



OECD Environmental Performance Reviews

SLOVAK REPUBLIC 2024



OECD Environmental Performance Reviews: Slovak Republic 2024

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The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Note by the Republic of Türkiye

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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Foreword

The principal aim of the OECD Environmental Performance Review (EPR) programme is to help member and selected partner countries improve their individual and collective performance in environmental management by:

- helping countries assess progress in achieving their environmental goals
- promoting continuous policy dialogue and peer learning
- stimulating greater accountability from governments towards each other and public opinion.

This is the third EPR of the Slovak Republic. It examines the country's environmental performance since the previous review in 2011. Progress in achieving domestic objectives and international commitments provides the basis for assessing Slovakia's environmental performance. Such objectives and commitments may be broad aims, qualitative goals or quantitative targets. A distinction is made between intentions, actions and results. Assessment of environmental performance is also placed within the context of Slovakia's historical environmental record, present state of the environment, physical endowment in natural resources, economic conditions and demographic trends.

The OECD is grateful to the Ministry of Environment of the Slovak Republic for providing information and comments, organising the review mission (13-16 June 2023) and virtual policy mission (3 October 2023), as well as for facilitating contacts inside and outside government institutions.

Thanks are also due to the representatives of the two examining countries, Ladislav Miko (Czechia) and Hanno Zingel (Estonia), for participating in the review.

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The OECD Working Party on Environmental Performance discussed the Environmental Performance Review of the Slovak Republic at its meeting on 24 January 2024 and approved the Assessment and Recommendations.

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Reader's guide

Signs

The following signs are used in figures and tables:

- .. : not available
- : nil or negligible
- .

Country aggregates

OECD Europe: This zone includes all European member countries of the OECD, i.e. Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

OECD: This zone includes all member countries of the OECD, i.e. the countries of OECD Europe plus Australia, Canada, Chile, Colombia, Costa Rica, Israel*, Japan, Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: Euro (EUR)

In 2022, USD 1 = EUR 0.950

In 2021, USD 1 = EUR 0.845

Cut-off date

This report is based on information and data available up to November 2023.

Indicators

Internationally-comparable indicators presented in the [OECD Environment at a Glance](#) online platform support the analysis. They should be read in conjunction with this report.

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Basic statistics of the Slovak Republic

2022 or latest available year (OECD values in parenthesis) ^a

PEOPLE AND SOCIETY					
Population (million)	5		Population density per km ²	111	(36)
Share of population by type of region			Population annual growth rate, latest 5 years	0.0	(0.5)
Predominantly urban (%)	13	(49)	Income inequality (Gini coefficient)	0.22	(0.32)
Intermediate (%)	50	(28)	Poverty rate (% of pop. with less than 50% median income)	8	(11)
Rural (%)	37	(23)	Life expectancy	77	(81)
ECONOMY AND EXTERNAL ACCOUNTS					
Total GDP (National currency, billion)	110		Imports of goods and services (% of GDP)	105	(35)
Total GDP (USD billion, current PPPs)	223		Main exports (% of total merchandise exports)		
GDP compound annual real growth rate, latest 5 years	1.9	(1.7)	Vehicles; other than railway/tramway rolling stock	32	
GDP per capita (1 000 USD current PPPs)	41	(56)	Electrical machinery and equipment	17	
Value added shares (%)			Nuclear reactors, boilers, machinery, mechanical appliances	12	
Agriculture	2	(2)	Main imports (% of total merchandise imports)		
Industry including construction	32	(23)	Electrical machinery and equipment	21	
Services	66	(75)	Vehicles; other than railway/tramway rolling stock	16	
Exports of goods and services (% of GDP)	99	(34)	Nuclear reactors, boilers, machinery, mechanical appliances	12	
GENERAL GOVERNMENT					
Percentage of GDP					
Expenditure	46	(46)	Education expenditure	4	(5)
Revenue	40	(39)	Health expenditure	7	(9)
Gross financial debt	64	(121)	Environmental protection expenditure	0.9	(0.6)
Fiscal balance	-2	(-8)	Environmental taxes (% of GDP)	2.0	(1.4)
			(% of total tax revenue)	5.8	(4.6)
LABOUR MARKET, SKILLS AND INNOVATION					
Unemployment rate (% of civilian labour force)	6.1	(5.0)	Patent applications (% of all technologies) ^b 3-yr average		
Tertiary educational attainment of 25- to 64-year-olds (%)	29	(40)	Environment-related technologies	13	(12)
Gross expenditure on R&D (% of GDP)	0.9	(2.7)	Environmental management	6	(3)
			Climate change mitigation technologies	9	(10)
			Climate change adaptation technologies	2	(2)
ENVIRONMENT					
Energy intensity TES per capita (toe/cap.)	3.1	(3.8)	Passenger cars stock (cars/100 inhabitants)	45	(49)
TES per GDP (toe/1 000 USD 2015 PPPs)	0.09	(0.08)	Water stress (abstraction as % of available resources)	1	(8)
Renewables (% of TES)	13	(12)	Water abstraction per capita (m ³ /cap./year)	108	(735)
Carbon intensity (energy-related CO ₂)			Municipal waste per capita (kg/capita)	500	(530)
Emissions per capita (t/cap.)	5.1	(7.8)	Material productivity (USD, 2015 PPPs/DMC, kg)	2.9	(2.5)
Emissions per GDP (t/1 000 USD 2015 PPPs)	0.15	(0.18)	Land area (1 000 km ²)	48	
GHG intensity ^c			% of arable land and permanent crops	28	(11)
Emissions per capita (t CO ₂ eq/cap.)	7.6	(10.8)	% of permanent meadows/pastures	11	(23)
Emissions per GDP (t CO ₂ eq/1 000 USD 2015 PPPs)	0.17	(0.18)	% of forest area	40	(33)
Mean population exposure to air pollution (PM _{2.5}), µg/m ³	19	(14)	% of other land (built-up/other land)	21	(33)

a) Values earlier than 2017 are not taken into consideration. OECD value: where the OECD aggregate is not provided in the source database, a simple OECD average of the latest available data is calculated where data exist for a significant number of countries.

b) Higher-value inventions that have sought protection in at least two jurisdictions.

c) Excluding emissions/removals from land use, land-use change and forestry.

Source: Calculations based on data extracted from databases of the OECD, IEA/OECD, EUROSTAT and the World Bank.

Executive summary

Slovakia has reduced some environmental pressures but faces challenges in several areas

The Slovak Republic has a small, open economy that grew steadily between 2010 and 2019. After a deep contraction during the COVID-19 crisis, gross domestic product (GDP) rebounded in 2021 and has grown moderately since. Over 2010-19, the country reduced domestic material consumption, emissions of greenhouse gases (GHGs) and major air pollutants, and to a lesser extent, energy supply and freshwater abstractions. However, air pollution remains a health concern; much municipal waste ends up in landfills; and progress in remediating contaminated sites has been slow. The country has improved wastewater treatment but faces the challenge of expanding coverage in the many small municipalities.

The country needs to step up its ambition to achieve carbon neutrality by 2050

Slovakia met its 2020 climate targets. However, national projections indicate it is not on a net-zero pathway. Most of the GHG emission reductions by 2030 are expected to come from energy industries (with additional nuclear capacity), and to a lesser extent from industrial processes, which are covered by the EU Emissions Trading System (ETS). The projected increase in GHG emissions in some non-ETS sectors, especially transport, and the decline of net carbon removals from forests, put at risk the achievement of 2030 targets and the net-zero goal. Enshrining carbon neutrality in legislation, as proposed in 2023, would strengthen long-term integrated strategic planning. With consistent sectoral pathways, such a law would hold the line ministries accountable for progress.

Climate is a priority of the recovery plan, but price support limits incentives to save energy

Slovakia's Recovery and Resilience Plan (RRP) is supported until 2026 by EU grants representing 6.4% of its 2021 GDP. The country has dedicated 45% of its RRP budget to climate objectives. Energy efficiency and sustainable transport are key priorities. This is positive, as the country needs to limit car dependency and shift investment from road to rail in order to curb transport emissions. Between 2022 and 2023, to mitigate the effects of the energy crisis, the government adopted measures amounting to 3.3% of GDP, a level above the EU average. However, they mainly consist of untargeted energy price support measures. From an environmental and fiscal point of view, it would be justified to keep the price signal and help the most vulnerable with support unrelated to energy consumption. This requires defining energy poverty and gathering the relevant data to target support while encouraging energy saving.

Effective use of EU funds is key for green investment

Spending on environmental protection is mainly financed by EU funds. However, over 2014-20, Slovakia had a low absorption rate of structural funds for environmental infrastructure and climate adaptation. The country should accelerate use of these funds by streamlining public procurement procedures and strengthening project preparation capacity of recipients, particularly at local level. Further applying the polluter- and user-pays principles is also necessary to support environmental infrastructure needs. Tariffs for water services are too low to recover the costs of service provision, especially for small municipalities. Consolidating municipal water services would improve the operational efficiency and financial sustainability of the sector. Slovakia should also ensure that expenditure of the Environmental Fund is aligned with environmental and climate objectives.

The green tax reform should be pursued

Slovakia has pledged for a fiscally neutral green tax reform. However, the tax burden has not shifted from labour to environmentally harmful activities. Carbon prices (from permit prices in the EU ETS and fuel excise taxes) are low compared to EU countries. They do not provide consistent incentives to cut GHG emissions across fuels and sectors. Revenue from taxes on motor vehicles, and on pollution and resources is also below the OECD Europe average. Slovakia can be praised for removing subsidies for electricity produced from domestic coal in 2023. This is essential for reducing GHG emissions and local air pollution. The country has mapped fossil fuel subsidies and should pursue efforts to phase them out.

Slovakia must scale up its efforts to halt and reverse biodiversity loss

Approximately 75% of species and 60% of habitats are in a poor or bad state, owing to pressures such as unsustainable agricultural and forestry practices, infrastructure development, and invasive alien species or other problematic species. The cost of foregone ecosystem services due to ecosystem degradation is estimated at EUR 20 billion per year. The development of a National Biodiversity Strategy and Action Plan to 2030 provides an opportunity to strengthen the country's ambition and strategic framework for biodiversity, ensuring alignment with the Kunming-Montreal Global Biodiversity Framework and the European Biodiversity Strategy 2030. It will be critical for Slovakia to address existing barriers to its implementation, including inadequate financing and low institutional capacity and co-ordination.

The protected area network is extensive but requires reform

More than 37% of the country is designated for protection, which is higher than the OECD average and surpasses international targets. However, the protected area network has several shortcomings. These include a low share of national parks' area under strict protection, overlapping systems of protection that are misaligned and confusing, and a lack of management plans. Pursuing the protected area reform is vital. A priority is to complete national park zoning, which is challenging due to tensions between landowners and the state, conflicts between economic and biodiversity interests, and the large share of privately owned land. Strong participatory processes, effective communication and economic incentives will be crucial.

Slovakia has taken promising steps to align agriculture and forestry with biodiversity objectives, but challenges remain

Past land-use decisions have resulted in large monoculture fields and the removal of landscape elements. This situation has persisted under the Common Agricultural Policy (CAP) and biodiversity in agricultural land continues to decline. However, Slovakia's CAP 2023-27 Strategic Plan is better geared towards protecting biodiversity and could help to break this trend if implemented effectively. While all of Slovakia's forests are under management plans, these do not always align with biodiversity objectives. Furthermore, a high intensity of salvage and sanitary logging in response to wind damage and bark beetle infestations has degraded critical habitat. Slovakia has taken steps to address these challenges and should continue to promote close-to-nature forestry as the preferred forestry practice.

The land-use, land-use change and forestry (LULUCF) sector is a declining net carbon sink

Even with additional planned measures, the country projects its GHG net removals will fall short of its LULUCF 2030 target set out in the EU Regulation. The main reason is the declining removals from forests resulting from the disproportionate share of mature tree stands. Slovakia must move swiftly to implement its planned measures and to identify other opportunities to increase carbon removals. It should seek synergies across biodiversity, climate mitigation and adaptation action by, for example, scaling up close-to-nature forestry, restoring grasslands, wetlands and other ecosystems, and promoting landscape planning. Potential trade-offs across these objectives need to be carefully managed.

Assessment and recommendations

The Assessment and Recommendations present the main findings of the OECD Environmental Performance Review of the Slovak Republic. They identify 29 recommendations to help the country make further progress towards its environmental objectives and international commitments. The OECD Working Party on Environmental Performance discussed and approved the Assessment and Recommendations at its meeting on 24 January 2024.

