pressures include land-use change, tourism development, invasive species, pollution, wildfire and climate change.

Key message 2: IPCC uptake is relatively strong through EU climate governance, Croatia's Climate Change Adaptation Strategy and national reporting. Croatia's first Biennial Transparency Report (BTR) identifies the Adaptation Strategy as a key national climate document and includes adaptation measures for biodiversity.

Key message 3: IPBES uptake is mostly indirect through EU biodiversity policy, Natura 2000, ecosystem restoration and protected area management.

Key messages expanded

Key message 1 expanded

Climate change is already increasing pressure on Croatia's coastal, island and freshwater ecosystems. Heatwaves and drought increase wildfire risk and water stress, while sea level rise and storms threaten coastal habitats and tourism infrastructure. Wetlands and river floodplains are important for flood regulation, while forests provide carbon storage, erosion control and habitat connectivity. Without additional action, future climate events could reduce GDP by up to 2.1 per cent by 2050, with particular impacts on infrastructure, tourism and agriculture. In contrast, targeted investments of 0.04 per cent of GDP could more than halve these impacts or even fully offset the losses outside the tourism sector (WBG Croatia CCDR 2025).

Key message 2 expanded

Croatia's policy landscape is strongly shaped by EU frameworks. Climate policy is consolidated through the Climate Change Adaptation Strategy and EU climate neutrality targets, while biodiversity policy is anchored in the Nature Protection Act, Natura 2000 and biodiversity strategies. IPCC knowledge is operationalized more clearly than IPBES knowledge, which remains embedded in conservation and ecosystem-services language.

Table 15. Croatia's focal points for IPCC and IPBES

Platform	Responsible institution	Department/unit
IPCC	Croatian Meteorological and Hydrological Service	
IPBES	Ministry of Environmental Protection and Green Transition; Ministry of Economy and Sustainable Development	Service for Strategic Affairs, Nature Protection Directorate

Table 16. Overview of climate and biodiversity policies in Croatia

Document/policy	Focus area	Biodiversity–climate integration
Climate Change Adaptation Strategy, 2020 - 2040 (with a view to 2070)	Adaptation	Includes biodiversity and ecosystem measures
NBSAP, 2017– 2025	Biodiversity	Recognizes ecosystem resilience and protected areas
NECP, 2021-2030 (submitted in 2025)	Renewable energy, emission reduction	Specifically mentions the priority of biodiversity conservation

EU NDC3.0, 2025 - 2035	Adaptation, mitigation	Strong biodiversity-climate alignment
Law on climate change and protection of the ozone layer, 2019	Climate change	Alignment with EU Climate legislation

Key message 3 expanded

Table 17. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters
Strengthening climate resilience measures for protection and revitalisation of ecosystems in the Spačva-Bosut Basin, 2024- 2027	Project aims to jointly develop climate resilience action plan in the Spačva-Bosut Basin	Forest Department Vinkovci, EU	Integrates climate resilience and revitalization of ecosystems
LIFE Program, ongoing	EU funding program dedicated entirely to environmental, climate and energy objectives	Government, EU	Strong biodiversity-climate alignment

Country profile: Greece

Key data snapshot

- **Country:** Greece (Hellenic Republic)
- **Location:** Southern Europe; Balkan Peninsula; extensive Mediterranean coastline
- **Land area:** 130,800 km²
- **Population (2026):** 9.9 million (80–90% urban, 10–20% rural)
- **Human Development Index (2023/24):** 0.908 (very high human development)
- **GDP per capita (2024):** US$ 29,696
- **Main economic sectors:** Services, tourism, finance, trade, industry, agriculture
- **Protected area coverage:** 35% terrestrial; 18–20% marine; 28% Natura 2000
- **Biodiversity:** 6,600 plant taxa; 23,000 animal species
- **Iconic landscapes:** Mount Olympus, Meteora, Greek islands, coastal ecosystems
- **Iconic species:** Mediterranean monk seal, loggerhead turtle, dolphins

Sources: WBG, CBD, IMF

Key messages

Key message 1: Main drivers of biodiversity loss include land-use change, agricultural intensification and abandonment, wildfires, marine pressures (overfishing and invasive species) and climate change (CBD Country Profile). Climate risks include rising temperatures, droughts, floods and increased wildfire frequency, affecting agriculture, tourism, forestry, water systems and public finances.

Key message 2: IPCC knowledge is increasingly integrated into national and regional climate policy (e.g. climate law, adaptation plans). IPBES uptake remains more indirect and largely embedded in biodiversity strategies and EU frameworks rather than fully operational across sectors.

Key message 3: EU-driven frameworks (e.g. Natura 2000, LIFE programmes) and nature-based solutions projects are key drivers of integration, but challenges remain due to sectoral silos, wildfire risks and pressures from tourism and agriculture.

Key messages expanded

Key message 1 expanded

Observed climate impacts on biodiversity and ecosystems: Greece is experiencing significant climate pressures, including rising temperatures, prolonged droughts, increased frequency of wildfires and more intense flood events. Mediterranean ecosystems are particularly vulnerable due to hot, dry summers that increase fire risk. Forest ecosystems are increasingly degraded by repeated fires, reducing biodiversity and carbon storage capacity. Agricultural landscapes are affected by intensification, monocultures and abandonment, which increase erosion and wildfire risks. Marine ecosystems face overfishing and invasive species pressures, while coastal ecosystems are affected by erosion and climate variability.

Projected climate risks: Climate projections indicate temperature increases of up to 6°C by 2100 (Bank of Greece, n.d.), with an increase in drought duration (up to 40 additional days of drought per year), more frequent floods and intensified extreme weather events. These changes are expected to significantly impact ecosystems, water availability and economic sectors such as agriculture and tourism.

Role of ecosystems in adaptation and resilience: Ecosystems play a key role in climate adaptation. Forests provide carbon sequestration and erosion control, wetlands regulate water flows and reduce flood risks, and coastal ecosystems buffer storm surges. However, ecosystem degradation, particularly due to fires, land-use change and marine pressures, limits their adaptive capacity. Nature-based solutions are increasingly recognized but require stronger implementation and integration into planning.

Key message 2 expanded

Greece's national policies align well with IPCC and IPBES assessments, with prominent examples being the National Climate Law 4936/2022, Regional Adaptation Action Plans that translate IPCC findings to the regional level, and the NBSAP, which includes IPBES findings on alien species. However, integration remains largely strategic and sectoral.

Table 18. Greece's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Environment and Energy	Climate Change and Energy Directorate
IPBES	Ministry of Environment and Energy	General Secretariat for Natural Environment and Water

Table 19. Overview of climate and biodiversity policies in Greece

Document/policy	Focus area	Biodiversity-climate integration
Climate Law (2022)	Climate neutrality & adaptation	Moderate integration; ecosystems recognized
EU NDC3.0 (2025 - 2035)	Adaptation, mitigation	Strong biodiversity-climate alignment
NBSAP (2014 - 2029)	Biodiversity conservation	Target 7 is dedicated to minimizing climate change impacts on biodiversity
National Adaptation Plan (NAP) 2016)	Adaptation	Strong integration; includes ecosystem-based adaptation
National Energy and Climate Plan (NECP) (2021 - 2030, submitted in 2025)	Energy transition	Biodiversity is included in line with the EU policies; forestry and land use included

Key message 3 expanded

Table 20. Bright spots: initiatives that provide windows of opportunity to strengthen integration across biodiversity, climate and sectoral policies

Title	Short description	Lead actor(s)	Why it matters
Science for Evidence-based and sustainabLe decIsions about NAtural capital (SELINA) (2022-2027)	Project provides necessary tools and information to help sustain, restore and enforce the climate-neutral use of	University of Patras	Builds on IPBES, IPCC, CBD findings

	European ecosystems and their services.		
LIFE (2021 - 2027)	Project aims to facilitate the Management & Conservation of National Biodiversity, through the development of an innovative tool for Greece's biodiversity	EU	Integrates climate change, biodiversity, circular economy and clean energy transition
The Rexus project (2021-2024)	Rexus aims to develop and validate knowledge and tools to facilitate the transition from NEXUS Thinking to NEXUS Doing	EU Horizon 2020, 17 consortium partners	Mainstreaming nexus approach

Country profile: Kazakhstan

Key data snapshot

- **Country:** Kazakhstan
- **Location:** Central Asia; partially in Eastern Europe
- **Land area:** 2,724,900 km²
- **Population (2026):** 20,532,240 (63% urban, 37% rural)
- **Human Development Index (2023):** 0.837 (very high human development)
- **GDP per capita (2025):** US$17,500
- **Coastline length:** 2,340 km of coastline along the Caspian Sea
- **Iconic landscapes/seascapes:** Irtysh, Ishim, Syr Darya and Ural rivers; Aral Sea, Caspian Sea, Lake Balkhash; Ustyurt Plateau; Betpak-Dala desert; Tien Shan mountains
- **Protected area coverage:** 30.9 million hectares (2025), corresponding to 11.3% of the country's territory (Seventh National Report to CBD).
- **Biodiversity:** over 6,000 species of vascular plants; 178 mammal species, 489 bird species, 12 amphibian species and 104 fish species.
- **Iconic species:** Saiga antelope, Kulan (Asiatic wild ass), snow leopard, Caspian seal, golden eagle

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: The main drivers of biodiversity loss are land degradation, desertification, deforestation, pollution and extractive industries (i.e. oil, gas, coal, uranium, copper [CBD, 2026]).

Climate change impacts are likely to manifest in more frequent and intense droughts, heatwaves, water scarcity, floods and extreme precipitation, adversely affecting agriculture and food security, energy, and health.