1. Towards sustainable development

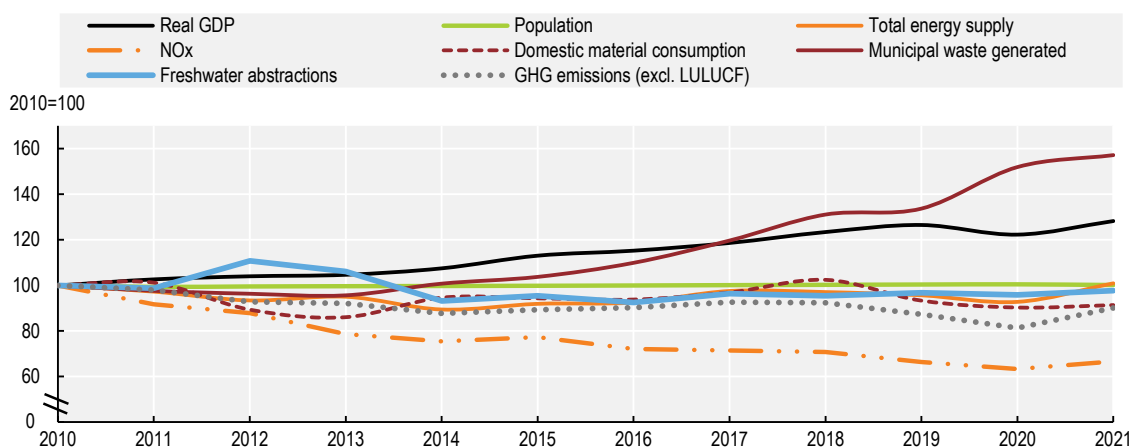
Addressing key environmental challenges

Slovakia has made progress on decoupling

The Slovak Republic has a small, open economy that grew steadily between 2010 and 2019. After a deep contraction during the COVID-19 crisis, gross domestic product (GDP) rebounded in 2021 and has grown moderately since (OECD, 2023a). Despite heavy dependence on Russian energy imports, government measures helped reduce the impact of rising energy prices. The economy is projected to grow by 1.1% in 2023 driven by investment supported by EU funds, and by 1.8% in 2024 thanks to improved export performance, with high uncertainty on the outlook.

Over 2010-19, Slovakia reduced domestic material consumption, emissions of greenhouse gases (GHGs) and major air pollutants, and to a lesser extent, energy supply and freshwater abstractions (Figure 1). By contrast, despite low population growth, municipal waste generation grew faster than GDP, reflecting increased consumption levels. Since 2019, decoupling has been less clear. By 2021, energy supply and gross GHG emissions were above their pre-pandemic levels.

Figure 1. Slovakia managed to decouple some environmental pressures from economic growth



Note: LULUCF: land use, land-use change and forestry. NOx: nitrogen oxides.

Source: IEA (2023), IEA World Energy Statistics and Balances (database); OECD (2023), OECD Environment Statistics (database); OECD (2023), OECD Economic Outlook (database).

StatLink  <https://stat.link/u3bsze>

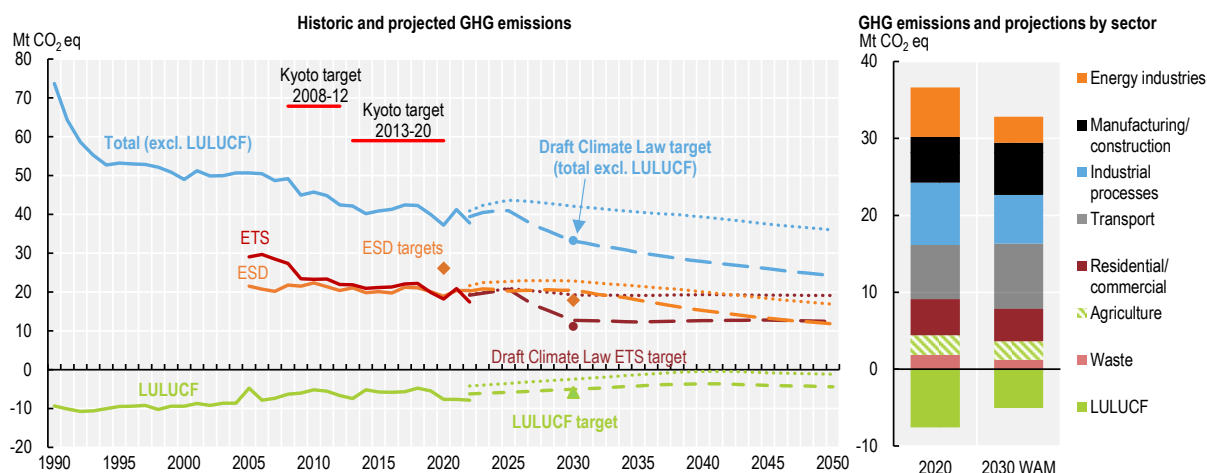
The country needs to step up its ambition and efforts to achieve carbon neutrality by 2050

Following EU legislation, the Slovak Republic adopted the Integrated National Energy and Climate Plan for 2021 to 2030 (NECP) and the Low-Carbon Development Strategy until 2030 with a View to 2050 to contribute to meeting the EU's 2030 energy and climate goals and achieve carbon neutrality by 2050 (MoEco, 2019) (MoE, 2020a). In 2023, the Ministry of Environment (MoE) introduced a draft law to enshrine carbon neutrality in legislation and strengthen long-term strategic planning across political cycles. In line with international best practices, the draft law establishes monitoring and enforcement mechanisms and provides for regional and local climate action plans. It reflects the 2030 targets of the EU "Fit for 55

package” and adds targets for sectors not covered by the EU Emissions Trading System (ETS). These targets would help strengthen the accountability of the administrations responsible for these sectors, but their ambition and coherence need to be reviewed. The target for growth in emissions from transport seems incompatible with the overall national reduction target for non-ETS sectors, as such growth will not be offset by targeted reductions in other sectors like buildings, agriculture and waste.


Slovakia met its obligations under the first and second period of the Kyoto Protocol (Figure 2). The country also achieved its 2020 target for non-ETS sectors. However, national projections indicate the country is not on a net-zero pathway. Most of the emission reductions by 2030 are expected to come from energy industries and to a lesser extent from industrial processes, which are covered by the EU ETS. GHG emissions in non-ETS sectors, especially transport, are projected to increase over 2020-30, even with additional measures. The expected decline of net carbon removals puts at risk the achievement of the LULUCF Regulation target (Chapter 2), and of the net-zero goal. As Slovakia is revising its NECP, it should clarify and strengthen the measures envisaged to achieve its goals.

Figure 2. Slovakia is not on a net-zero pathway



Note: LULUCF: land use, land-use change and forestry. Dotted lines refer to national projections with existing measures. Dashed lines refer to projections with additional measures. ESD 2020 target: under the EU Effort Sharing legislation; 2030 target: under the EU amended Effort Sharing Regulation (EU 2023/857). ESD targets are calculated as a percentage change from the 2005 ESR base-year emissions, which differ slightly from the revised 2005 emissions. LULUCF 2030 target: under the LULUCF Regulation (EU 2023/839). ETS: emissions under the EU Emissions Trading System; 2022 data are estimates.

Source: MoE (2023), National Inventory Report 2022; EEA (2023), Member States' greenhouse gas (GHG) emission projections, 24 October.

StatLink  <https://stat.link/01novb>

Although predominant, fossil fuels represent a smaller share of Slovakia's energy supply than the OECD average (60% vs. 78% in the OECD) due to the importance of nuclear energy. The country is committed to phase out coal mining and coal-fired power generation by 2023 and is increasing its nuclear capacity. Over the past decade, the energy mix has shifted progressively from coal to renewables (mainly biofuels and waste).

In 2020, renewable energy accounted for 17% of gross final energy consumption, above the target of 14% set by the EU Renewable Energy Directive for Slovakia. However, the country will have to raise its ambition to match the new renewable energy target of 42.5% for the whole European Union in 2030 (EU 2023/2413). The national target of 23% proposed by Slovakia is just enough to contribute to the previous EU target of 32%. Furthermore, the latest national projections with additional measures will only achieve 19% (MoEco, 2023).

Despite improvements in energy efficiency and economic restructuring, the Slovak economy is over 40% more energy intensive than the OECD Europe average due to its large industrial base. Slovakia has met its 2020 target under the EU Directive on Energy Efficiency but is not on track to meet the more stringent requirement for 2030 (EC, 2023a). Since 2014, energy consumption has risen steadily, except during the COVID-19 crisis, particularly in buildings and transport. The Recovery and Resilience Plan (RRP) should help develop and integrate renewable energies and support energy savings.

Air pollution remains a health concern

Despite significant improvements, average concentrations of fine particulates (PM_{2.5}) in Slovakia remain among the highest in OECD Europe. The country has faced several EU infringement proceedings for failing to meet limit value for PM₁₀. Solid fuel combustion for domestic heating, road transport and metal production are the main sources of this pollution (SHMU, 2021). In 2022, exceedances of EU air quality standards were recorded for PM_{2.5}, PM₁₀, benzo[a]pyrene and tropospheric ozone (SHMU, 2023). The 2023 Air Pollution Law, which strengthens competences of local authorities, including to introduce low-emission zones, is expected to improve air quality management.

Slovakia met its 2020-29 emission reduction commitments under the NEC Directive. It is on track to meet its 2030 targets, only with additional measures for ammonia emissions. However, the 2023 revision of the Air Pollution Charge Law left the tax rate on ammonia unchanged. The 2020 National Air Pollution Control Programme, to be updated in 2023, should model the effects of individual measures to identify the most cost-effective ones.

Further expanding wastewater treatment coverage is a challenge

Slovakia generally experiences low water stress, but climate change puts the southwest region, including the biggest drinking water reservoir, at severe risk of drought. Freshwater abstractions are low by OECD standards and have remained broadly stable in the past decade. Surface water quality seems better than the EU average, but there is some way to go to achieve good water status. Agriculture (use of fertilisers and pesticides), hydromorphological changes, untreated sewage, point sources of pollution and climate change are the most significant pressures on water bodies.

Slovakia has improved wastewater treatment, but its connection rate remains among the lowest in the OECD and individual sanitation systems are more common than in other EU countries. Complying with the more stringent requirements planned in the ongoing revision of the EU Urban Waste Water Treatment Directive (UWWTD) will be challenging. About 28% of the population live in municipalities with fewer than 2 000 inhabitants. Furthermore, the whole territory is designated as a sensitive area that needs advanced wastewater treatment.

As recommended by the OECD (OECD, 2019), Slovakia developed the National Programme for Implementing the UWWTD to set priorities. It estimates investment needs at nearly EUR 1.6 billion by 2027 (MoE, 2021a). The programme relies heavily on EU funds, yet almost half of these needs are not financed. Tariffs for water services are too low to recover the full costs of service provision and contribute to infrastructure financing needs, especially for small municipalities and regulated entities. The OECD recommended to incentivise connection to central sewer systems; further apply the polluter- and user-pays principles in the water sector and reflect at least part of the environmental and resource costs in tariffs for water supply and sanitation services and abstraction charges (OECD, 2019). The Water Policy Concept of the Slovak Republic plans a comprehensive reform of water pricing instruments by 2030 (Government of the Slovak Republic, 2022). Slovakia should also support municipalities with limited resources to build capacity to operate and maintain water infrastructure and to prepare and implement new investment projects. Consolidating municipal services would improve the sector's operational efficiency and financial sustainability.

Slovakia is lagging on waste management

Slovaks generate slightly less municipal waste per capita than the OECD Europe average (500 kg vs. 520 kg in 2021). Although separate collection has improved, municipal waste generation has grown faster than GDP in the last decade and 41% of this waste still ends up in landfills (OECD, 2023b). Despite a relatively well-developed waste policy framework, Slovakia has missed most of its 2020 waste objectives and its apparent progress in recycling is questionable (EC, 2023b). The country is at risk of missing the 2025 target of 55% for the preparation for re-use and the recycling of its municipal waste, and the 2035 target to landfill no more than 10% of its municipal waste. The lack of economic incentives to sort recyclable waste and the fragmentation of municipal waste management have been hampering progress (EC, 2023b).

Although decoupled from economic growth, materials consumption is projected to increase by more than 50% by 2050 from 2017 levels on current trajectory. As recommended by the joint OECD-EC circular economy roadmap for the Slovak Republic, the country should strengthen use of economic instruments to promote sustainable consumption and production, including by further raising the landfill tax for municipal waste and reforming the distribution of its proceeds; improve extended producer responsibility schemes; extend the mandatory use of green public procurement criteria; and expand pay-as-you-throw systems (only used by 6% of municipalities in 2018) (OECD, 2022a). The roadmap also recommends promoting a circular construction sector and a circular food and bio-waste value chain.

Improving environmental governance and management

Slovakia has a vision for sustainable development, but policy integration needs to go beyond the strategic level

Slovakia's Vision and Development Strategy 2030 is the reference framework for the implementation of the 2030 Agenda for Sustainable Development. The 2023 Voluntary National Review reports good performance on SDG 6 (clean water and sanitation) and SDG 7 (affordable and clean energy). However, progress is uneven on SDG 9 (industry, innovation and infrastructure), SDG 11 (sustainable cities and communities) and SDG 17 (partnerships for the goals) (Government of the Slovak Republic, 2023).

The Voluntary National Review notes that policy integration needs to go further than the strategic level to become a reality. Several inter-ministerial councils have been established, such as those for the European Green Deal (in charge of climate policy) and for the RRP. However, they do not seem to meet often. By mid-2023, the government was considering merging the councils for the 2030 Agenda, the European Green Deal and the Cohesion Policy to improve co-ordination on sustainable development. Slovakia could also envisage creating an independent body, such as the Council for Climate Accountability provided for in the draft Climate Law, or mandating an existing one, to assess and report on the consistency of sectoral policies with climate objectives. It is not clear how implementation of the Envirostrategy 2030 (MoE, 2019), which sets out various environmental commitments for all sectors, will be monitored. In 2022, the MoE elaborated an implementation plan but did not make it public.

Environment-related responsibilities are fragmented. The MoE oversees climate protection but lacks powers over energy policy and forestry. These competences are carried out by the Ministry of Economy and Ministry of Agriculture and Rural Development (MoA), respectively. Energy efficiency in the buildings sector falls under the authority of the Ministry of Transport. The district offices, which are local administration units of the state, include environmental protection departments responsible for implementing policy at local level. These departments are units of the Ministry of Interior but receive guidance from the MoE. Since the reform of public administration in 2013, specialised departments of the district offices have received less training and methodological support.

The effect of the reform of environmental assessment and permitting is uncertain

Slovakia is reforming environmental impact assessment (EIA) and environmental permitting to shorten the time for granting permits, including for renewables. The MoE planned to separate the permit under the Industrial Emissions Directive (IED) from the building permit, and to combine the EIA process with the IED permit. For simple constructions, the EIA and building permit would be integrated into a single process. These reforms were disrupted by the reform of the construction law, which also changed the EIA and IED permit processes. Although speeding up the granting of building permits is necessary (OECD, 2024a), a 2023 legislative amendment has been criticised for giving insufficient consideration to the environment, for limiting public participation and for lack of inter-ministerial consultation (President Zuzana Caputova, 2023) (MoE, 2023). The amendment was passed without the president's signature. The entry into force of the construction law and its amendments (due by April 2024) may be postponed due to the serious reservations expressed by stakeholders.

Slovakia has improved regulatory impact assessment (RIA) processes (OECD, 2020). Legislation introduced through the standard procedure is subject to mandatory economic, social and environmental impact assessments. The country compares well with other OECD countries in involving business in the development of laws and regulations, although the public and non-governmental organisations (NGOs) are less consulted. However, RIAs focus mainly on impacts on the budget and on business. In addition, an increasing number of laws have been enacted through a shortened procedure or directly by Parliament, which reduces the quality of legislation and impact assessments, and limits stakeholder participation. The establishment of analytical units in ministries is a good practice, but they are not systematically involved in decision making.

Non-compliance with environmental legislation remains high

Slovakia has a significant number of EU directive infringements, particularly in the areas of water and waste. The country was recently referred to the EU Court of Justice for exceeding air quality standards, failing to close non-compliant landfills and non-conformity with the Habitats and Birds directives.

The Slovak Environmental Inspectorate (SEI) and the district offices ensure compliance with national environmental legislation. In 2021, almost half of all SEI inspections found instances of non-compliance (SIŽP, 2022). Audit bodies have highlighted the insufficient capacity of the SEI. They have recommended enhancing risk-based planning of inspections and separating SEI's permitting and inspection roles (IMPEL, 2019) (SAO, 2020). Although fines provide SEI with increased revenue, they are often imposed at the lower end of legislative ranges, with little deterrent effect (Dráb, Engel' and Krištofóry, 2020).

The threshold of damages that differentiates administrative infringements from criminal cases can create uncertainty as to which authority is competent to deal with the offence (European Council, 2018). A national strategy to combat environmental illegal activities, which could help co-ordinating enforcement efforts and unifying procedures, has not yet been adopted (Mol, 2020) (MoE, 2022a). Since 2022, Slovakia has been reinforcing the police unit specialised in fighting environmental crime (EC, 2022a).

Progress of the state programme on contaminated sites 2016-21 has been slow (SAO, 2022). More than EUR 1 billion is needed for remediation by 2027, of which 21% will be covered by EU funds. The main obstacles include the difficulty for district authorities to identify polluters or liable entities; insufficient state budget allocations; lack of legislative deadline to decide which ministry will ensure remediation; and the length of public procurement processes.

Promoting investment and economic instruments for green growth

Climate is a priority of the recovery plan, but price support limits incentives to save energy

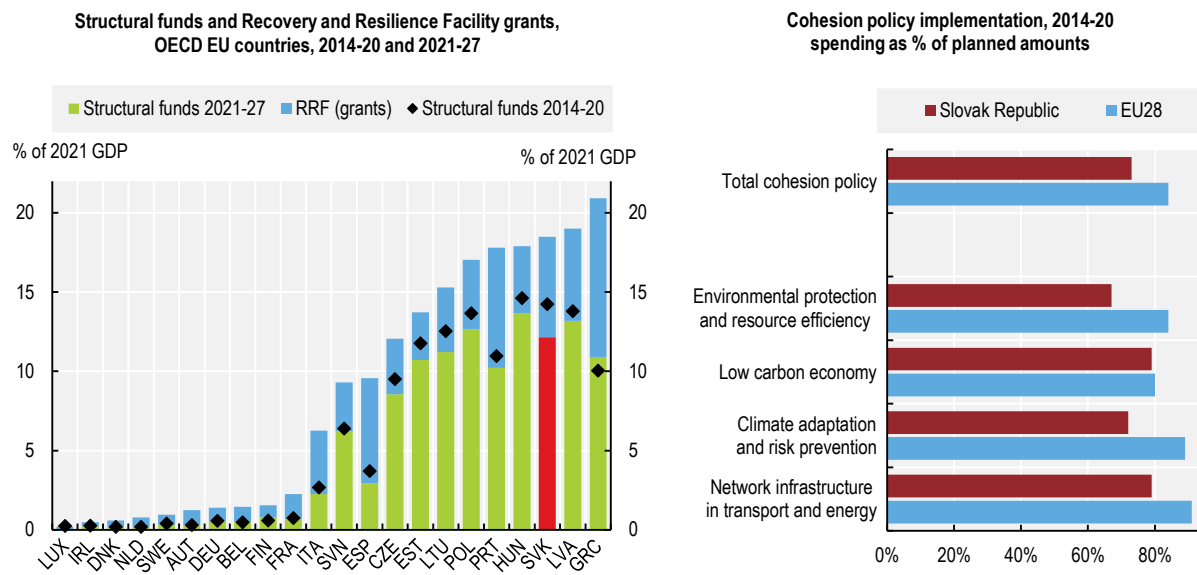
Slovakia submitted its RRP to boost its economy with Next Generation EU funds over 2021-26. The RRP consists of reforms and investments supported by EUR 6.4 billion in grants¹ (about 6.4% of 2021 GDP). Slovakia dedicated 45% of its RRP budget to climate objectives, well above the EU requirement of 37%. Energy efficiency and sustainable transport are key priorities. This is positive as investment in rail infrastructure has been significantly lower than investment in roads (0.2% of GDP vs. 1.1% in 2021). Slovakia has been among the EU countries with the fastest progress in implementation of the RRP. However, it should ensure sufficient administrative capacity and effective involvement of local and regional authorities for its successful implementation (EC, 2023a).

Between 2022 and 2023, to mitigate the effects of the energy crisis, the government adopted measures amounting to 3.3% of GDP, a level above the EU average (OECD, 2023c). They mainly consist of untargeted energy price support measures (a cap on electricity and gas prices for businesses, and on electricity, gas and heating supply prices for households). These measures are partly financed by taxes on windfall profits of energy suppliers and unspent EU cohesion funds for 2014-20. However, they remain costly to the budget and limit the incentive to save energy. From an environmental and fiscal point of view, it would be justified to keep the price signal and support the most vulnerable households with support unrelated to energy consumption. This requires identifying those most in need. In 2023, the Regulatory Office for Network Industries set up an inter-ministerial group to agree on an operational definition of energy poverty² and propose measures to combat it (URSO, 2023).

Effective use of EU funds is key for green investment

Around 70% of spending on environmental protection (mainly capital expenditure) is financed by EU funds (MoE/SEA, 2023). Slovakia is among the largest beneficiaries of EU funds per unit of GDP, but using these funds remains a challenge (Figure 3). Several factors explain the low absorption rate of funds for environmental infrastructure and climate adaptation over 2014-20. These comprise the lack of flexibility in reallocation; the large number of small, demand-oriented projects affected by the COVID-19 pandemic and rising construction prices; implementation difficulties within the MoE; and lengthy public procurement procedures (MIRDI, 2023).

Figure 3. Slovakia receives large amounts of EU funds, but their absorption is low



Note: In left panel, data refer to total allocations (excluding national co-financing) in current prices as a percentage of 2021 GDP. Structural funds: European Regional Development Fund, Cohesion Fund, European Social Fund; 2021-27: including Just Transition Fund; 2014-20: including Youth Employment Initiative. Recovery and Resilience Facility (RRF) grants: including REPowerEU grants.

Source: EC (2023), Cohesion Open Data Platform, period covered up to 30 June 2023; EC (2023), Consolidated Regulation (EU) 2021/241 establishing the Recovery and Resilience Facility, 28 February; EC (2022), RRF: Update of the maximum financial contribution, June.

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Slovakia has streamlined the governance and management of EU funds for 2021-27 with a single operational programme – “Programme Slovakia” – implemented by a single managing authority. It has amended its legislation to simplify and accelerate public procurement procedures. Strengthening capacities, particularly at local and regional level, could bolster implementation of reforms and investment (EC, 2021). The ongoing investment management reform should help to better plan projects and prioritise those with the highest social return (Haluš et al., 2023). Slovakia has made progress in identifying the municipalities most vulnerable to climate hazards (OECD, 2023d). It should build on this work to prioritise investment in adaptation.

The Environmental Fund finances around 10% of public investment in the environment, particularly water. The Fund has recently improved its strategy, management and project evaluation. However, budget planning has been hampered by limits set by the Ministry of Finance on the use of proceeds from the auctioning of EU ETS allowances for environmental purposes. Only 22% of these revenues were spent on environmental action over 2015-22, well below the 50% required by the ETS Directive³ (EC, 2023c). A 2023 legislative update adjusted the minimum requirements for the use of proceeds from the auctioning of EU ETS allowances. This is expected to increase the share of revenue spent on environmental action.

The green tax reform should be pursued

The Envirostrategy 2030 has pledged for a fiscally neutral green tax reform. In 2021, the government has committed to strengthen the role of environmental taxes and review subsidies to promote environmentally friendly behaviour. In real terms, revenue from environmentally related taxes (ERT) increased until 2019, driven by road fuel consumption while fuel tax rates were eroded by inflation. It then remained broadly stable before falling in 2022 with the surcharge on electricity.⁴ As a share of GDP, revenue from ERT was above the OECD Europe average in 2021 (2.5% vs. 2.1%). Taxes on energy products dominate, while

revenue from taxes on motor vehicles, and on pollution and resources, was well below the OECD Europe average.

Carbon prices are low compared to EU countries. With an average net effective carbon rate (ECR⁵) of EUR 55 per tonne of CO₂, Slovakia ranked in the bottom third of EU members in 2021 (OECD, 2022b). Although it priced about 80% of its GHG emissions, only 21% of these emissions were priced at a net ECR above EUR 60 per tonne of CO₂, the midpoint benchmark for carbon costs in 2020. In addition, ECR do not provide consistent incentives to cut GHG emissions across fuels and sectors. The tax on diesel is well below that on petrol, despite the higher carbon content of diesel and its local air pollution cost. Households⁶ benefit from tax exemptions on electricity, natural gas and coal. Energy sources used to generate electricity and combined heat and power are untaxed.

Slovakia can be praised for removing subsidies for electricity produced from domestic coal in 2023. Over 2011-21, the country supported the use of fossil fuels at an average rate of EUR 308 million per year and this aid mainly benefited coal (Hricišínová and Boros, 2022). The country has mapped fossil fuel subsidies and identified those for reform: regulated energy prices, subsidies for electricity generation from domestic coal, and energy tax exemptions for households and energy-intensive businesses. It should build on this work to drive the reform forward.

Since 2023, the one-off registration tax has partly reflected vehicles' emissions (EURO standard) rather than its age. This is a positive move to rejuvenate the fleet and shift towards cleaner vehicles. However, the annual motor vehicle tax rate does not vary with emissions (although electric vehicles are exempted) and only businesses pay it. As in other OECD countries, the favourable tax treatment of the personal use of company cars encourages their use (EC, 2022b). Distance-based charges depending on vehicle emissions and the place of driving are the best option to address local air pollution (van Dender, 2019). Only heavy goods vehicles pay a toll based on the distance travelled and their emissions on specific sections of motorways (ACEA, 2022). The system could be extended to cars, which pay a flat rate.

Slovakia has reformed the landfill tax (2018 and 2022 for industrial and construction waste), introduced a charge for the use of light plastic bags (2018) and a deposit-refund system for single-use PET bottles and cans (2022). It has also increased air pollution tax for certain pollutants. However, the environmental impacts of these changes remain to be assessed. There is still some way to go to implement a green tax reform shifting the tax burden from labour – which is heavily taxed in Slovakia – to environmentally harmful activities.

Recommendations on sustainable development

Addressing key environmental challenges

- Enshrine climate neutrality in national law with consistent sectoral pathways, with a view to strengthening long-term integrated strategic planning, preventing infringements and avoiding the future costs of inaction.
- Consolidate municipal water and waste services to improve operational efficiency and financial sustainability.
- Implement circular economy approaches in the construction sector and the food and bio-waste value chain.