Key message 2: IPCC findings, scenarios, methodologies and guidelines inform national policies such as the NDC 3.0. While IPBES assessments are often not explicitly cited in national policy documents, several concepts aligned with IPBES findings (e.g. ecosystem services, nature-based solutions) are reflected indirectly.

Key message 3: Projects that aim to overcome silos in water management, land degradation, biodiversity and health showcase successful examples of integrated responses to polycrises.

Key messages expanded

Key message 1 expanded

Land degradation and desertification: Around 66 per cent of the country is prone to desertification, and 60 per cent of land is degraded, including 57 per cent of cropland and 38 per cent of grasslands (BES-Net, 2019). Land degradation is exacerbated by unsustainable land use, overgrazing, declining soil fertility and deforestation as primary drivers (Kazakhstan Government, 2026). Economic losses from degradation can reach US$5.6 billion (ELD, 2024). Mining, oil, gas and infrastructure development drive biodiversity loss through pollution, habitat fragmentation and ecosystem degradation (CBD, 2026).

Kazakhstan is warming faster than the global average, with projected increases up to 5.3°C by the 2090s (World Bank & ADB, 2021). Climate change is intensifying aridity, reducing water availability, and increasing extreme events.

Major risks include (see Figure 4):

- More frequent and intense droughts. Freshwater availability may decline by 20–30 per cent, with wheat yields potentially dropping by up to 50 per cent by the 2050s (World Bank & ADB, 2021).
- Rising heatwaves are causing crop loss, livestock mortality, and infrastructure strain.
- Shrinking glaciers (Tian Shan, Pamir) will initially increase flood risk, then reduce long-term water supply.
- Floods and extreme precipitation. Spring floods are increasing due to snowmelt, heavy rainfall, and climate shifts. The 2024 floods displaced over 117,000 people (GIZ, 2025).

	Agriculture	Energy	Infrastructure	Water	Health care	Cross-sectoral
Droughts	• Average agriculture losses from the past (7 Bn. KZT – 300 Bn. KZT)	• Decreased hydro power production due to lower water levels (-5% to -20%) • Limited energy supply from CHP plants due to insufficient cooling (-3.8% to 4.7%)	• Increased costs in water transport	• Increased water demand in agriculture, coal mining, steam and air conditioning services	-	-
Sources	• ClimateDamageDatabase_MapView_2024.xlsm	• IEA energy balance 1998 • Van Vliet et al., 2016	• Increased demand for wholesale services in water transport as observed during drought years	• Increased water demand in relevant sectors as observed during drought years	-	-
Heatwaves	• Wheat yield losses (457 bn. KZT until 2030, 608 bn. KZT until 2050) • Increased sunflower yields (1,8 bn. KZT until 2030, 0.9 bn. KZT until 2050) • Decline in livestock production (109 bn. KZT until 2030, 170 bn. KZT until 2050))	• Decreased hydro power production due to lower water levels (-5% to -20%) • Limited energy supply from CHP plants due to insufficient cooling (-3.8% to 4.7%) • Additional cooling demand: 0.5% to 8.5% per 1°C change in ambient temperature	-	-	• Higher health costs due to water-born and vector-borne diseases (SSP2-4.5: 4.9 Mn. USD by 2050)	• Average labor productivity losses due to heat stress (-0.95 to -1.9% by 2050) • Increased beverage consumption (3%-5%)
Sources	• UNDP, 2020	• IEA energy balance 1998 • Van Vliet et al. ,2016	-	-	• World Bank, 2024a	• Climate Analytics
		• World Bank, 2021				• Mirasgedis et al., 2013
Floods	• Killed livestock, flooded arable land (2% of total flood damages; 0.5 Bn. KZT -51 Bn. KZT)	• Damaged energy infrastructure (22 Bn. KZT -112 Bn. KZT) • Electrical outages causing sales losses in other sectors (0.5%-7.7%)	• Damages buildings and interior (87% of total flood damages; 0.5 Bn. KZT -51 Bn. KZT) • Damaged road infrastructure and cars (11% of total flood damages; 0.5 Bn. KZT - 51 Bn. KZT)	-	-	-
Sources	• ClimateDamageDatabase_MapView_2024.xlsm	• World Bank, 2019	• ClimateDamageDatabase_MapView_2024.xlsm	-	-	-

Figure 4. Quantifiable benchmark impacts from main climate hazards in Kazakhstan (source: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, 2025, pp. 19–20)

Key message 2 expanded: Climate policies and planning explicitly rely on IPCC findings, scenarios, methodologies and guidelines (e.g. Kazakhstan's NDC 3.0 mentions reliance on IPCC's Good Guidance report; IPCC methodologies used for greenhouse gas emissions calculations, AR6 data). IPBES findings are not explicitly mentioned in the national policies; however, the IPBES Assessment includes in its key messages the need to overcome silos (e.g. the need for better interministerial coordination), to understand synergies and engage with diverse stakeholders (including in the private sector) (see Table 22).

Table 21. Kazakhstan's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Ecology and Natural Resources	Climate Policy Department
IPBES	No focal point appointed (as of May 2026)	

Table 22. Overview of climate and biodiversity policies in Kazakhstan

Document/policy	Focus area	Biodiversity–climate integration
Kazakhstan–2050 Strategy (2012–2050)	Economic development, resource use, energy transition	Indirect: identifies water scarcity and natural resource depletion as long-term risks, acknowledges transition from hydrocarbon economy; biodiversity not explicitly addressed
Concept for Transition to a Green Economy (2013–2050)	Emissions reduction, energy efficiency, renewable energy, water resource management	Links environmental sustainability with economic development; ecosystem protection referenced alongside climate mitigation and resource efficiency goals
Strategy on Achieving Carbon Neutrality by 2060 (2023)	Emissions reduction pathway to net zero, energy transition	Ecosystem-based approaches referenced; NDC 3.0 aligned with this strategy; Biodiversity is not a primary focus
NDC 3.0 Third NDC (2025–2035)	17% below 1990 by 2035 (unconditional), 25% with international support, whole-of-government approach	More biodiversity-related language: climate-smart agriculture, afforestation, ecosystem restoration as mitigation and adaptation; sustainable land/water management explicitly promoted; aligned with IPCC findings
National Biodiversity Conservation Concept 2026–2035	Expand protected areas (from 31 million to 33.2 million ha), increase forest cover, wildlife monitoring; pasture degradation, plant biodiversity	Explicitly recognizes climate change as a key driver of biodiversity loss; calls for ecosystem-based and adaptive management integrating climate; identifies harmful subsidies and cross-sectoral coordination gaps; aligned timeframe with NDC 3.0 (2026–2035)

Key message 3 expanded

Table 23. Bright spots: initiatives that provide windows of opportunity to strengthen biodiversity–climate integration

Title	Description	Organization
Kazakhstan-Biodiversity Finance Initiative (BIOFIN) biodiversity projects	Kazakhstan joined BIOFIN in 2013, becoming one of the first countries in Central Asia to begin a systematic analysis of biodiversity financing	BIOFIN (UNDP)
Energy-Water-Land Use Nexus in Central Asia (2024–2028)	Aims to mainstream nexus principles into development planning and develop practical tools and instruments to support decision makers for enhanced cross-sectoral and transboundary cooperation	United Nations Economic Commission for Europe (UNECE)
Promotion of sustainable food systems and improved ecosystems services in Northern Kazakhstan landscape	Aims to provide agroecological incentives for sustainable agricultural production and implementation of sustainable rangeland management methods	UNDP
NAP (2024–2028)	National adaptation planning across sectors. Expected to link ecosystem health to adaptation capacity. Four key sectors: agriculture, water resources, forestry and disaster risk reduction, aiming to integrate climate risks into national planning	Ministry of Environment and Natural Resources; financed by the Green Climate Fund and supported by UNDP

Country profile: Moldova

Key data snapshot

- **Country:** Republic of Moldova
- **Location:** Eastern Europe; landlocked between Romania and Ukraine
- **Land area:** 33,846 km²
- **Population (2025):** 2.5 million (43% urban, 57% rural)
- **Human Development Index (2023):** 0.767 (high human development)
- **GDP per capita (2024):** US$ 6,500
- **Main economic sectors:** agriculture, services, food processing, remittances
- **Protected area coverage:** 6–7% of territory
- **Biodiversity:** steppe, forest-steppe and river ecosystems; moderate diversity
- **Iconic landscapes:** Codrii forests, Dniester and Prut river valleys
- **Iconic species:** European pond turtle, otter, white stork

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: Moldova's biodiversity is highly affected by agricultural land use, forest fragmentation, soil erosion, water pollution and climate change. Its adaptation priorities focus on agriculture, water, health, forestry, energy and transport.

Key message 2: IPCC uptake is stronger than IPBES uptake and is visible through NDCs, climate adaptation planning and risk assessments. Moldova's National Climate Change Adaptation Programme (NCCAP) 2030 aims to integrate adaptation into development planning across priority sectors.

Key message 3: IPBES uptake is emerging through the Biodiversity Programme 2024–2030, ecosystem restoration and EU-aligned environmental reforms.

Key messages expanded

Key message 1 expanded: Moldova's biodiversity–climate risks are concentrated in agricultural landscapes, forests and river systems. Drought and heat reduce crop yields and increase water stress, while degraded soils and fragmented forests reduce resilience. River floodplains and forests offer important adaptation benefits through water regulation, erosion control, carbon storage and habitat connectivity. 'Moldova is the third most vulnerable ECA country to natural hazards, partly due to its high reliance on a low-productivity agricultural sector, as well as the high exposure of its population. In Moldova, 12.2 percent of the population is exposed to natural hazards, compared to the upper-middle-income country average of 2.1 percent, and the economy and households are highly dependent on natural capital, particularly through the agricultural sector' (WBG Moldova CCDR, 2024, p. 4).