Improving environmental governance and management

- Enhance inter-ministerial co-ordination on sustainable development by, for example, merging existing related councils; consider establishing an independent body to assess and report on the consistency of sectoral policies with environmental and climate objectives.
- Strengthen vertical co-ordination in environmental policy making and implementation; build capacity of district offices and improve their environmental guidance.
- Ensure a high level of public participation in environmental impact assessment and permitting procedures as part of the reform of the construction law; reinforce the environmental aspect and public consultation in regulatory impact assessments; systematically use available analytical capacity in conducting assessments.
- Further promote compliance with environmental requirements by adopting a government-wide strategy to combat environmental illegal activities; strengthen capacity of the Slovak Environmental Inspectorate, separating its permitting and inspection roles and enhancing risk-based planning of inspections; increase sanctions and ensure fines have a real deterrent impact.
- Accelerate the clean-up of contaminated sites by securing adequate financial resources.

Promoting investment and economic instruments for green growth

- Accelerate the absorption of EU funds to boost environmental investment; simplify and accelerate public procurement procedures, ensuring proper safeguards and transparency; strengthen project preparation capacity of recipients, particularly at local level, including by developing intermunicipal co-operation.
- Systematically screen actual and proposed subsidies, including tax provisions, to identify and reform those that are not justified on economic, social and environmental grounds.
- Further improve the management and planning of the Environmental Fund, ensuring its expenditure is aligned with Slovakia's environmental and climate objectives and needs.
- Pursue the green tax reform, planning a regular and transparent adjustment of rates with inflation; reflect the carbon content of fuels in energy taxes and pursue efforts to phase out fossil fuel subsidies (e.g. energy tax exemptions for households); further apply the polluter- and user-pays principles in the water and waste sector (e.g. raising the landfill tax and reforming the distribution of its proceeds).
- Agree on a multi-dimensional and operational definition of energy poverty and gather the relevant data to target support to the most vulnerable, while encouraging energy saving.

- Limit car dependency: shift investment from road to rail; remove preferential tax treatment for company cars; link the annual motor vehicle tax to vehicle emissions and extend it to private cars; extend distance-based charges to passenger cars on motorways.

2. Biodiversity and forests in the context of climate change

Biodiversity status and trends

Slovakia's rich biodiversity is under threat

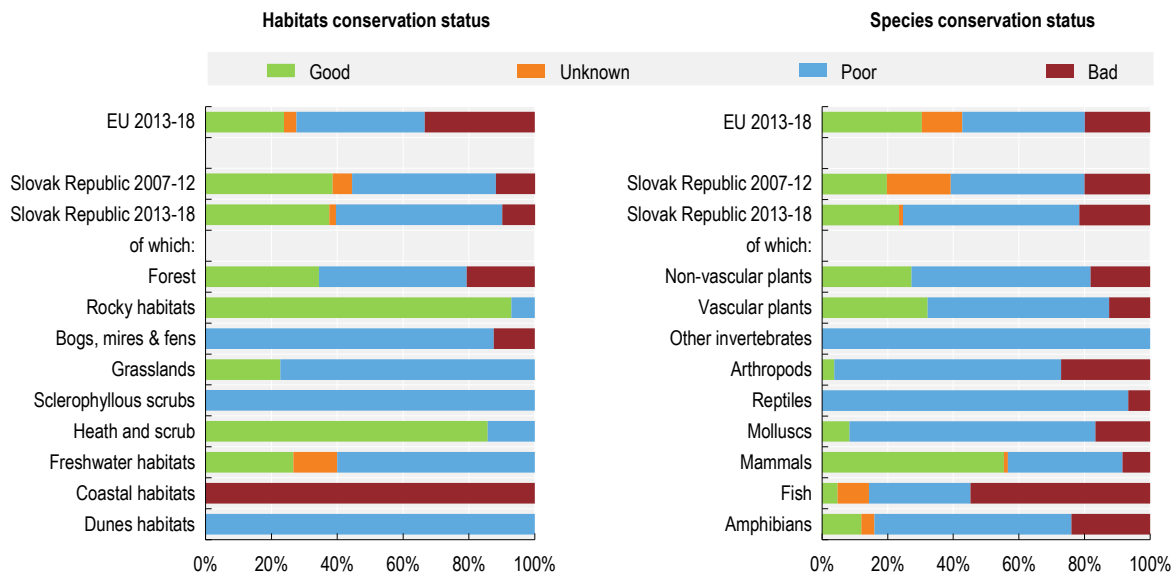
Slovakia spans two biogeographic regions: the Carpathian Mountains and the Pannonian Lowlands. Forests cover approximately 40% of Slovakia's territory, making it among the most forested countries in Europe. The other dominant ecosystem types are cropland and grassland (Černecký et al., 2021).

The conservation status of Slovakia's species and habitats is unfavourable. Approximately 75% of species and 60% of habitats of European interest in Slovakia are in a poor or bad state (EEA, 2021) (Figure 4). However, the share of species and habitats with unfavourable status did not significantly change between 2007-12 and 2013-18. Almost 25% of vertebrates and 7% of invertebrates are threatened with extinction. Approximately 12% of non-vascular plants (e.g. mosses) and 15% of vascular plants are threatened (OECD, 2023b).

Key pressures on biodiversity include unsustainable agricultural practices; invasive alien species (IAS) and other problematic species; forestry (e.g. the high volume of incidental logging in some forest areas); fragmentation of habitats and soil sealing, mainly through development of residential, commercial, industrial and transport infrastructure; and natural processes such as secondary ecological succession.⁷ These pressures are expected to persist (Černecký et al., 2020).

Slovakia's biodiversity is expected to face increasing pressure from climate change. Average annual air temperature has increased by 1.7°C since 1881. Precipitation has decreased in the south and increased in the north, while the risk of droughts and floods is increasing (MoE, 2022b). Observed and expected impacts on biodiversity include shifts in vegetation zones and species distributions, phenological changes, extinction risk to species with a narrow ecological niche, and increased risk of IAS and pest outbreaks (e.g. bark beetle infestation). Montane pine forests, swamps in the foothills, and mountains and other aquatic systems are among the most vulnerable ecosystems (MoE, 2022b).

Figure 4. A significant share of habitats and species are in an unfavourable state



Note: The new report for 2013-18 is based primarily on data from KIMS (Complex Information Monitoring System). While the number of habitats and species with unfavourable conservation status increased between 2007-12 and 2013-18, this may be due to data improvements. Sclerophyllous scrubs: *Juniperus communis* formations on heaths or calcareous grasslands; Coastal habitats: inland salt meadows and pannonic salt steppes and salt marshes; Dune habitats: pannonic inland dunes.

Source: EEA (2021), Conservation status of habitat types and species: datasets from Article 17, Habitats Directive 92/43/EEC reporting.

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Data and knowledge on biodiversity have improved, but gaps remain

Biodiversity monitoring addresses mainly species and habitats of European interest. Biodiversity data are recorded in Slovakia's Comprehensive Information and Monitoring System, which is accessible to the public and integrates a breadth of environmental information. Between 2007-12 and 2013-18, monitoring helped address data gaps, reducing the share of habitats and species with unknown status. However, knowledge and data gaps remain for freshwater habitats, fish and, to a lesser degree, amphibians and small mammals of European interest. Slovakia should address these gaps and ensure long-term systematic monitoring of priority habitats and species. Furthermore, the monitoring scope should extend to cover species and habitats that are not of European interest.

Slovakia lags other OECD countries in mapping ecosystems and valuing their services. However, important progress has been made in recent years with the publication of the *Catalogue of Ecosystem Services of Slovakia* (Mederly and Černecký, 2019) and *The Value of Ecosystems and their Services in Slovakia* (Černecký et al., 2021). The latter constitutes the first economic evaluation of ecosystem services at the national level.

To build on these efforts, Slovakia should advance work on natural capital accounting by establishing a pilot ecosystem comprising physical (extent, condition, capacity) and monetary accounts. Ecosystem service valuation should be integrated into decision making (e.g. through cost-benefit analysis) and be an input into policy design.

Legislative, strategic and institutional framework

Slovakia has strengthened its biodiversity legislation

The Nature and Landscape Protection Act (543/2002) (hereafter Nature Act) is the principal legislation governing nature, landscapes and the conservation, sustainable use and restoration of biodiversity. Slovakia has amended the Nature Act several times since 2010. Key amendments reform national park governance and management, and promote mainstreaming of biodiversity into sustainable forestry practices. Other positive developments include adoption of legislation on genetic resource access and benefit sharing and on IAS, as well as amendments to the Forest Act (discussed below).

Opportunities exist to reinforce and update the strategic framework for biodiversity

Protecting and sustainably managing nature is a key pillar of Slovakia's Vision and Development Strategy 2030 (2021) and Envirostrategy 2030 (2019). Both strategies include high-level qualitative and quantitative objectives for biodiversity. The National Biodiversity Strategy and Action Plan (NBSAP) 2014-20 was the main strategy for biodiversity action, but it has expired. The NBSAP set a 2050 vision, nine goals for 2020 and actions to achieve them. The goals were mostly qualitative and lacked specificity.

Drafting of a new NBSAP began in 2019 and it is expected to be adopted in 2024. In line with good practice, the NBSAP should include a long-term vision, mission, specific and measurable targets, and accompanying measures aligned with the Convention on Biological Diversity's Kunming-Montreal Global Biodiversity Framework and the EU Biodiversity Strategy 2030.

Slovakia recognises the need for a more interactive and co-operative approach to the preparation of the post-2020 NBSAP (MoE, 2020b). The MoE intends to consult the national Biodiversity Working Group, which includes various ministries, NGOs and academic institutions. It will be necessary to engage these and other stakeholders, such as businesses, landowners and forest managers, early in the NBSAP's development to ensure its effective design and support for its successful implementation.

To complement the NBSAP and support achievement of a potential restoration target, Slovakia should consider developing a nature restoration strategy with dedicated funding. About 60% of Slovakia's ecosystems are degraded, resulting in a loss of approximately EUR 20 billion per year in ecosystem services such as climate regulation, flood control and timber provision (Černecký et al., 2021). Yet restoration has been ad hoc, with no significant progress made towards the 2014-20 NBSAP target of restoring at least 15% of degraded ecosystems by 2020 (MoE, 2020b). The strategy could identify priority sites (e.g. "priority habitat types" in Annex 1 of the EU Habitats Directive) and cost-effective restoration measures, especially those that contribute to disaster risk reduction, climate resilience and mitigation. It should address national priorities and requirements of the new EU Nature Restoration law.

... and enhance resources required for implementing the strategic framework

A key challenge is the implementation of the strategic framework for biodiversity. Slovakia made good progress towards some of the nine goals of its 2014-20 NBSAP (e.g. IAS and access and benefit sharing). However, progress towards most goals was too slow or insignificant (e.g. restoration and protection of water-dependent habitats and species) (MoE, 2020b). Of the 167 tasks outlined in the action plan, 99 were fully implemented, 42 partially implemented and 26 not implemented (MoE, 2020c).

Limited biodiversity finance, institutional capacity and co-ordination on the ground are obstacles to proper implementation. Government expenditure on biodiversity protection fluctuated considerably from 2010-21. It dropped to EUR 31.7 million in 2017 (0.09% of government spending) and peaked at EUR 98.8 million in 2021 (0.22% of government spending) (OECD, 2023e). EU funds are a key source of biodiversity (and broader nature) funding but too often substitute for, rather than complement, state funding. Further,

Slovakia does not harness the full potential of EU and international funds owing to a lack of capacity within central and local governments to develop, fundraise for and implement biodiversity projects.

The challenges in securing and disbursing financial resources highlighted in Chapter 1 are acute for biodiversity. Slovakia would benefit from a focused finance strategy to promote a more strategic and systematic approach to mobilising and allocating resources for biodiversity, nature and landscape protection. Ideally, such a strategy would be based on an assessment of i) biodiversity finance needs; ii) barriers to effective spending and opportunities for increasing the cost effectiveness and efficiency of existing funding; and iii) priorities for mobilising additional resources, particularly domestic and private finance.

Protected areas

Protected area network is extensive but has shortcomings

Slovakia's protected area (PA) coverage is significantly higher than the OECD average. With more than 37% of its territory designated for protection, it has comfortably surpassed the 2020 target for PA coverage of 17% (Aichi Target 11) and the 2030 target of 30% under the Kunming-Montreal Global Biodiversity Framework (Target 3).

During 2011-21, Slovakia declared additional small PAs, including 76 nature reserves spanning 65 km² to protect the country's remaining old growth forests. After a slow start, the process to identify and designate Natura 2000 sites has accelerated since 2019. In 2022, Slovakia published "Conservation principles for habitats of European interest, and habitats of species of European interest, in sites of European importance" (ŠOP, 2022).

Slovakia's multiple, overlapping systems of protection (domestic, European, international) do not always align, creating confusion among stakeholders and management challenges. Moreover, the PA network is inconsistent with good practice standards set by the International Union for Conservation of Nature. For example, less than 20% of the area of national parks (and only 4% of Slovak Karst National Park) is strictly protected and strictly PAs are fragmented.

An additional limitation of the PA network is the lack of approved management plans. More than 90% of PAs do not have valid management plans. Many adopted management plans are yet to be implemented (MoE, 2020b) (ŠOP, 2023). Various factors may explain the lack of implementation, such as the limited staff and financial capacity: the number of employees and the budget per 100 km² of Slovakia's national parks are consistently below the regional average.⁸ However, staff numbers have increased as part of the PA reform (MoE, 2022c).

Slovakia has launched a protected area reform and must shepherd it through to completion

The Envirostrategy 2030 commits Slovakia to assessing and improving its PA network. It sets ambitious targets of expanding no-intervention zones in national parks to 50% by 2025 and to 75% by 2030. However, these targets may not be appropriate for national parks comprising large areas of significantly modified ecosystems, which require active management to achieve nature and biodiversity objectives. For these parks, the no-interference zone can be below the 50% threshold (MoE, 2019).

A 2021 Nature Act amendment strengthened the legal basis for PA zoning. It also established nine independent national park administrations under the MoE, which are responsible for park management, administration and strategic planning. State land in the highest protection zones of national parks was transferred from the MoA to the MoE. The transfer of the remaining state land is conditional upon the completion of national park zoning.

A priority now is to complete PA zoning, with an initial focus on national parks. Two-thirds of national parks are yet to be zoned. Zoning is complex due to long-standing tensions between landowners and the state, conflicts between economic interests (mainly forestry) and biodiversity interests, and the large share of land within national parks still privately owned. Fragmentation of land ownership, yet to be fully resolved by the land reform, makes consensus and agreement difficult to reach (MoE, 2022c).

Effective communication, participatory processes and economic incentives are required to facilitate national park zoning and governance. The national park reform and zoning restrict forestry and other economic activities, while creating new business and employment opportunities. Development plans akin to the Nitra region post-mining transition plan developed with local stakeholders could facilitate the national park reform. Additionally, it could ensure its long-term viability by helping to build sustainable local economies that benefit, and benefit from, national parks.

The conditionality clause requiring the completion of national park zoning before state land in lower levels of protection is transferred from the MoA to the MoE creates an additional challenge to zoning. It provides an instrument for opponents to the national park reform to undermine zoning to maintain the status quo. Slovakia should consider removing this condition, transferring the management of all state land in national parks to the MoE, regardless of its degree of protection and the status of zoning, and focus on protection of these sites.

National parks require an increase in financial resources to hire more staff (e.g. foresters/land managers, guards, tourism service providers) and invest in park infrastructure (e.g. visitor centres, trail development or maintenance). Sufficient, predictable and long-term core state funding is fundamental but currently lacking. State funding should be complemented by international and EU funding, and national parks' own revenues.

A new source of PA funding has emerged with the 2023 update to Act 414/2012, which allows earmarking of auctioning revenues from the ETS to support carbon sequestration measures in PAs. However, the specific modalities and criteria for disbursing these funds are yet to be defined. It will be important to spend the resources effectively to maximise benefits for both biodiversity and the climate, and to ensure consistency with new and incoming EU law-based instruments, such as an EU certification framework for carbon removals.

To generate their own revenues, national parks could use various mechanisms such as entrance fees, accommodation tax, issuance of concessions and payments for ecosystem services (MoE, 2022c), but these are yet to be leveraged. A notable exception is the PA entrance fees at Slovak Paradise National Park (Slovenský Raj). However, the entrance fee rate is lower than willingness-to-pay estimates (MoE, 2022c).

Mainstreaming of biodiversity

Slovakia faces challenges aligning biodiversity and forestry interests, but is shifting towards more sustainable forestry models

Forest area accounts for about 40% of Slovakia's territory and has increased slightly since 2010. Forestry contributed between 0.7-0.9% of annual GDP in 2010-22, which is more than in most OECD countries. It employs 73 000 people (FISE, 2022).

While some monoculture plantations exist (primarily conifers), forests are mainly diverse and have a natural species composition. The proportion of broadleaved trees is increasing, which is a positive trend for biodiversity and forest resilience (MoE/SEA, 2023). Introduced tree species cover less than 3% of forest area (MoE, 2022d). The share of naturally regenerating forest has increased slightly, accounting for 60% of total growing stock in 2020 (FAO, 2020).

While species composition is diverse, the age structure is not. Mature forest stands over 70 years old and very young stands (under 20 years) are disproportionately represented. The lack of variety in age structure increases forest vulnerability to biotic (e.g. bark beetle infestation) and abiotic (e.g. drought; wind damage) disturbances, both of which are increasing with climate change (MoE, 2022d).

Logging intensity is higher than in most OECD countries (OECD, 2023f). It has a long-term increasing trend, which is expected to persist (MoE, 2022d). This is due to an increase in planned logging as tree stands reach maturity and high volumes of incidental logging (e.g. salvage and sanitary logging), following disturbances.

All Slovakia's forests are covered by ten-year forest management plans to promote sustainable forestry. However, some plans are inconsistent with the management objectives of protected areas. Furthermore, salvage and sanitary logging have resulted in large-scale clearing of habitat of the threatened western capercaillie in Natura 2000 sites. To address this issue, Slovakia updated its legislation in 2020 to require environmental assessments of forest management plans and enable environmental authorities to restrict salvage and sanitary logging. Slovakia should ensure these changes are implemented effectively and efficiently, and that forest management plans and PA plans are aligned.

Additionally, Slovakia has taken measures to better mainstream biodiversity in forestry, through amendments to the Forest and Nature Acts. These amendments improve coherence between the two laws and promote close-to-nature forestry, which is now practised on over 112 000 ha (MoE/SEA, 2023). The draft 2024-30 National Forestry Programme of Slovak Republic sets a target of 25% of forests (i.e. 500 000 ha) under close-to-nature management by 2030. A plan for increasing close-to-nature forestry and technical guidance for foresters on such practices would be beneficial. Slovakia could also require and guide efforts to further integrate considerations of biodiversity, ecosystem services, and climate change mitigation and adaptation into forest management plans.

While protected and well-managed forests provide multiple benefits to society (e.g. watershed services and climate regulation), forest owners/managers have insufficient economic incentives to provide these services. In a positive step, the government introduced the Forestry Support for Non-Productive Forest Functions in 2017. However, the scheme has not yet driven action beyond regulatory requirements and has scope for improvement (e.g. stronger application of criteria; re-calculation of payment rates to enhance cost effectiveness) (Báliková and Šálka, 2022). Strengthening this mechanism and harnessing other instruments (e.g. payments for ecosystem services) for mobilising public (state and European Union) and private finance, could help Slovakia achieve its environmental objectives in forest management.

Slovakia could also renew its efforts to expand voluntary sustainable forest certification under the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). While two-thirds of forest area is under FSC or PEFC certification, the overall area certified has been declining since 2010.

The common agricultural policy has not fulfilled its potential for Slovak's biodiversity, but this looks to be changing

Agricultural land covers nearly half of Slovakia but declined slightly over 2010-21 (MoE/SEA, 2023). It consists predominantly of arable land (59%) and permanent grassland (36%). Agriculture has contributed between 2-3% to annual GDP since 2010 (OECD, 2023e).

Biodiversity in agricultural landscapes continues to decline. In the past decade, the Common Farmland Bird index declined faster than the EU average (EC, 2023d). Agricultural activities threaten more than 60% of habitats and 70% of species of European interest (Černecký et al., 2020). A key issue is the loss of landscape diversity, resulting from the removal of landscape elements (e.g. hedgerows, solitary trees) and the cultivation of monocultures. This is exacerbated by the large average field size in Slovakia (the largest

in the European Union) (OneSoil, 2020), which stems from collectivisation and land consolidation following the Second World War.

Agricultural practices such as excess use of industrial fertilisers and pesticides also pose a threat to biodiversity. Consumption of nitrogen-based inorganic fertilisers (kg/ha) has increased by 20% since 2011 and is above the EU average. Pesticide application (kg/ha) is lower than in most EU countries but has been increasing faster. During 2011-21, pesticide application increased by 30%. Grassland habitats and species face the additional threats of woody succession and invasive alien plant species, owing to the abandonment of land and reductions in low-intensity grazing (Černecký et al., 2020).

The EU Common Agricultural Policy (CAP) provides important incentives for conserving and sustainably using biodiversity in Slovakia's agricultural land, but its full potential has not yet been realised (EC, 2020) (MoE, 2020c). Large monoculture fields have persisted under CAP and little progress has been made to restore landscape features (Gális, 2020). Furthermore, the effectiveness of agri-environmental-climate measures (AECMs) has been patchy. For example, during the 2014-20 period, measures to promote multi-functional field edges and protect threatened species were undersubscribed (EC, 2020) (MoE, 2020c). In contrast, measures supporting protection of grassland habitats and organic agriculture performed well (MoE, 2020c). The share of agricultural land farmed organically reached 13.6% in 2021, above the EU average and the Envirostrategy's target for 2030 (MoE/SEA, 2023). The National Action Plan for Organic Farming sets a new target of 14% for 2027 (MoA, 2023a).

While it is too soon to evaluate its impact, Slovakia's CAP 2023-27 Strategic Plan is better geared towards protecting biodiversity and achieving other environmental objectives, such as climate change mitigation and adaptation. This reflects not only revised and more stringent CAP requirements following EU negotiations, but also how Slovakia has translated the CAP nationally – a process that benefited from improved and effective stakeholder engagement.

Slovakia has changed the criteria for direct payments (pillar one) to allow for more landscape features (unproductive land) within the eligible hectares and strengthened the environmental requirements for obtaining these payments (i.e. conditionality). Additionally, the Strategic Plan allocates EUR 560 million (28% of pillar one) to a Whole-Farm Eco-Scheme that divides large parcels of land by biobelts and sets aside non-productive landscape elements.

Other measures targeting biodiversity include AECMs (under pillar 2) for protecting great bustard, ground squirrel and grasslands, and for managing Natura 2000 habitats. Support is also allocated to adopting or maintaining organic farming practices on 14% of agricultural land. Payment levels for the Eco-Scheme and AECMs were calculated carefully and certified by an independent body (MoA, 2023b).

Slovakia should ensure the farm advisory service has sufficient capacity to support the uptake and effective implementation of the Eco-Scheme and AECMs, with involvement of relevant agricultural and environmental experts. It will also be important to closely monitor the implementation and outcomes of environmental measures, and ensure the conditionality requirements are respected, particularly in ecologically sensitive and important areas.

To further promote positive biodiversity outcomes from CAP, Slovakia could consider using the flexibility mechanism to increase the share of pillar 1 going to the Whole-Farm Eco-Scheme and to transfer funding from pillar 1 to pillar 2 AECMs. A focus on results-based AECMs could also be beneficial (OECD, forthcoming). Additionally, Slovakia should continue to build and disseminate knowledge about biodiversity-friendly and climate-smart farming practices, including through the European Innovation Partnership for Agricultural Productivity and Sustainability.

Beyond CAP payments and conditionality, Slovakia could consider other policy measures to promote nature and biodiversity in the agriculture sector. For example, the Slovak Land Fund could introduce terms into agricultural leases requiring specific biodiversity measures in key areas such as PAs. Favourable lease rates could be considered where additional demands are placed on farmers. Additionally, to manage the

increase in pesticide use, Slovakia could develop economic thresholds to inform decisions on pesticide application. To manage the adverse effects of fertilisers, strengthened nitrate testing and compliance control in areas threatened by nitrates (as indicated in the Envirostrategy), would be beneficial.

Slovak's energy transition must be consistent with climate and biodiversity commitments

Slovakia has taken important steps to address the pressures of the energy sector on biodiversity. Notably, the State Nature Conservancy, NGOs and electricity transmission companies have been working together to address powerline impacts on biodiversity. Additionally, in 2018, Slovakia removed bioenergy subsidies that were contributing to unsustainable biomass harvesting and introduced sustainability criteria for biomass.

Challenges remain. Slovakia received a letter of formal notice from the European Commission for failing to conduct a strategic environmental assessment (SEA) of the national plan on the usage of hydropower (EC, 2022c). The SEA considered only 4 of 37 small hydropower plants listed in the plan. Furthermore, at the project level, authorities did not conduct the necessary EIA for several already constructed hydropower plans required by the EIA and Water Framework Directives.

As a late mover on solar and wind energy, Slovakia has an opportunity to learn from other countries' experiences in harnessing synergies and minimising trade-offs between these technologies and biodiversity protection (OECD, 2024b). Direct, indirect and cumulative biodiversity impacts should be assessed as part of environmental assessments and mitigated effectively. Identifying renewable energy zones where risk to biodiversity is low (e.g. abandoned agricultural land, brownfield sites) could help reduce biodiversity impacts and project delays, while allowing for accelerated permitting. Slovakia should also fully harness opportunities to integrate solar panels into the built environment.

Slovakia has set an objective of developing sustainability criteria for all sources of renewable energy as part of its Envirostrategy 2030. Criteria are yet to be developed for solar PV and geothermal energy. Industry views the wind criteria, which were adopted more than a decade ago, as a barrier to investment (WindEurope, 2022). It would be beneficial to review these criteria to ensure they reflect the current state of knowledge and are fit-for-purpose. The country could also assess the need for decision-support tools (e.g. ecological sensitivity maps and guidance) to help renewable energy companies, energy planners and regulators implement renewable energy criteria.