Key message 2 expanded: Moldova's policy landscape reflects growing integration through climate adaptation planning and EU policy alignment. Climate governance is more operational than biodiversity governance, but recent biodiversity and environment strategies create stronger entry points for integrated planning. The NCCAP 2030 explicitly emphasizes systemic, cross-sectoral, mainstreamed adaptation and strengthened synergies between vulnerable sectors.

Table 24. Moldova's focal points for IPCC and IPBES

Platform	Responsible institution	Department/unit
IPCC	Ministry of Environment	Climate Change Policy Section
IPBES	Ministry of Environment	

Table 25. Overview of climate and biodiversity policies in Moldova

Document/policy	Focus area	Biodiversity–climate integration
NCCAP	Integrate climate change adaptation measures into development planning at all priority levels	Highlights biodiversity conservation, especially forestry, afforestation
NDC 3.0	Climate	Specifically highlights the climate impacts on biodiversity (especially forestry)
Law no. 74/2024 on climate action	Legal framework for Moldova to achieve net-zero emissions by 2050	Climate change mitigation and adaptation linked with natural disaster risk management

Key message 3 expanded

Table 26. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration

integration

Title	Short description	Lead actor(s)	Why it matters
Restoring Ecosystems for Marine Pollution Prevention Project	Sustainable landscape management practices within the Dniester River Basin	GEF	A chance to use IPCC and IPBES findings to inform sustainable management of the environmentally and

(RE-MAP), 2025 - ongoing			socioeconomically critical watershed in Moldova.
National Forest Extension and Rehabilitation Program (2023 – 2032)	A 10-year initiative designed to increase national forest coverage from roughly 13.8% to at least 17% of the country's territory by 2032.	Ministry of Environment	Vulnerability of forests to climate change is explicitly mentioned: about 15-25% of the areas are affected by drought
LIFE RENATA	Support the country in aligning its protected Emerald Network sites' establishment and management with EU standards	Government, EU	A chance to use IPCC and IPBES findings to inform the projects legal, technical, and operational workstreams

Country profile: Montenegro

Key data snapshot

- **Country:** Montenegro
- **Location:** Southeast Europe/Western Balkans; Adriatic coastline; borders Croatia, Bosnia and Herzegovina, Serbia, Kosovo and Albania
- **Land area:** 13,883 km²
- **Population (2023):** 623,633 (68.8% urban, 31.2% rural)
- **Human Development Index (2023):** 0.862 (very high human development)
- **GDP per capita (2024):** US$ 13,263
- **Main economic sectors:** tourism, services, energy, agriculture, forestry, construction, transport/logistics
- **Protected area coverage:** 19% of the country
- **Biodiversity:** 3,250 vascular plants; 352 bird species; 38 reptiles; 18 amphibians; 16,000–20,000 insect species
- **Iconic landscapes:** Lake Skadar, Durmitor and Tara Canyon, Boka Kotorska, Adriatic coast, karst systems, Posidonia oceanica seagrass meadows
- **Iconic species:** brown bear, wolf, Balkan lynx (regional), Dalmatian pelican, endemic freshwater fish

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: The main drivers of biodiversity loss are habitat conversion and construction pressure; pollution from waste and untreated wastewater; illegal logging, hunting and fishing; extraction activities; invasive alien species; and climate change. Climate impacts include rising temperatures, drought, floods, heavy rainfall, heatwaves, wildfires, landslides and sea level rise. Key affected sectors include agriculture, water, tourism, forestry, energy, infrastructure and health (NAP, 2025).

Key message 2: IPCC methodologies and climate science are clearly embedded in Montenegro's climate policy frameworks (i.e. NDC, NAP), while explicit uptake of IPBES assessments is limited. Integration between biodiversity and climate policies exists but remains uneven and largely strategic rather than operational.

Key message 3: A growing number of projects in protected area management, adaptation planning and nature-based investment demonstrate emerging efforts to overcome silos among the biodiversity, climate and economic sectors.

Key messages expanded

Key message 1 expanded

Observed climate impacts on biodiversity and ecosystems: Montenegro is already experiencing rising air and sea surface temperatures, droughts, floods, heavy rainfall, heatwaves, wildfires, landslides and strong winds. Forest ecosystems are increasingly affected by drought and fire risk; freshwater systems are under pressure from hydrotechnical interventions, pollution and resource extraction; and coastal and wetland ecosystems face salinization, altered hydrology and reduced water availability. Biodiversity loss is closely linked with these pressures and is consistently described as cumulative and interacting with climate change rather than separate from it (NAP, 2025).

Projected climate risks: Under the RCP4.5 scenario, Montenegro faces moderate warming of about 2°C by mid-century compared to 1971–2000, with the most pronounced increases in summer (up to 2.5°C by century's end), while spring remains least affected. Regarding precipitation, projections show modest annual declines of up to –5% by mid- and late century, with sharp summer reductions reaching –30%, while spring shows slight increases. Climate projections indicate worsening drought conditions under most scenarios, particularly in southern and central regions. Forest fire risk is expected to increase significantly, while coastal areas face sea level rise and flooding. Climate impacts are expected to intensify pressures on water quality, sediment dynamics, ecosystem stability, biodiversity status and tourism attractiveness, especially in wetlands and coastal ecosystems (4th National Communication of Montenegro to UNFCCC, 2024; NAP, 2025).

Role of ecosystems in adaptation and resilience: Ecosystems play a central role in adaptation. Forests reduce erosion and landslide risks; wetlands regulate floods and water flows; coastal ecosystems support livelihoods and buffer climate impacts. The NDC highlights nature-based solutions for both mitigation and adaptation, including forest conservation and wetland protection. Ecosystems such as Lake Skadar and peatlands provide important carbon storage and resilience benefits through ecosystem-based adaptation and mitigation functions (NDC3.0, 2025).

Significant data gaps remain, including uneven biodiversity monitoring, limited research coverage and weak or insufficiently standardized indicators. Evidence of implementation outcomes is considerably weaker than evidence of planning and strategy design. Significant progress has been achieved through Montenegro's EU accession process, particularly under Chapter 27. One of the most important advances has been the completion of habitat and species mapping across the entire national territory, providing an important foundation for biodiversity monitoring, conservation planning and alignment with EU environmental standards.

Key message 2 expanded

Montenegro's policy landscape shows more advanced institutional development in climate policy than in biodiversity policy. Climate governance is supported by newer instruments, such as the Law on Climate Change, NDC and NAP, while biodiversity governance continues to rely primarily on NBSAP and related frameworks.

IPCC methodologies are clearly embedded, including:

- Use of 2006 IPCC Guidelines and 2019 Refinement
- Use of the IPCC Fifth Assessment Report global warming potentials
- Reference to AR6 pathways and CMIP6 projections
- Integration into inventories, projections and vulnerability assessments

IPBES uptake is limited:

- No explicit references to IPBES assessments have been identified.
- Biodiversity knowledge is primarily reflected through ecosystem-service frameworks, indicators and CBD reporting.
- Integration remains indirect and less institutionalized compared to climate science.

Table 27. Montenegro's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Ecology, Sustainable Development and Northern Region Development	Institute for Hydrometeorology and Seismology
IPBES	Ministry of Ecology, Sustainable Development and Northern Region Development	Environmental Protection Agency

Table 28. Overview of climate and biodiversity policies in Montenegro

Document/policy	Focus area	Biodiversity–climate integration
National Strategy for Sustainable Development to 2030	Sets Montenegro's sustainable development strategy to 2030	Explicitly mentions climate change impacts and the need to protect ecosystems (notably forests) that are vulnerable to climate change
Climate Law, 2025	Mitigation, adaptation and governance	Establishes climate framework; specifically mentions nature-based solutions
NDC 3.0, 2025–2035	Mitigation and adaptation	Aligns with NBSAP, NAP and land-degradation neutrality targets; promotes nature-based solutions
Law on Environmental Protection (2016)	Framework for Environmental policy, regulates EIA and SEA, ensure access to environmental information and transparency, covers pollution control, resource management and public participation.	It integrates biodiversity conservation and climate change into all major environmental planning and decision-making processes.
NAP, 2025–2035	Adaptation	Strongest integration instrument; links ecosystems and resilience

Key message 3 expanded

Table 29. Bright spots: selected projects that prioritize cross-sector relevance and translation of biodiversity and climate knowledge into planning, investment and management tools

Title	Short description	Lead actor(s)	Why it matters
EU LIFE Programme	EU-supported projects on biodiversity and climate action	Ministry of Ecology and partners	Possibility to improve the uptake of IPCC and IPBES assessments

Integrating Biodiversity into Sectoral Policies and Practices and Strengthening the Protection of Key Biodiversity Areas in Montenegro, 2023–2027	Aims to protect ecosystems and key biodiversity areas, integrating them with the tourism, forestry and agriculture sectors	Ministry of Ecology	Possibility to improve the uptake of IPCC and IPBES Assessments
NBSAP, 2026–2031	Biodiversity conservation	Ministry of Ecology, GEF, UNEP	Aligns with KMGBF and the EU negotiating Chapter 27– Environment and Climate Change
2nd and 4th National Communication of Montenegro to UNFCCC	Climate-driven impacts on forest (forest distribution and growth, forests' pests and diseases, forest fires)	Ministry of Ecology, Sustainable Development and Northern Region Development, Ministry of Agriculture, Water and Forest, Institute of Hydrometeorology and Seismology	Possibility to improve the uptake of IPCC and IPBES Assessments

Country profile: North Macedonia

Key data snapshot

- **Country:** Republic of North Macedonia
- **Location:** Southeast Europe/Western Balkans; landlocked; borders Serbia, Bulgaria, Greece and Albania
- **Land area:** 25,713 km²
- **Population (2023):** 1.83 million (60–65% urban, 35–40% rural)
- **Human Development Index (2022):** 0.770 (high human development)
- **GDP per capita (2023/2024):** US$ 8,000
- **Main economic sectors:** services (60%), industry (25–30%), agriculture (10%)
- **Protected area coverage:** 13–14% of national territory
- **Biodiversity:** 16,000 recorded species; high freshwater endemism
- **Iconic landscapes:** Lake Ohrid, Prespa Lakes, Šar Mountains, Mavrovo, Pelister, Galičica, Vardar basin
- **Iconic species:** Balkan lynx, brown bear, Dalmatian pelican, Ohrid trout, Balkan chamois

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: The main drivers of biodiversity loss are land-use change and fragmentation, hydropower development, forest degradation, agricultural pressures, water pollution and climate change. Climate risks include rising temperatures, drought, reduced precipitation, heatwaves, wildfires and hydrological changes. Key affected sectors include agriculture, forestry, water, energy, tourism and health.