Biodiversity mainstreaming has progressed slowly for other sectors

Integration of biodiversity into infrastructure decisions is improving but is not systematic. Positive developments include the monitoring of transport impacts on land-use change, strengthened governance of IAS, improved knowledge on migratory routes of large mammals affected by transport infrastructure, and integration of biodiversity and broader nature considerations into the Transport Strategy 2030 (MoE, 2020c).

To help address infrastructure impacts on biodiversity, Slovakia could consider adopting an explicit biodiversity "no net loss" or ideally "net positive gain" objective for infrastructure developments. It could support achievement of this objective through adoption of a national biodiversity offsetting scheme. It will be critical that such a scheme is well governed and follows best practices (OECD, 2016). This includes full adherence to the mitigation hierarchy: avoid then minimise and restore/rehabilitate residual impacts onsite before offsetting.

Poorly regulated tourism has put pressure on Slovakia's ecosystems and their services, particularly in PAs. At the same time, the potential benefits of sustainable ecotourism for biodiversity, local economies and people have not been fully realised. At a strategic level, Slovakia is starting to address this through its Envirostrategy 2030 and the development of its Strategic Plan for the Development of Green Tourism. It

has also promoted tourism and biodiversity links under the Interreg Centralparks initiative and the Slovak Republic-Hungary Cross-Border Cooperation Programme (MoE, 2020c).

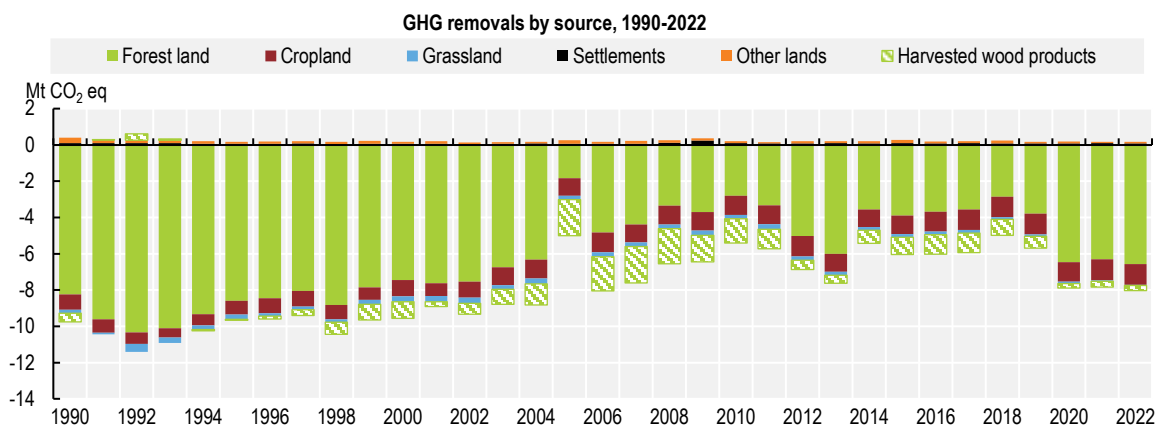
Across all sectors, businesses could play a more active role in Slovakia's biodiversity agenda. No formal mechanism exists for governments to engage with business on biodiversity issues and collaboration has been limited. In addition to providing clear policy signals for business, Slovakia could consider establishing a multi-stakeholder business and biodiversity platform to communicate with business and facilitate the exchange of good practices. It could also engage in the European Biodiversity and Business Platform, which has no Slovakian members.

Climate change mitigation, adaptation and biodiversity

Despite new policies, projections show Slovakia will fall short of its 2030 LULUCF target

Slovakia's land use, land-use change and forestry (LULUCF) sector is a net sink. However, net carbon removals have a long-term declining trend (Figure 5). This is mainly due to declining removals from forests, resulting from the skewed age structure of forests and the increase in planned and actual harvest (discussed above) (MoE, 2022b; MoE, 2022d). Removals from grasslands and harvested wood products also show a declining trend.

Figure 5. GHG removals from land use, land-use change and forestry have declined



Note: Removals dropped by half in 2005 due to wind damage to forests in the High Tatras. Increased removals in 2020/21 likely reflects reduced forestry activity owing to COVID-19. Settlements and other lands are net sources of GHG emissions, mostly due to the construction of transport infrastructure, industrial sites and municipal development; 2022 data are estimates.

Source: MoE (2023), National Inventory Report 2022; EEA (2023), Member States' greenhouse gas (GHG) emission projections, 24 October.

StatLink  <https://stat.link/5tmz3q>

The revised LULUCF Regulation (EU 2023/839) requires Slovakia to increase net GHG removals in the LULUCF sector by 504 kilotonnes of carbon dioxide equivalent (kt CO₂e) by 2030 compared to the 2016-18 average. According to Slovakia's projections, GHG net removals in the LULUCF sector will decline by 2030, even in a scenario with additional planned measures. Examples of these additional measures include changing the species composition of forests, afforestation of unused agricultural land, increasing the share of long-life wood products (HWP), increasing carbon sequestration in agricultural soils, and maintaining and restoring grasslands (MoE, 2022b).

Slovakia will need to swiftly and comprehensively implement the measures identified for enhancing removals and reducing emissions from LULUCF. It will also need to identify and implement additional

measures across all land-use sectors to meet its target. For forest land, which has the most influence on GHG removals, adjusting harvest volume (e.g. by decreasing harvesting rates or modifying rotation periods) may be the most effective measure for increasing removals in the short term (Barka, Priwitzer and Pavlenda, 2020). However, this could undermine long-term mitigation by delaying the transition to more resilient and stable forest stands (see below). Work is under way to enhance modelling and methodologies to estimate the impact of measures across the different land-use categories and inform their prioritisation.

Slovakia has adopted a comprehensive strategic framework for adaptation

Slovakia adopted a National Adaptation Strategy (NAS) in 2014 and an updated strategy in 2018 (MoE, 2018). The NAS establishes an institutional framework and co-ordination mechanism to promote adaptation. A National Adaptation Plan (NAP) adopted in 2021 outlines seven priority areas with specific objectives and measures for the short term (2021-23) and medium term (2024-27)⁹ (MoE, 2021b). The NAS and NAP emphasise an integrated approach to adaptation and cover all adaptation-relevant areas.

Adaptation measures for biodiversity and nature-based solutions are integrated into both the NAS and NAP. The NAP outlines seven measures to support biodiversity and ecosystem services under the priority domain “natural environment and biodiversity”, including strengthening PA networks; monitoring climate impacts on biodiversity and ecosystem services; and controlling spread of IAS. Measures involving the sustainable management and restoration of ecosystems are also integrated into other priority areas such as water protection (e.g. restoration of floodplains and wetlands), adapted forestry (e.g. conversion of monocultures to close-to-nature forest stands, forest protection against biotic and abiotic agents, tending to young forest stands, research and monitoring of primeval forests), and sustainable agriculture (e.g. promoting mosaic agricultural land and suitable pollinator habitats).

Slovakia must harness synergies across biodiversity, climate adaptation and climate mitigation while managing potential trade-offs

Various measures could simultaneously deliver nature and biodiversity protection, climate adaptation and climate mitigation benefits. For example, diversifying the species and age structure of forests through targeted planting and close-to-nature forestry will increase the resilience of forests in the long run. This, in turn, would reduce the risk of GHG emissions associated with tree loss. Restoration and protection of wetlands, including peatlands, could secure their carbon stocks, reduce the impacts of droughts and floods, and provide habitat for wetland species.

Trade-offs may also exist. For example, in some contexts, afforestation projects could increase removals in the short term but compromise biodiversity. This in turn could undermine ecosystem resilience and long-term mitigation objectives. Harvesting of even-aged forest stands – particularly monocultures – may be required to transition to more resilient close-to-nature forestry that provides adaptation, biodiversity and longer-term mitigation benefits. However, it may reduce the carbon sink in the short term. Such trade-offs need to be assessed and carefully addressed through national strategies, policies and locally tailored management plans.

While Slovakia’s strategies increasingly recognise synergies across biodiversity and climate change, these need to be harnessed in practice. This requires effective policy mixes coupled with integrated approaches to financing and project implementation. The RPP for Slovakia provides a platform for this, allocating EUR 159 million to adaptation, with emphasis on nature and biodiversity protection. Key areas of focus include the reforms of landscape planning, water management and national park management.

Landscape planning offers an integrated approach to delivering on climate and biodiversity objectives. To that end, it protects and restores landscape features necessary for retaining water; provides habitat and ecological corridors; and supports carbon sequestration and storage. While the methodological underpinning for landscape planning is well established through the Landscape Ecological Planning and

Territorial System of Ecological Stability, its implementation is lacking. A landscape planning law has been drafted but not adopted.

Slovakia's MoA is leading a new initiative – the Carbon and Water Bank – to improve the status and quality of water and soil with a positive impact on the climate, the water cycle and biodiversity. The concept involves a climate fund for soil with new sources of finance, a soil information and monitoring system, and a carbon and water bank certification scheme. As the scheme develops, Slovakia should ensure the necessary practices and safeguards are in place to promote both cost effectiveness and environmental integrity.

Finally, it will be important for Slovakia to monitor and evaluate how synergies across mitigation, adaptation and biodiversity are being harnessed in practice; better understand how species and ecosystem services are responding to climate change; and inform adaptive management.

Recommendations on biodiversity and forests in the context of climate change

Strategic and institutional framework for biodiversity

- Adopt a National Biodiversity Strategy and Action Plan (NBSAP) with a long-term vision, mission and specific and measurable targets aligned with the Kunming-Montreal Global Biodiversity Framework and the EU Biodiversity Strategy for 2030. Develop a national plan for restoring ecosystems that identifies priority sites and cost-effective restoration measures.
- Develop a national biodiversity finance plan to mobilise and promote efficient, cost-effective use of public and private resources. Enhance the capacity of local, regional and central governments to develop, fundraise for and implement nature and biodiversity projects.
- Strengthen data and information and their use in decision making: address remaining data and knowledge gaps for habitats and species of conservation importance; advance natural capital accounting; develop tools and capacity to integrate ecosystem service values into policy development and appraisal.

Protected area reform

- Strengthen and simplify the protected area system in line with international good practice. Prioritise zoning of national parks, including the expansion and consolidation of areas under strict protection. Adopt and implement management plans for protected areas (in line with EU 2030 target for effective management of protected areas).
- Enhance the capacity of national park administrations and the State Nature Conservancy to manage protected areas effectively, support participatory approaches and communicate with local stakeholders. Consider contracting professional mediators to facilitate zoning.
- Establish development plans for national parks and adapt regional development plans to promote sustainable local economies that benefit from and are consistent with the biodiversity objectives of national parks.
- Resolve land ownership in protected areas: revise the condition in the Nature Act requiring zoning to be approved before certain state lands are transferred to the MoE; accelerate efforts to purchase, lease or exchange private land in protected areas.
- Increase the volume and predictability of state funding for national parks and increase national parks' own revenues through appropriately priced entrance fees, payments for ecosystem services, tourism taxes and other tailored measures.

Mainstreaming biodiversity into sectoral policies and practices

- Adapt forestry practices to better support nature and adapt to climate change: require and guide integration of biodiversity, ecosystem services and climate change considerations into forest management plans and their appraisal; scale up close-to-nature forestry and measures to protect young trees from ungulates; strengthen economic incentives for land and forest owners/managers and promote forest certification.
- Increase agricultural landscape diversity, including by reducing field sizes, and adopt biodiversity-friendly farming practices: promote and support the uptake of the Eco-Scheme and AECMs; leverage the CAP flexibility mechanism to increase funding of biodiversity measures; ensure conditionality is respected; leverage other policy options beyond CAP payments.

- Align the energy transition with biodiversity, water and climate objectives: assess and address cumulative biodiversity impacts in renewable energy planning; identify areas of low ecological risk for accelerated deployment of solar and wind energy; develop/adapt renewable energy sustainability criteria.
- Adopt an objective of no net loss or net gain for infrastructure projects. Examine the potential for a national biodiversity offsetting scheme to support this objective, ensuring strict adherence to the mitigation hierarchy.

Biodiversity and climate linkages

- Scale up efforts to increase net removals from LULUCF across all land-use categories in line with Slovakia's 2030 EU commitment. Harness synergies and manage potential trade-offs across biodiversity, climate mitigation and adaptation, and between short- and long-term mitigation action.
- Promote integrated landscape planning to improve water retention, carbon stocks and species' habitat through biological corridors, vegetation belts and other green/blue infrastructure. Review, update and implement the Landscape Ecological Planning and Territorial System of Ecological Stability (so-called ÚSES) methodologies, including in the application of the CAP Strategic Plan.
- Monitor and enhance knowledge of climate change impacts on biodiversity and ecosystem services to better incorporate climate considerations and facilitate adaptive management, especially in protected areas, agriculture and forestry.

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Notes

¹ Considering the 2022 downward revision of the Recovery and Resilience Facility, REPowerEU grants and Brexit Adjustment Reserve.

² According to Act No. 250/2012 Coll. on Regulation in Network Industries, a household is energy poor when its average monthly expenditure on the consumption of electricity, gas, heating and hot water accounts for a significant share of its average monthly income.