Key message 2: IPCC knowledge is relatively well embedded in climate policy frameworks (NDC, NAP), while IPBES-related knowledge remains less systematically integrated, particularly in economic and sectoral planning.

Key message 3: A range of donor-supported and national projects demonstrate efforts to translate biodiversity and climate knowledge into practice, but these remain largely project-based and not fully institutionalized.

Key messages expanded

Key message 1 expanded

Observed climate impacts on biodiversity and ecosystems: "North Macedonia is highly vulnerable to natural and climate-related hazards (especially wildfires, landslides, and floods), and potential costs of inaction are substantial. The country has a history of devastating floods and faces increasing extreme weather events, such as torrential rains and heat waves. Climate change threatens access to fresh water, increasing water-borne diseases, and extreme temperatures heighten morbidity and

mortality. Over the past 20 years, losses from disasters and extreme climate events have totalled an estimated US$ 667 million" (WBG North Macedonia CCDR, 2024).

North Macedonia is experiencing rising temperatures, prolonged droughts, changing precipitation patterns and increased climate variability. Forest ecosystems are increasingly affected by wildfires, pest outbreaks and shifts in species composition, reducing their resilience and carbon sequestration capacity. Freshwater ecosystems, particularly Lake Ohrid and Prespa Lakes, are highly vulnerable due to temperature increases and hydrological changes. These ecosystems host high levels of endemism, making them particularly sensitive to ecological disruption.

Projected climate risks: Climate projections indicate temperature increases of 1.5°C to 2.5°C by mid-century, reduced summer precipitation, increased drought frequency and higher variability in rainfall. Additional risks include increased wildfire occurrence, reduced snow cover in mountainous areas, and altered river flows due to earlier snowmelt and reduced water availability. These changes are expected to significantly affect biodiversity, water systems, agriculture and energy production.

Role of ecosystems in adaptation and resilience: Ecosystems play a critical role in climate adaptation. Forests regulate climate and store carbon, wetlands provide flood control and water storage, and diverse landscapes support resilience in agriculture. Despite recognition of nature-based solutions in national policy frameworks, implementation remains limited and largely project-based.

Key message 2 expanded

North Macedonia's policy landscape shows moderate integration between climate and biodiversity, with stronger development in climate governance.

IPCC uptake is relatively strong, with IPCC climate projections, emissions scenarios and risk assessments informing national planning. IPCC findings are also integrated into NDC, NAP and national communications. However, uptake remains primarily high-level strategic rather than operational (limited integration at the municipal and local levels).

IPBES uptake is weaker, with some concepts used in IPBES assessments informing policy (NBSAP). Biodiversity knowledge remains largely confined to environmental policy, with limited integration into economic planning and sectoral decision-making.

Table 30. North Macedonia's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Environment and Physical Planning (MoEPP)	Climate Change Department
IPBES	MoEPP; Environmental Consultancy Department at Farmahem; Faculty of Natural Sciences and Mathematics	Department of Nature, MoEPP

Table 31. Overview of climate and biodiversity policies in North Macedonia

North Macedonia

Document/policy	Focus area	Biodiversity-climate integration
Strategic nationwide development document (NDS) 2024-2044	Development planning	Recognizes sustainability
NDC2.0 (2021)	Mitigation & adaptation	Includes ecosystem-based adaptation
Long-term strategy on climate action and action plan (2021- 2030/2050)	As an EU candidate, alignment with the 2030 Climate and Energy Framework and the 2050 Long-term Strategy / European Green Deal	Climate change impacts on biodiversity (including indicators and monitoring system) and a national research plan for biodiversity are explicitly mentioned

Key message 3 expanded

Table 32. Selected projects that demonstrate efforts to integrate biodiversity and climate knowledge into policy and practice

Title	Short description	Lead actor(s)	Why it matters
BIOFIN Initiative (2025 - 2027)	Biodiversity finance planning and integration into fiscal policy	UNDP, Ministry of Finance	Connects biodiversity with economic / finance planning
Law on Climate Action	Climate governance	Government, Parliament	The Law has been in a legislative pipeline for several years. Intended to strengthen integration between climate change and biodiversity

NBSAP (ongoing)	Updating the previous NBSAP (2018-2023 /2028)	Ministry of Environment and Physical Planning	Opportunity to incorporate IPCC and IPBES assessment findings into NBSAP
eHUB4LIFE	A national initiative dedicated to strengthening of North Macedonia participation in the LIFE Programme	Ministry of Environment and Physical Planning	Opportunity to promote IPCC and IPBES uptake through LIFE projects

Country profile: Slovenia

Key data snapshot

- **Country:** Republic of Slovenia
- **Location:** Central/Southeast Europe; Alpine–Mediterranean–Pannonian crossroads
- **Land area:** 20,273 km²
- **Population (2025):** 2.1 million (55% urban, 45% rural)
- **Human Development Index (2023):** 0.918 (very high human development)
- **GDP per capita (2024):** US$ 32,000
- **Main economic sectors:** services, manufacturing, tourism, forestry
- **Protected area coverage:** 41% terrestrial (including Natura 2000)
- **Biodiversity:** one of Europe's biodiversity hotspots; extensive forests and karst systems
- **Iconic landscapes:** Julian Alps, Triglav National Park, Karst Plateau, Ljubljansko Barje
- **Iconic species:** brown bear, wolf, lynx, olm (Proteus)

Sources: WBG, CBD, IMF

Key messages

Key message 1: Slovenia's biodiversity is closely tied to forests, karst systems, wetlands, rivers and Natura 2000 sites. Climate change increases flood, drought, heat and forest disturbance risks.

Key message 2: IPCC uptake is strong through EU climate governance, Slovenia's climate neutrality pathway and adaptation strategy. Slovenia is legally bound to reach climate neutrality by 2050 and reduce greenhouse gas emissions by at least 55 per cent.

Key message 3: IPBES uptake is indirect but relatively advanced through ecosystem services, Natura 2000 and other restoration projects.

Key messages expanded

Key message 1 expanded: The temperature in Slovenia is rising faster than the global average. The warming of the atmosphere is likely to continue with less precipitation and higher temperatures in summer likely leading to more frequent droughts and more precipitation in winter leading to an increase in flooding events (EEA Slovenia Country Profile, 2025). Slovenia's biodiversity–climate interaction is especially visible in forests, rivers, wetlands, karst ecosystems and mountain landscapes. Floods and droughts are increasingly important, while forest ecosystems face stress from heat, pests, storms and changing species suitability. Healthy forests and wetlands provide adaptation benefits through water regulation, carbon storage, habitat connectivity and flood mitigation.

Key message 2 expanded: Slovenia has one of the stronger integration contexts among the target countries because EU climate and biodiversity frameworks are deeply embedded in national policy. The Strategic Framework for Climate Change Adaptation provides adaptation guidance, while Natura 2000 and ecosystem services mapping support biodiversity governance. However, implementation still requires stronger cross-sector coordination and local uptake.

Table 33. Slovenia's focal points for IPCC and IPBES

Platform	Responsible institution
IPCC	Ministry of Environment, Climate and Energy of the Republic of Slovenia
IPBES	Ministry of the Environment and Spatial Planning

Table 34. Overview of climate and biodiversity policies in Slovenia

Document/policy	Focus area	Biodiversity–climate integration
Strategic Framework for Climate Change Adaptation (2016 - 2050)	Adaptation	Recognizes ecosystem and sectoral vulnerability
NBSAP, 2020 - 2030	Environment/ biodiversity	Covers climate, nature, quality of life, pollution
EU NDC3.0 (2025 - 2035)	Adaptation, mitigation	Strong biodiversity-climate alignment
National Energy and Climate Plan (NECP) (2021 - 2030, submitted in 2025)	Energy transition	Biodiversity is included in line with the EU policies; forestry and land use included

Key message 3 expanded

Table 35. Bright spots: initiatives that offer windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters
LIFE-IP NATURA.SI	Updating Natura 2000 Management Program (PUN 2022-2028)	Ministry of Natural Resources and Spatial Planning, EU	An opportunity to use IPCC and IPBESS assessment findings to inform the new management program
SELINA, 2022 - 2027	Science-policy integration for biodiversity and climate	Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU)	Builds on IPBES, IPCC, CBD findings
Climate Law (proposal stage)	Legal framework aligned with the EU climate legislation ('fit for 55' package)	Government	Stronger climate and biodiversity integration

Country profile: Tajikistan

Key data snapshot

- **Country:** Republic of Tajikistan
- **Location:** Central Asia; landlocked; predominantly mountainous (Pamir range)
- **Land area:** 143,100 km²
- **Population (2025):** 10.5 million (27% urban, 73% rural)
- **Human Development Index (2023):** 0.685 (medium human development)
- **GDP per capita (2024):** US$ 1,200
- **Main economic sectors:** agriculture, hydropower, mining, remittances
- **Protected area coverage:** 20–22% of territory
- **Biodiversity: Mountain ecosystems;** high-altitude species; moderate endemism
- **Iconic landscapes:** Pamir Mountains, glacier systems, alpine valleys
- **Iconic species:** snow leopard, Marco Polo sheep, markhor, brown bear

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: Tajikistan's biodiversity and livelihoods are highly exposed to climate risks due to glacier retreat, water variability, land degradation and mountain hazards.

Key message 2: IPCC uptake is stronger than IPBES uptake and is reflected in the National Strategy for Adaptation to Climate Change to 2030 and the updated NDC. The updated NDC covers agriculture, energy, forestry and biodiversity, industry, construction, transport, infrastructure and adaptation.

Key message 3: Integration is emerging through adaptation planning, ecosystem restoration, resilient agriculture, and glacier and water risk management.

Key messages expanded

Key message 1 expanded: Three primary drivers of biodiversity loss are: 1) habitat degradation; 2) overexploitation of natural resources; and 3) climate change (CAREC, 2025). Climate change impacts are likely to result in severe droughts, floods, landslides, heat and increased air pollution. Climate change-related damages to infrastructure, livestock productivity, and agriculture could reduce real GDP by 5-6% by 2050; the annual average costs of land degradation in Tajikistan are estimated at nearly $325 million, which is only expected to double by 2050. Climate impacts could push an additional 100,000 people into poverty, with women, children, and persons with disabilities most at risk (WBG Tajikistan CCDR, 2024).

Tajikistan's biodiversity–climate nexus is dominated by water. Glacier retreat changes river flows, affects hydropower and irrigation, and increases risks from glacial lake outburst floods, landslides, floods and droughts. Mountain pastures, forests and wetlands are critical for slope stability, water regulation and rural livelihoods, but are degraded by overgrazing, fuelwood pressures, erosion and climate stress.

Key message 2 expanded: Tajikistan's policy framework increasingly recognizes that climate adaptation, biodiversity and land degradation must be addressed together. The 2019 National Strategy for Adaptation to Climate Change to 2030 is a multisectoral policy document addressing climate risks such as floods, droughts, avalanches and landslides, with implementation at national, regional and local levels. IPBES uptake is weaker and more indirect, though ecosystem services, land restoration and agrobiodiversity are increasingly visible in projects and NBSAP-related processes.

Table 36. Tajikistan's focal points for IPCC and IPBES

Platform	Responsible institution
IPCC	Committee for Environmental Protection under the Government of Tajikistan
IPBES	No focal point (as of May 2026)

Table 37. Overview of climate and biodiversity policies in Tajikistan

Document/policy	Focus area	Biodiversity–climate integration
National Strategy for Adaptation to Climate Change to 2030, 2019 - 2030	Adaptation	Strong links to agriculture, land, natural disasters, water resources
NDC2.0, 2021 - 2030	Climate	Covers agriculture, energy, forestry & biodiversity, industry & construction, transport & infrastructure
Law on Glacier Protection, 2024	Climate change and glaciers	The law acknowledges the centrality of glaciers as a national water resource, and their role in modulating climate effects on water supply.

Key message 3 expanded

Table 38. Bright spots: initiatives that provide windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters
Sustainable Landscape Restoration in the Republic of Tajikistan" (RESILAND Tajikistan), 2024 - 2028	Restoration of degraded lands and local livelihoods	Government, CAREC, WBG	Mainstreams climate risks
NDC3.0	Raising NDC ambition	Committee for Environmental Protection, UNDP (Climate Promise Initiative)	An opportunity to use IPCC and IPBES Assessment findings to inform NDC3.0
NBSAP, the 7th National Report (7NR), and a Biodiversity Finance Plan development using the BIOFIN methodology, 2025 - ongoing	Biodiversity	National Centre for Biodiversity and Biosafety of the Committee for Environmental Protection, UNDP, GEF	An opportunity to use IPCC and IPBES Assessment findings

Country profile: Uzbekistan

Key data snapshot

- **Country:** Republic of Uzbekistan
- **Location:** Central Asia; double-landlocked; bordered by Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan and Turkmenistan
- **Land area:** 447,400 km²
- **Population (2025):** 38 million (51% urban, 49% rural)
- **Human Development Index (2025):** 0.740 (medium-high human development)
- **GDP per capita (2025):** US$ 3,400
- **Main economic sectors:** agriculture (cotton, wheat), energy (gas), mining (gold, uranium), manufacturing
- **Protected area coverage:** 9.5% of territory
- **Biodiversity:** more than 27,000 species; high desert and steppe biodiversity
- **Iconic landscapes:** Kyzyl-Kum Desert, Aral Sea, Syr Darya and Amu Darya Rivers, Fergana Valley, Tian Shan mountains
- **Iconic species:** snow leopard, saiga antelope, Bukhara deer, golden eagle

Sources: WBG, CBD, IMF, UNDP

Key messages

Key message 1: Uzbekistan's biodiversity is under severe pressure from water mismanagement, desertification, agricultural intensification and climate change. Climate risks, including rising temperatures, drought, glacier loss and dust storms, are strongly interconnected with ecosystem degradation and affect key sectors such as agriculture, water, energy and livelihoods.

Key message 2: IPCC knowledge is more strongly integrated into national policy frameworks than IPBES, particularly through climate strategies, water management and energy planning. However, integration remains largely technical and high level, with limited mainstreaming into broader governance systems.

Key message 3: Uzbekistan is showing increasing momentum towards integrated biodiversity–climate approaches, particularly through land restoration and water management initiatives in the Aral Sea region, though institutional and data challenges remain.

Key messages expanded

Key message 1 expanded: Uzbekistan is highly vulnerable to climate change due to its predominantly arid and semi-arid landscapes. Rising temperatures, increasing drought frequency and declining glacier-fed river flows are already reshaping ecosystems across deserts, steppes and mountain regions. The desiccation of the Aral Sea represents one of the most severe examples of ecosystem collapse globally, resulting in widespread habitat loss, soil salinization and declining biodiversity. Dust

and salt storms originating from the exposed seabed further degrade ecosystems and human health, reinforcing a cycle of environmental decline.

Temperatures have risen by nearly three times the global average over recent decades, with increases of up to 2.5°C in the Aral Sea region. Droughts have become more frequent, with six dry years recorded between 2019 and 2024. Climate projections indicate that natural disasters result in average losses of US$ 92 million every year (UNEP, 2025), while the economic cost of flooding is estimated at US$236 million annually (WBG, 2023). Without action on climate adaptation, Uzbekistan's economy is predicted to be 10 per cent smaller by 2050 (WBG, 2023). Average temperatures, having risen 2.9°C from 1950 to 2020, are expected to rise by another 1.21°C–1.94°C over the century (WBG, 2023). These changes are expected to intensify desertification, reduce agricultural productivity, and increase pressure on water-dependent ecosystems. At the same time, ecosystems play a critical role in adaptation. Forests, wetlands and rangelands regulate water cycles, reduce erosion, and buffer extreme climate impacts. Nature-based solutions such as afforestation of the Aral Sea seabed with local shrub species (*saksaul*/*Haloxylon*) and sustainable land management are increasingly recognized as essential for building resilience, although their large-scale implementation remains uneven.

Key message 2 expanded: Uzbekistan's policy landscape reflects a gradual transition towards integrating climate and biodiversity considerations, although climate governance remains more advanced in both scope and implementation. The IPCC findings are embedded in key national frameworks, such as the NDC2.0 (2021) and NDC 3.0 (2025), and a range of climate-related strategies, where they inform planning in critical sectors, including water management, agriculture and energy. IPCC-based evidence is also used in vulnerability assessments and emissions projections, helping guide national responses to climate risks. However, this integration remains largely technical and confined to specific sectors, with limited translation into broader governance systems or cross-sectoral policy frameworks. Constraints in national modelling capacity and scenario development further limit the depth and independence of IPCC application.

The IPBES Assessment findings are increasingly reflected in updates to the NBSAP and in land restoration initiatives, particularly in response to environmental challenges such as the Aral Sea crisis. Concepts such as ecosystem services and nature-based solutions are gaining recognition within policy discussions and programme design. Nevertheless, IPBES-informed approaches remain weakly integrated into core economic sectors and national planning systems. Institutionalization is limited, and there are significant gaps in knowledge translation, which restrict the effective use of biodiversity-related evidence in decision-making processes beyond the environmental domain.