³ Under the amended EU ETS Directive (2023/959), member states will have to use all auction revenues that are not attributed to the Union budget for climate-related purposes, with the exception of revenues used for the compensation of indirect carbon costs.

⁴ Revenue from energy taxes includes a surcharge on electricity to finance feed-in tariffs for renewables and co-generation and subsidies for electricity generation from domestic coal. The decrease in 2022 reflects the fall in revenue from the surcharge, as high market prices have led to a reduction in support for electricity and CHP producers.

⁵ As Slovakia has no carbon tax, effective carbon rates (ECR) consist of permit prices from the EU ETS, and fuel excise taxes.

⁶ Households are exempted if they are the final consumers and are directly supplied with the commodity they use for their own consumption (i.e. no exemption if they live in multi-flat buildings).

⁷ Secondary succession refers to growth or change in an ecological community following a disturbance that does not remove all existing vegetation from a site. This can have a negative impact on biodiversity, for example, where woody vegetation replaces important grassland habitat following abandonment of farmland. Affected ecosystems in Slovakia are grasslands, peatlands and moors.

⁸ Based on data collected from some national parks in Austria, Germany, Poland, Czechia and Romania.

⁹ Water protection, management and use; Sustainable agriculture; Adapted forestry; Natural environment and biodiversity; Health and healthy population; Residential environment; Technical, economic and social measures.

Annex 1. Actions taken to implement selected recommendations from the 2011 OECD Environmental Performance Review of the Slovak Republic

Recommendations	Actions taken
Chapter 1. Towards sustainable development	
<p>Consolidate the inter-institutional co-operation platform and extend its activities to the strategic design and assessment of climate change, energy and transport policies; strengthen the system to monitor implementation of GHG emission reduction policy measures, extending it to their related financial and economic costs, with a view to assessing and improving overall cost-effectiveness.</p>	<p>Several inter-ministerial councils have been established to ensure strategic co-ordination. These include the councils for the 2030 Agenda; for the European Green Deal (in charge of climate policy); for the Recovery and Resilience Plan (RRP); and for the Cohesion Policy 2021-27. By mid-2023, the government was considering merging some of these councils to improve co-ordination on sustainable development.</p> <p>A dedicated analytical group prepared a broad study on the impacts of the EU “Fit for 55 package” legislation on Slovakia’s economy and environment. Another collaborated on the preparation of the public sector energy savings plan in the context of the energy crisis. However, these initiatives are ad hoc.</p> <p>The 2023 draft Climate Law envisaged creating a Council for Climate Accountability.</p>
<p>Review the efficiency and effectiveness of environmentally related taxes in achieving their environmental objectives, and their coherence with other economic instruments.</p>	<p>Envirostrategy 2030 (2019) has pledged for a fiscally neutral green tax reform. A 2020 joint OECD-Ministry of Environment (MoE) paper reviews the use of economic instruments for the environment in Slovakia and proposes reform options by environmental domain. Slovakia has reformed the landfill tax (2018 and 2022 for industrial and construction waste), introduced a charge for the use of light plastic bags (2018) and a deposit-refund system for single-use PET bottles and cans (2022). It has also increased air pollution tax for certain pollutants. However, the environmental impacts of these changes remain to be assessed. The tax burden has not shifted from labour to environmentally harmful activities.</p>
<p>Consider restructuring taxes on energy products used in sectors not covered by the EU ETS by including a CO₂ tax component; consider raising the tax rate on diesel with a view to making the tax treatment of automotive fuels consistent with climate change objectives.</p>	<p>Energy taxes do not reflect climate damage of fuel use. They are low compared to EU countries. Fuel taxes decreased in real terms. The tax on diesel remains well below that on petrol.</p>
<p>Continue to gradually phase out coal subsidies and tax concessions for energy use by households and in energy-intensive industries, with a view to encouraging changes in energy-consumption patterns and contributing to fiscal consolidation.</p>	<p>Slovakia has mapped fossil fuel subsidies and identified those for reform. It is committed to end subsidies for electricity produced from domestic coal in 2023. Energy tax exemptions for households and energy-intensive businesses remain. Between 2022 and 2023, to mitigate the effects of the energy crisis, the government adopted measures amounting to 3.3% of GDP. They mainly consist of untargeted energy price support measures.</p>
<p>Consider extending the annual road vehicle tax to private cars and link the tax rate to environmental performance, particularly regarding carbon and other emissions that may pose risks to human health in urban areas.</p>	<p>The annual motor vehicle tax rate does not vary with emissions (although electric vehicles are exempted) and only businesses pay it.</p>
<p>Extend to cars the existing distance-based and emission-differentiated road tolls applied to heavy goods vehicles.</p>	<p>Only heavy goods vehicles pay a toll based on the distance travelled and their emissions on specific sections of motorways. Cars pay a flat rate.</p>
<p>Speed up modernisation of rail infrastructure, improve public transport services and develop alternative modes to road transport.</p>	<p>Investment in rail infrastructure has been significantly lower than investment in roads. The Ministry of Transport has published an investment plan for railway infrastructures in 2022. Sustainable transport is a priority of Slovakia’s RRP, which subsidises the modernisation of railway, tram and trolleybus lines, the construction of cycle lanes and the roll-out of electric vehicle charging stations.</p>

Periodically assess the value-added of the Environmental Fund and Recycling Fund in terms of both their economic efficiency and environmental effectiveness in meeting their objectives; consider options for adjusting the objectives and operation of the funds, including eventually phasing them out.

Improve the effectiveness of Slovakia's participation in the EU ETS and use of the Kyoto Protocol flexible mechanisms by ensuring transparency of transfers of emission allowances and revenue use, and fully implementing the Green Investment Scheme.

Strengthen capacity to attract, absorb and efficiently allocate EU funds for environmental purposes.

Build capacity for economic analysis to support environment-related policy development and implementation; strengthen co-operation between the Slovak Statistical Office, the Ministry of Environment and other relevant ministries and agencies to develop environmental accounting.

Develop a new environmental strategy as an integral part of Slovakia's strategy for economic and social development; ensure that the environmental administration is stable, professional, efficient and open, dedicated to pursuing ambitious environmental goals.

Further streamline and simplify environmental permitting and integrate inspection procedures; develop an explicit environmental enforcement policy that includes enforcement priorities and policies for applying sanctions; strengthen compliance promotion efforts targeting small and medium-sized enterprises.

Ensure that environmental impact assessment and strategic environmental assessment procedures are fully in line with EU requirements, particularly regarding public participation and access to justice.

Establish a forum in which the Ministry of Environment and NGOs meet regularly with a view to strengthening dialogue and co-operation.

Develop cost-effective measures to reduce air emissions from growing sectors (e.g. transport, residential heating), and to reduce potential health impacts in urban areas.

The Recycling Fund was abolished in 2016 with the introduction of the Extended Producer Responsibility system.

The Environmental Fund has recently improved its strategy, management and project evaluation. However, budget planning has been hampered by limits set by the Ministry of Finance on the use of proceeds from the auctioning of EU ETS allowances for environmental purposes. Only 22% of these revenues were spent on environmental action over 2015-22. A 2023 legislative update is expected to increase the share of auctioning revenue earmarked for the environment.

Since 2021, like other low-income EU member states, Slovakia has benefited from the Modernisation Fund (financed by revenues from the auctioning of EU ETS allowances), to modernise its energy system and improve energy efficiency.

In 2013, the Slovak Republic sold 7 million unused assigned amount units under article 17 of the Kyoto Protocol. The proceeds were used for the SlovSEFF III programme, which supported projects to improve energy efficiency and use renewable energy sources until 2022.

Over 2014-20, Slovakia had a low absorption rate of structural funds for environmental purposes. The country has streamlined the governance and management of EU funds for 2021-27 with a single operational programme "Programme Slovakia" implemented by a single managing authority. Slovakia has amended its legislation to simplify and accelerate public procurement procedures. The ongoing reform of public investment management aims to better plan projects and prioritise those with the highest social return. Spending efficiency and overall capacity of municipalities are limited by their small size.

The Slovak Republic has established analytical units, such as the Value for Money Department of the Ministry of Finance and the Institute for Environmental Policy, an independent unit of the MoE. However, they are not systematically involved in decision making.

Important progress has been made with the publication of the *Catalogue of Ecosystem Services of Slovakia* (2019) and *The Value of Ecosystems and their Services in Slovakia* (2021).

The Envirostrategy 2030, approved in 2019, sets out various environmental commitments for all sectors. In 2022, the MoE elaborated an implementation plan but did not make it public. Indicators were developed to monitor progress in some areas of the Envirostrategy.

Slovakia is reforming environmental impact assessment (EIA) and environmental permitting. The MoE planned to separate the permit under the Industrial Emissions Directive (IED) from the building permit, and to combine the EIA process with the IED permit. For simple constructions, the EIA and building permit would be integrated into a single process. These reforms were disrupted by the reform of the construction law, which also changed the EIA and IED permit processes. A 2023 legislative amendment has been criticised for giving insufficient consideration to the environment, for limiting public participation and for lack of inter-ministerial consultation. The entry into force of the construction law and its amendments (due by April 2024) may be postponed due to the serious reservations expressed by stakeholders.

A national strategy to combat environmental illegal activities has not yet been adopted. Since 2022, Slovakia has been reinforcing the police unit specialised in fighting environmental crime.

Examples of successful collaboration include the development of the Envirostrategy, the circular economy roadmap, the Water Policy Concept and the Common Agricultural Policy (CAP) Strategic Plan 2023-27. A "Green Tripartite" channels suggestions and comments from NGOs in environmental policy making.

Slovakia met its 2020-29 emission reduction commitments under the NEC Directive. It is on track to meet its 2030 targets, only with additional measures for ammonia emissions.

Measures planned by the 2020 National Air Pollution Control Programme (under revision) include subsidies for alternative-fuelled vehicles; vehicle inspections; support for improving the energy efficiency of buildings; and replacement of fossil fuel heating systems and old boilers with low-emission solutions. Costs are reported for a limited number of measures. The 2023 Air Pollution Law, which strengthens competences of local authorities, including to introduce low-emission zones, is expected to improve air quality management. The Integrated National Energy and

Review and adjust the ten sub-basin water management plans so as to increase synergies between policies (including those for agriculture, water supply and sanitation, landscape and land-use planning, flood prevention, nature conservation and climate change adaptation); complete institutional arrangements for river basin management with a view to assuring adequate consultation between stakeholders and effective implementation at the sub-basin level.

Conduct a comprehensive evaluation of the current gap in water supply and sanitation infrastructure, the measures required to meet objectives and their cost; on this basis, devise a realistic strategy for achieving EU objectives for the water sector, particularly for wastewater treatment, including clear priorities, strategic financial planning for achieving objectives and proposals for further institutional reform of the water management sector; identify measures to increase connections to the water and wastewater networks.

Strengthen measures to reduce flood risks and their impacts, emphasising preventive landscape and land-use planning and low cost (ecosystem) options and technologies.

Review economic instruments applied to waste management with a view to increasing the incentive for waste minimisation, recovery and diversion from landfill.

Implement the state programme on contaminated sites, applying the polluter pays principle to site clean-up when appropriate; prioritise sites with the greatest risk to human health and the environment, and assure long-term funding for orphan site remediation.

Climate Plan for 2021 to 2030 (under revision), the long-term building renovation strategy and the RRP have important co-benefits on air quality.

River Basin Management Plans (RBMPs) have been developed in line with the EU Water Framework Directive. The third RBMPs (2022-27) include programmes of measures to address key pressures: organic pollution, pollution by nutrients and priority substances, and hydromorphological alterations. Drought and water scarcity as a consequence of climate change are also addressed. The MoE prepared RBMPs in co-operation with all stakeholders and draft RBMPs were subject to a strategic impact assessment.

In 2022, Slovakia adopted the Water Policy Concept until 2030 with a view to 2050 to integrate water planning instruments and ensure synergies with sectoral policies. The Concept was drawn up in a participatory and inclusive manner.

Slovakia has drawn up development plans for public water supply and sewerage for 2021-27. Investment needs for implementing the EU Urban Waste Water Treatment Directive and improving public water supply have been estimated at EUR 1.6 billion and EUR 660 million, respectively, by 2027. The plans rely heavily on EU funds and identify investment gaps of EUR 750 million for wastewater treatment and EUR 370 million for water supply. Tariffs for water services are too low to recover the full costs of service provision and contribute to infrastructure financing needs, especially for small municipalities and regulated entities. The Water Policy Concept plans a comprehensive reform of water pricing instruments by 2030.

Flood risk management plans in the sub-basins of the Slovak Republic were developed in 2015 based on the 2011 preliminary flood risk assessment and subsequent flood hazard and risk maps. Updated flood risk management plans were under public consultation in November 2023.

Although separate collection has improved, municipal waste generation has grown faster than GDP in the last decade and 41% of this waste still ends up in landfills. Slovakia has reformed the landfill tax (2018 and 2022 for industrial and construction waste), introduced a charge for the use of light plastic bags (2018) and a deposit-refund system for single-use PET bottles and cans (2022). The 2018 reform required all municipalities to pay the landfill tax even if a landfill is operated on their territory (previously an exemption). However, municipalities in this case receive compensation from landfill tax revenue. This weakens the incentive to divert waste from landfill and reduces potential support for sorting and recycling municipal waste. In addition, the reform does not provide for the tax rates to be adjusted for municipal waste after 2021 (2024 for industrial and construction waste).