Table 39. Uzbekistan's focal points for IPCC and IPBES

Platform	Responsible ministry	Department/unit
IPCC	Ministry of Ecology, Environmental Protection and Climate Change	National Centre for Climate Change
IPBES	State Committee for Ecology and Environmental Protection	

Table 40. Overview of climate and biodiversity policies in Uzbekistan

Document/policy	Focus area	Biodiversity–climate integration
Uzbekistan 2030 strategy	Development	Explicitly mentions biodiversity conservation, aims to expand protected area coverage to 12%
Strategy for Transition to a Green Economy, 2019 - 2030	Development	Explicitly mentions climate change and biodiversity conservation
Presidential Decree PF/UP-106, 2024	Climate change and biodiversity	Climate Council develops unified state policy related to climate and biodiversity
NDC 3, 2025 - 2035	Climate	Explicitly highlights the interconnectedness of biodiversity conservation and climate change
National Adaptation Plan (NAP)	Adaptation	Strong ecosystem-based focus

Key message 3 expanded:

Table 41. Bright spots: initiatives that provide windows of opportunity to strengthen biodiversity–climate integration

Title	Short description	Lead actor(s)	Why it matters
RESILAND Uzbekistan, 2022 - 2028	Transboundary landscape restoration	Government, CAREC, WBG	Supports high-level dialogue, regional exchange platforms
BIOFIN, 2021 - ongoing	Review of biodiversity finance strategies and policies	Government, UNDP	Connects biodiversity with economic / finance planning
NBSAP, the 7th National Report (7NR), 2024 - ongoing	Biodiversity	Ministry of Ecology, Environmental Protection, and Climate Change, UNDP	Opportunity to use IPCC and IPBES Assessment findings

Annex I. IPBES Nexus, IPBES Transformative Change, and IPCC AR6 Assessments in a nutshell

IPBES Nexus Assessment

The Nexus Assessment demonstrates that biodiversity, climate, water, food, and health challenges are intricately interlinked and influence each other (Figure SPM 1). Addressing issues in isolation can create unintended trade-offs, whereas integrated, cross-sectoral approaches can effectively address them while maximizing synergies (co-benefits).

Five key challenges limited the uptake of nexus approaches in policy and practice:

1. navigating social-ecological complexity;
2. fragmented, sectoral and siloed decision-making;
3. neglecting multiple and diverse values;
4. inadequate and inappropriate scaling of actions;
5. and insufficient, inaccessible and unpredictable finance.

As the nexus governance approaches address problems across temporal, jurisdictional and spatial scales, they can support informed, evidence-based decision-making in national policy as well as global policy frameworks such as the Sustainable Development Goals, the Kunming-Montreal Global Biodiversity Framework, the United Nations Convention to Combat Desertification and the Paris Agreement and others.

The Nexus Assessment considered different world views, values and knowledge systems because understanding the nexus of biodiversity, water, food, health and climate change necessitated considering perspectives and values across different societies and cultures. The Nexus Assessment highlighted that the Indigenous Peoples' and local communities' worldviews often offered a distinct perspective on the relationships between nature and people, shaped by their unique values and life experiences. These perspectives frequently highlight essential principles such as balance, complementarity, harmony, reciprocity, respect, interpersonal relationships, kinship and spirituality.

The Nexus Assessment's SPM key messages can be broadly summarized into four groups:

A. Past and current nexus interactions:

- Biodiversity loss and climate change are interdependent and produce compounding adverse impacts on human health and well-being
- Biodiversity is declining in all regions of the world
- In the past 50 years, global trends in a wide range of indirect drivers have intensified direct drivers of biodiversity loss

- Policies prioritizing short-term gains often overlook impacts on biodiversity and interconnected systems, disproportionately harming vulnerable groups

B. Future nexus interactions

- If current trends in direct and indirect drivers continue, they will exacerbate climate change and there will be negative outcomes for biodiversity, water availability and quality, food security and human health.
- Nexus-wide benefits with positive outcomes for people and nature are feasible in the future. Response options that effectively conserve, restore and sustainably use and manage ecosystems, reduce pollution across terrestrial, freshwater and marine realms and support adoption of sustainable healthy diets and climate change mitigation and adaptation tend to offer balanced nexus-wide benefits.
- Scenarios focused on synergies among biodiversity, water, food, human health and climate change (as opposed to siloed approaches) have more beneficial outcomes for global policy goals (e.g. SDGs).

C. Response options that address nexus interactions

- Numerous highly synergistic response options are already available to actors in multiple sectors for sustainably managing biodiversity, water, food, health and climate change. Nexus Assessment analysed 71 response options grouped in 10 broad categories.
- Response options can facilitate or impede each other, leading to potential synergies and trade-offs among them.
- Response options can boost progress towards global policy goals such as SDGs, KMGBF, etc.

D. Governing the nexus for achieving just and sustainable futures

- Transforming current siloed modes of governance can enable addressing associated direct and indirect drivers in an integrated manner, with benefits for people and nature now and into the future
- Gaps in finance to meet biodiversity needs amount to $0.3 trillion to $1 trillion per year. Urgent action to transform values and structures and address the dominance of a narrow set of interests within economic and financial systems can enable increased investments for biodiversity and the other nexus elements.
- Nexus governance approaches, decision-making and capacity-strengthening can be enhanced through a road map that can be used by a wide range of actors.

IPBES Transformative Change Assessment

The IPBES Transformative Change (TC) Assessment focuses on “a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and

values" that deliberately contributes to achieving the 2050 Vision for Biodiversity and global sustainability. The Assessment clarifies transformative change means, how it occurs and how to promote and accelerate it for a just and sustainable world.

The TC Assessment's 17 key messages can be broadly summarized into three groups:

A. Transformative change is urgent, necessary and challenging, yet possible:

- Transformative change for a just and sustainable world is urgent. Delaying action to achieve global sustainability is costly compared with the benefits of taking action now.
- The three key underlying causes of biodiversity loss are: a) disconnection from and domination over nature and people; b) concentration of power and wealth; and c) prioritization of short-term, individual and material gains. These causes are rooted in currently dominant worldviews, values, and practices. Many Indigenous Peoples and local communities possess worldviews, structures and practices that are aligned with generating a just and sustainable world.
- Equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action are the four key principles that can guide the process of deliberate transformative change.
- Five overarching challenges/barrier for transformative change are: (a) relations of domination over nature and people; (b) economic and political inequalities; (c) inadequate policies and unfit institutions; (d) unsustainable consumption and production patterns, including individual habits and practices; and (e) limited access to clean technologies and uncoordinated knowledge and innovation systems.
- Weaving together insights from diverse approaches and knowledge systems, including Indigenous and local knowledge, enhances strategies and actions for transformative change

B. Five strategies for transformative change are:

- Strategy 1 deals with conserving and regenerating places of value to nature and people.
- Strategy 2 focuses on driving systemic change in the sectors most responsible for biodiversity loss and nature's decline.
- Strategy 3 concerns transforming economic systems for nature and equity.
- Strategy 4 relates to transforming governance systems to make them integrated, inclusive, accountable and adaptive.
- Strategy 5 focuses on shifting societal views and values to recognize and prioritize fundamental interconnections between humans and nature.
- Knowledge co-creation, multiple evidence base approach, as well as a meaningful engagement of IPs and LCs are cross-cutting elements in these strategies.

C. Enabling transformative change: roles for all

- No single vision of transformative change is appropriate to all contexts and scales. Visions that recognize and combine intrinsic, relational and instrumental values are the most promising for transformative change.
- Being system-wide, the transformative change requires a whole-of-society and whole-of-government approach.
- Governments, civil society, and businesses are powerful enablers of transformative change, which can be driven through policies, regulations, plans, collective action, and finances.

IPCC AR6 Working Group I Report

IPCC AR6 Working Group I Report assesses the physical science basis of climate change. The report provides a comprehensive view of each component of the climate system and its changes to date; considers five illustrative emissions scenarios and climate model projections of changes in the climate system that take into account solar activity and background forcing from volcanoes; assesses the climate system responses to the interplay between human influence, natural drivers and internal variability; examines the effects of various assumptions on projections of climate and air pollution and the ability to distinguish the differences between climate responses to emissions reductions and natural climate variability. The WGI SPM contains 14 key messages that are grouped into four categories:

A. The current state of the climate

- It is unequivocal that human influence has warmed the atmosphere, ocean and land (KMs 1.1-1.8).
- The scale of recent changes across the climate system as a whole are unprecedented (KMs 2.1-2.4).
- Human-induced climate change is affecting weather extremes across the globe (KMs 3.1-3.5)
- The *very likely* range of equilibrium climate sensitivity is between 2°C (*high confidence*) and 5°C (*medium confidence*). The AR6 assessed best estimate is 3°C with a *likely* range of 2.5°C to 4°C (*high confidence*).

B. Possible climate futures

- Global surface temperatures will continue to increase until at least mid-century under all emissions scenarios considered (KMs B.1.1-B.1.4).
- Frequency and intensity of hot extremes and other changes in the climate system become larger with global warming (KMs B.2.1-B.2.5). Continued global warming will further intensify the global water cycle (B3), the ocean and land carbon sinks will be less effective (B4), and many changes will be irreversible for centuries to millennia (B5).

C. Climate information for risk assessment and regional adaptation

- Natural variability will influence how human-driven climate change is experienced, particularly at regional and short-term scales, though it does not significantly alter long-term global warming trends (C1). As warming increases, all regions will face more frequent and overlapping climate hazards, with risks intensifying from 1.5°C to 2°C and beyond (C2). Additionally, low-probability but high-impact events such as ice-sheet collapse or abrupt system changes cannot be excluded and must be considered in risk assessments (C3).

D. Limiting future climate change

- Limiting global warming requires reducing cumulative CO_2 emissions to net zero, alongside deep cuts in other greenhouse gases, particularly methane, which also improves air quality (D1).
- Low-emission scenarios lead to rapid improvements in greenhouse gas concentrations and air quality compared to high-emission pathways. Differences in global temperature trends between these scenarios become evident within about two decades, with broader climate impacts emerging over longer timescales (D2).

IPCC AR6 Working Group II Report

IPCC AR6 Working Group II Report assesses the impacts of climate change on ecosystems, biodiversity, and human communities as well as climate-related vulnerabilities and adaptive capacities of natural world and societies. The WGII SPM key messages are grouped into four bundles:

A. Introduction presents key concepts such as adaptation and resilience

B. Observed and projected impacts and risks

- Human-induced climate change has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability (B1.1)
- Human and ecosystem vulnerability are interdependent (B2).
- Climate change impacts and risks are becoming increasingly complex resulting in compounding overall risk and risks cascading across sectors and regions (B5).

C. Adaptation measures and enabling conditions

- Many initiatives prioritize immediate and near-term climate risk reduction, which reduces the opportunity for transformational adaptation (C1).
- Soft limits to some human adaptation have been reached but can be overcome by addressing financial, governance, institutional and policy constraints (C3).
- There is an evidence of maladaptation across sectors and regions. Maladaptation can be avoided by flexible, multi-sectoral, inclusive and long-term planning and

implementation of adaptation options with benefits to many sectors and systems.

D. Climate resilient development

- Worldwide climate resilient development is more urgent than previously assessed in AR5 (D1).
- Inclusive development choices that prioritize risk reduction, equity and justice are enabling conditions for climate resilient development (D2).
- Safeguarding biodiversity and ecosystems is fundamental for climate resilient development (D4).

IPCC AR6 Working Group III Report

IPCC AR6 Working Group III Report examines the sources of global emissions and assesses the climate change mitigation progress and pledges, as well as the impact of national climate pledges in relation to long-term emissions goals. The WGII SPM contains 14 key messages that are grouped into five bundles:

A. Introduction situates the report in relation to other processes within an evolving international context.

B. Recent developments and current trends

- Net anthropogenic GHG emissions have increased since 2010 across all major sectors globally (B2), although regional GHG contributions vary (B3).

C. System transformations to limit global warming

- Global GHG emissions are projected to peak between 2020 and at the latest before 2025 in global modelled pathways (C1).
- Global net zero CO2 emissions are reached in the early 2050s in modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot, and around the early 2070s in modelled pathways that limit warming to 2°C (>67%). (C2)

D. Linkages between mitigation, adaptation, and sustainable development

- Accelerated and equitable climate action in mitigating, and adapting to, climate change impacts is critical to sustainable development. Climate change actions can also result in some trade-offs. The trade-offs of individual options could be managed through policy design. (D1)
- There is a strong link between sustainable development, vulnerability and climate risks. (D2)

E. Strengthening the response

- Climate governance is most effective when it integrates across multiple policy domains, helps realize synergies and minimize trade-offs, and connects national and subnational policymaking levels (high confidence). Effective and equitable climate governance builds on

engagement with civil society actors, political actors, businesses, youth, labour, media, Indigenous Peoples and local communities. (E3)

- International cooperation is a critical enabler for achieving ambitious climate change mitigation goals. (E6)

List of authors from the ECA Trialogue countries that contributed to the IPBES and IPCC assessments

The authors from these target countries or third-country nationals associated with institutions from target countries have contributed to the IPBES and IPCC processes in various capacities.

Table 42. Trialogue country authors' contributions to the IPBES Nexus and Transformative change assessments

Name	Role	Nominating government/ organization	Nationality	Affiliation
Elena Bukvareva	Nexus Assessment, lead author	Biodiversity Conservation Center Moscow	Russian Federation	Biodiversity Conservation Center - Armenia (BCC-Armenia)
Alla Aleksanyan	Nexus Assessment, MEP task force/expert group member		Armenia	Armenian National Academy of Sciences
Haris Piplas	Nexus Assessment, review editor	Bosnia and Herzegovina	Bosnia and Herzegovina Switzerland	ETH Zurich (Swiss Federal Institute of Technology)

Hamid Čustović	Nexus Assessment, Bureau task force/expert group member		Bosnia and Herzegovina	University of Sarajevo, Faculty of Agriculture and Food Science - Institute of Soil Science, Academy of Science and Art of Bosnia and Herzegovina
Roxanne Suzette Lorilla	Nexus Assessment, fellow	National Observatory of Athens	Greece	Department of Geography, Harokopio University of Athens
Anna Metaxas	Nexus Assessment, lead author	Canada	Canada Greece	Oceanography, Dalhousie University
Alexandros Gasparatos	Nexus Assessment, review editor	United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS)	Greece	University of Tokyo
Adla Kahrić	Transformative Change Assessment, fellow	Bosnia and Herzegovina	Bosnia and Herzegovina	Federal Ministry of Environment and Tourism
Niki Frantzeskaki	Transformative Change Assessment, coordinating lead author		Greece	Utrecht University, The Netherlands

Karina Benessaiah	Transformative Change Assessment, lead author	Tunisia	Tunisia Greece	University of Guelph, Department of Geography, Environment and Geomatics
Jerneja Penca	Transformative Change Assessment, lead author	Slovenia	Slovenia	Science and Research Centre Koper

Table 43. Trialogue country authors' contributions to the IPCC AR6 reports

Last Name	First Name	Role	Gender	Country of Residence	Citizenship	Affiliation
ZANIS	Prodromos	LA WGI	M	Greece	Greece	Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki
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MIRZABAEV	Alisher	LA, WG2	M	Germany	Uzbekistan	University of Bonn

MIRASGEDIS	Sebastian	LA, WG3	M	Greece	Greece	National Observatory of Athens
STRBAC	Goran	LA	M	United Kingdom	Serbia	Imperial College London

Annex II. Converging SPM messages: IPBES Nexus, IPBES Transformative Change and IPCC AR6 Assessments

Table 44. Converging SPM messages: IPBES Nexus, IPBES Transformative Change and IPCC AR6 (a fact sheet version of the table is available here for download)

Theme	Source	Statement (SPM / Key Message)
Nexus (Interlinkages, trade-offs, synergies)	IPBES Nexus	"Biodiversity loss and climate change are interdependent and produce compounding impacts and impacts that threaten human health and well-being." (A1) "Scenarios that prioritize objectives for a single element of the nexus without regard to other elements (i.e. solely for biodiversity, water, food, human health or climate change) will result in trade-offs across the nexus." (B1) "Scenarios focused on synergies among biodiversity, water, food, human health and climate change have more beneficial outcomes for global policy goals, such as the Sustainable Development Goals." (B3) "Response options can facilitate or impede each other, leading to potential synergies and trade-offs among them." (C2)
	IPBES TC	"…the global interconnected crises related to biodiversity loss, nature's decline and the projected collapse of key ecosystem functions" (KM1) "Governance systems that effectively reduce biodiversity loss and nature's decline integrate biodiversity into sector policies and decision-making, engage diverse actors and hold actors accountable"

		(B7)
	IPCC AR6 SPM	"This report recognizes the interdependence of climate, ecosystems and biodiversity, and human societies" (Introduction, p.3) "Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people" (A2) "Human and ecosystem vulnerability are interdependent." (A2.2) "Climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric, and coastal and open ocean ecosystems. Hundreds of local losses of species have been driven by increases in the magnitude of heat extremes (high confidence) with mass mortality events recorded on land and in the ocean." (A2.3) "Climate change has reduced food security and affected water security, hindering efforts to meet Sustainable Development Goals" (A2.4) "Climate change has caused widespread adverse impacts and related losses and damages13 to nature and people that are unequally distributed across systems, regions and sectors. Economic damages from climate change have been detected in climate-exposed sectors, such as agriculture, forestry, fishery, energy, and tourism. Individual livelihoods have been affected through, for example, destruction of homes and infrastructure, and loss of property and income, human health and food security, with adverse effects on gender and social equity" (A2.6) "Most observed adaptation responses are fragmented, incremental, sector-specific and unequally distributed across regions." (A3.3) "Actions that focus on sectors and risks in isolation and on short-term gains often lead to maladaptation over the long term, creating lock-ins of vulnerability, exposure and risks that are difficult to change." (B4.3) "Mitigation options often have synergies with other aspects of sustainable development, but some options can also have trade-offs. There are potential synergies between sustainable development and, for instance,

		energy efficiency and renewable energy. Similarly, depending on the context48, biological CDR methods like reforestation, improved forest management, soil carbon sequestration, peatland restoration and coastal blue carbon management can enhance biodiversity and ecosystem functions, employment and local livelihoods. However, afforestation or production of biomass crops can have adverse socio-economic and environmental impacts, including on biodiversity, food and water security, local livelihoods and the rights of Indigenous Peoples, especially if implemented at large scales and where land tenure is insecure." (B6.4) Climate resilient development is enabled when governments, civil society and the private sector make inclusive development choices that prioritize risk reduction, equity and justice, and when decision-making processes, finance and actions are integrated across governance levels, sectors, and timeframes (C1.2). "Comprehensive, effective, and innovative responses integrating adaptation and mitigation can harness synergies and reduce trade-offs between adaptation and mitigation." (C2.1) "Accelerated climate action can also provide co-benefits. Many mitigation actions would have benefits for health through lower air pollution, active mobility (e.g. walking, cycling), and shifts to sustainable healthy diets." (C2.3) "Accelerated and equitable action in mitigating and adapting to climate change impacts is critical to sustainable development. Mitigation and adaptation actions have more synergies than trade-offs with Sustainable Development Goals. Synergies and trade-offs depend on context and scale of implementation." (C4) "Many mitigation and adaptation actions have multiple synergies with Sustainable Development Goals (SDGs) and sustainable development generally, but some actions can also have trade-offs." (C4.2) "Implementing both mitigation and adaptation actions together and taking trade-offs into account supports co- benefits and synergies for human health and well-being." (C4.3)
A need for	IPBES Nexus	"Transforming current siloed modes of governance

transformative change. Many solutions already exist.		through more integrative, inclusive, equitable, accountable, coordinated and adaptive approaches enables successful implementation of response options to manage the nexus elements, and their associated direct and indirect drivers, in an integrated manner, with benefits for people and nature now and into the future." (D1)
	IPBES Transformative Change Assessment	"Transformative change is defined as fundamental, system-wide shifts in views, structures and practices. Deliberate transformative change for a just and sustainable world shifts views, structures and practices in ways that address the underlying causes of biodiversity loss and nature's decline." (KM2)
	IPCC AR6 SPM	"Adaptation options that are feasible and effective today will become constrained and less effective with increasing global warming. With increasing global warming, losses and damages will increase and additional human and natural systems will reach adaptation limits. Maladaptation can be avoided by flexible, multi-sectoral, inclusive, long-term planning and implementation of adaptation actions, with co-benefits to many sectors and systems." (B4) "All global modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot, and those that limit warming to 2°C (>67%), involve rapid and deep and, in most cases, immediate greenhouse gas emissions reductions in all sectors this decade." (B6) Reaching net zero CO2 or GHG emissions primarily requires deep and rapid reductions in gross emissions of CO2, as well as substantial reductions of non-CO2 GHG emissions. (B6.2) "Governance systems that effectively reduce biodiversity loss and nature's decline integrate biodiversity into sector policies and decision-making, engage diverse actors and hold actors accountable" (B7) "Deep, rapid, and sustained mitigation and accelerated implementation of adaptation actions in this decade would reduce projected losses and damages for humans and ecosystems, and deliver many co-benefits, especially for air quality and health." (C2) "Deep, rapid, and sustained mitigation and accelerated implementation of adaptation actions in this decade would reduce future losses and damages related to

		climate change for humans and ecosystems" (C2.1) "Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all." (C3) "The systemic change required to achieve rapid and deep emissions reductions and transformative adaptation to climate change is unprecedented in terms of scale, but not necessarily in terms of speed" (C3.1)
Diverse knowledge systems and values	Nexus Assessment	The SPM "is based on evidence from multiple knowledge systems." (Preamble, p.3) "Scenarios with positive outcomes across the nexus elements are characterized by timely adoption of sustainable consumption and production practices, enhanced climate change mitigation and adaptation action and considerations of multiple values and knowledge systems" (B1) "Policies that support sustainable healthy diets, sustainable resource use and waste reduction and that consider multiple actors and their values and knowledge systems play a critical role in scenarios that successfully achieve sustainable futures." (B3) "Some response options are inherently similar to bundles in that they comprise multiple synergistic actions, such as Indigenous food systems that emerge from Indigenous and local knowledge and traditional practices and which are based on holistic world views." (C2) "Agroecology represents a shift to production systems where equitable access to land and a blend of scientific and Indigenous and local knowledges guide the sustainable management of biodiversity, crops and other resources" (C3) "Improving capacities for governance can strengthen awareness of the need for change, enhance the co-production of knowledge, help navigate trade-offs and assist in addressing injustices." (D3) "Reforms to governance and economic systems can be facilitated by deliberate steps to identify existing challenges and contexts, increase actor engagement through coordination, knowledge co-production and strategic action and seek iterative, adaptive and

		scalable solutions" (D4)
	TC Assessment	"The report highlights the diverse perspectives of Indigenous Peoples and local communities and demonstrates that their practices and lifestyles are often rooted in knowledge and value systems that promote sustainability. As such, they can offer important lessons for the transition to sustainable living in global societies." (p.3) "Transformative change involves weaving together diverse knowledge systems, including Indigenous and local knowledge." (p7) "Drawing on a rapidly growing body of literature and informed by evidence from diverse scientific disciplines and different knowledge systems, the Transformative Change Assessment recognizes that a simple systemwide reorganization of constituent elements is not enough." (Preamble, p.9) "Weaving together insights from diverse approaches and knowledge systems, including Indigenous and local knowledge, enhances strategies and actions for transformative change" (KM5) "Indigenous and local knowledge often supports biocultural approaches (integrating biodiversity conservation with cultural values) that have demonstrated long-term sustainability in placebased conservation measures." (KM8) "Effective transformative change involves various stakeholders, incorporating their diverse knowledge systems and multiple values in the planning, implementation and evaluation of resource-, land- and sea-use governance at all levels." (KM11) "Shifting dominant societal views and values to recognize and prioritize human-nature interconnectedness is a powerful strategy for transformative change. These shifts can be facilitated through cultural narratives and by changing dominant social norms, facilitating transformative learning processes, co-creating new knowledge and weaving together different knowledge systems, world views and values that recognize human-nature interdependencies and ethics of care. […] This can be done by recognizing and promoting world views and values that emphasize care, reciprocity and harmony with nature, including Mother Earth. These world

		views and values include those associated with Indigenous and local knowledge systems." KM12 "Transformative visions value nature in multiple ways, and no single vision is appropriate to all contexts and scales. Visions that recognize and combine intrinsic, relational and instrumental values are the most promising for transformative change. In addition, visions that promote Indigenous and local knowledge are associated with positive social, economic and environmental outcomes." KM13
	AR6 SPM	"This report recognizes … the value of diverse forms of knowledge; …" (Introduction, p.3) Enabling conditions [for climate resilient development] depend on local circumstances and include, among other things, knowledge diversity. (see C1.2) "Climate resilient development is advanced when actors work in equitable, just and inclusive ways to reconcile divergent interests, values and worldviews, toward equitable and just outcomes." (C5.4) "Climate resilient development benefits from drawing on diverse knowledge." (C6) "Drawing on diverse knowledges and cultural values, meaningful participation and inclusive engagement processes including Indigenous Knowledge, local knowledge, and scientific knowledge - facilitates climate resilient development, builds capacity and allows locally appropriate and socially acceptable solutions." (C6.5)
Equity, just transition, inclusion	Nexus	"Governance can also be improved through inclusion of a wider range of actors and values, with a particular focus on equity, alongside economic and financial reforms." (A3) The feasibility and effectiveness of options increase with integrated, multi-sectoral solutions that differentiate responses based on climate risk, cut across systems and address social inequities (B4.1). "Ensuring the full and effective participation of a wide range of actors, including Indigenous Peoples and local communities, in the co-design, coordination and implementation of bundles of response options can help to increase the magnitude and equity of benefits as well as to facilitate the emergence of new options

		from collaborative contexts." (C2) "Nexus governance approaches" provide more synergistic, holistic and transdisciplinary framings of problems and solutions, include more actors across multiple nexus interactions, emphasize explicit values such as equity and accountability, enable policy alignment, collaboration and integration and are experimental, adaptive and reflexive." (D1)
	IPBES TC	"Four key principles are responsive to and address the underlying causes of biodiversity loss and nature's decline and guide the process of deliberate transformative change. These principles are equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action" (KM3) Out of five strategies for transformative change, Strategy 3 concerns transforming economic systems for nature and equity (KM7, KM10)
	IPCC AR6 SPM	Climate change impacts have adverse effects, among other things, on gender and social equity (A2.6) "Climate resilient development is enabled when governments, civil society and the private sector make inclusive development choices that prioritize risk reduction, equity and justice, and when decision-making processes, finance and actions are integrated across governance levels, sectors, and timeframes." (C1.2) "Implementing both mitigation and adaptation actions together and taking trade-offs into account supports co-benefits and synergies for human health and well-being," including delivering equity. (C4.3) "Prioritising equity, climate justice, social justice, inclusion and just transition processes can enable adaptation and ambitious mitigation actions and climate resilient development." (C5)
A need for uptake	Nexus assessment	Nexus governance approaches, decision-making and capacity-strengthening can be enhanced through a series of deliberative steps and actions, informed by diverse evidence. (D3)
	TC Assessment	Uncoordinated knowledge system is identified as one of the 5 overarching systemic challenges (barriers) for transformative change. (KM4)

	IPCCAR6 SPM	Key barriers to adaptation are limited resources, lack of private sector and citizen engagement, insufficient mobilization of finance (including for research), low climate literacy, lack of political commitment, limited research and/or slow and low uptake of adaptation science, and low sense of urgency. (A3.6)
Urgency	Nexus assessment	"Urgent action to transform values and structures and address the dominance of a narrow set of interests within economic and financial systems can enable increased investments for biodiversity and the other nexus elements" (D2) "Scenarios show that climate change adaptation is urgently needed and can have multiple benefits for other nexus elements" (B4) "Many response options will be less effective or impossible to implement if climate change is not urgently addressed" (C10) "Current economic and financial systems are driving declines in nature, resulting in costs now and growing nature-related risks, thus increasing the urgent need for action" (D3)
	TC Assessment	"Transformative change for a just and sustainable world is urgent and necessary…" (KM1) "This entanglement of crises, increasingly referred to as a polycrisis, points to the urgency and necessity of handling the different crises in an integrated manner." (A1) "The urgency of transformative change is underscored by the projected collapse of key ecosystem functions associated with current global trends driving biodiversity loss, which has implications for all ecosystems and for human wellbeing"(1.2.1, 1.2.3, 4.2.4).
	IPCCAR6 SPM	"Climate change is a threat to human well-being and planetary health. There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all." (C1) "Evidence of observed adverse impacts and related losses and damages, projected risks, levels and trends in vulnerability and adaptation limits, demonstrate that worldwide climate resilient development action is more urgent than previously assessed in AR5." (C1.1)

		"Without urgent, effective, and equitable mitigation and adaptation actions, climate change increasingly threatens ecosystems, biodiversity, and the livelihoods, health and well-being of current and future generations." (C 1.3)

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