The joint OECD-EC circular economy roadmap for the Slovak Republic (2022), recommended the country strengthen the use of economic instruments, including by further raising the landfill tax for municipal waste and reforming the distribution of its proceeds; improve extended producer responsibility schemes and expand pay-as-you-throw systems.

Progress of the state programme on contaminated sites has been slow.

Chapter 2. Biodiversity and forests in the context of climate change

Develop a comprehensive strategy for protected areas in line with the Natura 2000 objective, involving all relevant stakeholders and taking account of the benefits and costs of different options; further develop the monitoring and information system for nature and biodiversity protection.

A specific/separate strategy for protected areas in line with the Natura 2000 areas objective does not exist. However, most of the information is included in the Priority Action Framework for Natura 2000; National Biodiversity Strategy and Action Plan, which is based on the Convention on Biological Diversity and Envirostrategy 2030. The MoE prepared and submitted the National Programme on Wetland Protection (updated in six-year period) and its action plans (developed for three-year period) to the government.

Legal changes over 2015-21 broadened stakeholders' involvement in protected area governance, including through the national parks councils.

Since 2016, the State Nature Conservancy has been developing a common monitoring and information system for nature and biodiversity protection, focusing on habitats/species of EU importance. Gradually, a broader set of data is being added. The database will have to be extended further to cover other species and habitats, in co-ordination with other sectors related to biodiversity protection.

Expand the use of existing economic instruments for biodiversity protection, and develop new instruments, particularly payments for ecosystem services.

Use of economic instruments in nature protection remains underdeveloped. Entry fees are now charged in the Slovak Paradise National Park in the most popular locations. The idea to extend this practice to other national parks has been discussed but not implemented.

A study of the Institute for Environmental Policy recommended extending entry fees to other national parks, levying a tax on accommodation and expanding payments for ecosystem services.

Payments for ecosystem services are yet to be scaled up. However, in 2017, Slovakia introduced a new subsidy scheme – “forestry support for non-productive forest functions” – to support sustainable silviculture measures and close-to-nature forest management. Agri-environmental payments for biodiversity are also integrated into the CAP.

The Ministry of Agriculture (MoA) introduced a “Soil – carbon and water bank of the country” concept in 2022. The aim is to value and finance soil and landscape ecosystem services, taking Fit for 55 carbon neutrality and climate change adaptation targets into account.

Better integrate landscape protection into land-use planning; explore ways in which the tourism sector could provide payments for the services provided by landscape management; develop a valuation methodology to provide a basis for estimating payments to landowners and farmers for the ecological services they provide.

Slovakia has continued efforts to promote landscape planning and better integrate it with spatial planning. This includes developing 50 regional and local systems of ecological stability (USES) projects under the Operational Programme Quality of Environment. The RRP includes reform and investment plans for landscape planning. A draft law on landscape planning has been prepared but not adopted.

Slovakia has assessed ecosystems and ecosystem service values at the national level and at three national parks. Additionally, Slovakian experts led the development of the Carpathian Ecosystem Services Toolkit as part of the Interreg Central Europe programme.

Promote voluntary farm management plans in which environmental objectives going beyond national requirements would be eligible for additional support; promote fertiliser and manure management plans at the farm level in nitrate-vulnerable zones.

Voluntary farm management plans with extra support are not in place.

Since 2018, manure management plans have been mandatory in nitrate-vulnerable areas.

Consider how environmental outcomes could be better targeted in payments under the harmonised rural development programme, including Natura 2000 payments, other agri-environmental payments and payments to maintain farming in less favoured areas.

About 40% of the Rural Development Programme 2014-22 budget was allocated to green initiatives. Of the total EUR 1.2 billion, EUR 152 million went towards agri-environmental payments, EUR 163 million towards organic farming, EUR 8 million for Natura 2000 payments and EUR 8 million for forestry, environmental and climate services. The largest share of this package, EUR 628 million in total, supported areas with significant constraints. Uptake of agri-environmental schemes was mixed: payments targeting species protection were undersubscribed due in part to low payment rates, while payments targeting grassland habitats performed well. The CAP Strategic Plan 2023-27 includes a Whole-Farm Eco-Scheme that aims to reduce field size and increase landscape elements, as well as agri-environmental payments targeting key species and habitats.

Strengthen incentives for more environmentally sound agricultural practices by accelerating the identification of landowners and the development of the land market.

The government approved a 30-year plan of the MoA to finish the land consolidation process in 2019. This process has faced delays.

Further strengthen inspection and enforcement of trade-related environmental conventions, remove legal obstacles to imposing penalties for infringement of CITES on Slovak territory, and continue programmes for training judges and prosecutors in environmental matters.

Customs authorities are responsible for enforcing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) at the border (infringements detected by customs authorities doubled between 2012 and 2016). Inside the country, the Slovak Environmental Inspectorate (SEI) and district offices are in charge. All have the power to impose fines, to safeguard illegally kept specimens and subsequently seize them or forfeit for the benefit of the state. Crime offences in the CITES area are covered in § 305 of the Slovak Penal code and are dealt with by the Department of Hazardous Materials Detection and Environmental Crime of the police.

The National Action Plan for 2014-19 aimed to make the fight against illegal trade with endangered species more effective. An inter-ministerial body was established, combining the police, the MoE, customs authorities, the SEI, prosecution, and veterinary and tax authorities. It sets the half-year priorities to which the checks are targeted based on trends in illegal trade.

Regular training of control and law enforcement authorities also contribute to the more effective control of CITES legislation.

Source: OECD secretariat based on country submission and findings of the 2024 EPR.

Chapter 1. Towards sustainable development

This chapter provides a brief overview of key environmental trends in the Slovak Republic and progress towards the Sustainable Development Goals and environmental targets. It assesses the environmental effectiveness and economic efficiency of the environmental policy mix, including regulatory, fiscal and economic instruments and investment in environment-related infrastructure. It examines the interaction between the environment and other policy areas with a view to highlighting the opportunities and barriers to enhance policy coherence for sustainable development.

1.1. Introduction

The Slovak Republic is a land-locked Central European country where population and economic activity are heavily concentrated in the Bratislava and Western Slovakia regions. Regional economic disparities remain high, with Eastern Slovakia lagging the rest of the country. The economy is small, open and strongly integrated into the EU market. Heavily dependent on industrial exports (particularly cars), it is highly exposed to external shocks.

After a deep contraction (-3.3%) during the COVID-19 crisis, the economy rebounded in 2021 (+4.8%) and has grown moderately since (OECD, 2023a). Despite heavy dependence on Russian energy imports, Slovakia's gross domestic product (GDP) grew by 1.8% in 2022 thanks to government measures to reduce the impact of rising energy prices and robust private consumption, alongside a reduction in household savings (NBS, 2023). GDP is projected to grow by 1.1% in 2023 and 1.8% in 2024. In 2023, growth will be mainly driven by investment supported by EU funds. Lower inflation, stronger private consumption and improved export performance should support GDP growth in 2024, with high uncertainty related to the absorption of EU funds and energy prices.

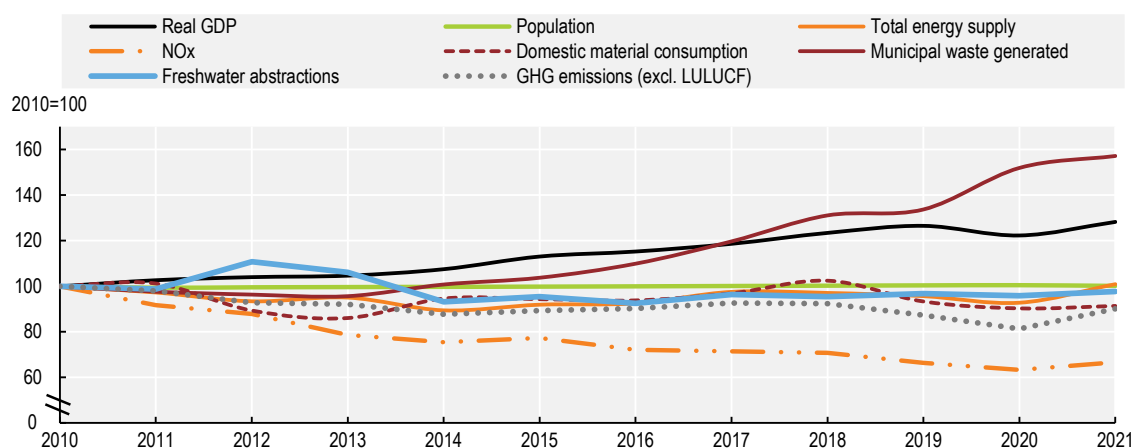
Slovakia's geographical position, with the Carpathian Mountains and Pannonian lowland areas, allows for a rich diversity of flora and fauna and diversified landscape. Renewable natural resources are abundant. Forests and agricultural land each cover about 40% of the territory. The southwestern part of the country is one of the biggest sources of drinking water in Central Europe (OECD, 2023b). Except for magnesite and construction materials, domestic geological reserves are limited. The country depends largely on imports for fossil fuels and metals, as well as for most raw materials.

1.2. Addressing key environmental challenges

1.2.1. Slovakia has made some progress on decoupling

Between 2010 and 2019, Slovakia reduced domestic material consumption, emissions of greenhouse gases (GHGs) and major air pollutants and, to a lesser extent, energy supply and freshwater abstractions (Figure 1.1). By contrast, despite low population growth, municipal waste generation grew faster than GDP, reflecting increased consumption levels. Since 2019, decoupling has been less clear with the economic downturn due to COVID-19 and the recovery in 2021. By 2021, energy supply and gross GHG emissions were above their pre-pandemic levels.

Figure 1.1. Slovakia managed to decouple some environmental pressures from economic growth



Note: LULUCF: land use, land-use change and forestry. NOx: nitrogen oxides.

Source: IEA (2023), IEA World Energy Statistics and Balances (database); OECD (2023), OECD Environment Statistics (database); OECD (2023), OECD Economic Outlook (database).

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1.2.2. The economy is more carbon efficient, but the country is not on track net-zero emissions by 2050

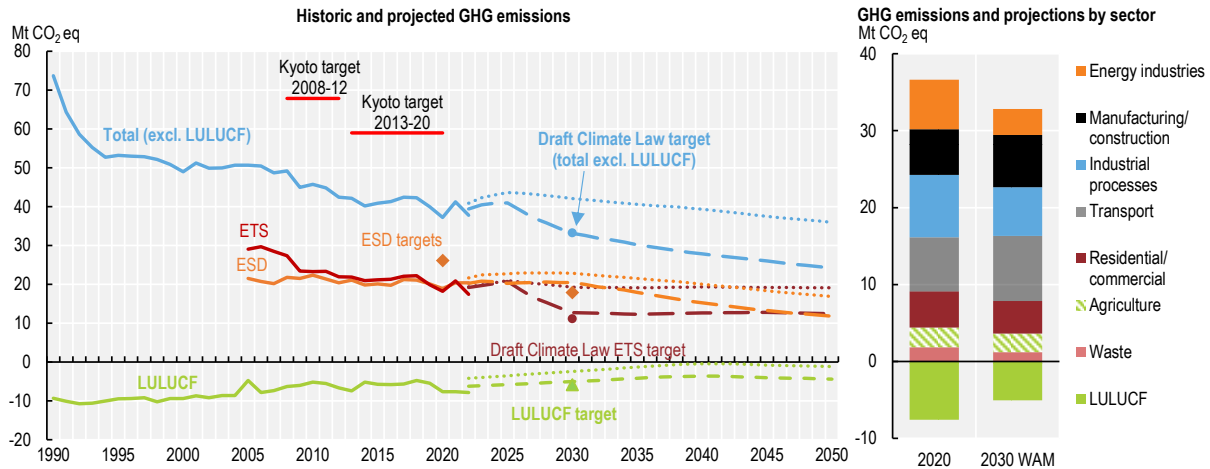
Slovakia is not on track to achieve its climate targets

The Slovak Republic follows the EU legislation on climate change. It has adopted the Integrated National Energy and Climate Plan for 2021 to 2030 (NECP) and the Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050 (MoEco, 2019) (MoE, 2020a). This aims to help Slovakia contribute to meeting the EU's 2030 energy and climate goals and achieve carbon neutrality by 2050. In 2023, the Ministry of Environment (MoE) introduced a draft law to enshrine carbon neutrality in legislation and strengthen long-term strategic planning across political cycles (Box 1.1). The law also set sectoral targets. These targets would help strengthen the accountability of the administrations responsible for these sectors, but their ambition and coherence need to be reviewed. The target for growth in emissions from transport seems incompatible with the overall national reduction target for sectors not covered by the EU Emissions Trading System (ETS). Indeed, such growth will not be offset by targeted reductions in other sectors like buildings, agriculture and waste.

Slovakia met its obligations under the first and second period of the Kyoto Protocol (Figure 1.2). Its emissions decreased at the same rate (-20%) as in the European Union over 2010-20. However, they rebounded faster in 2021, after the lifting of COVID-19 restrictions (+11% vs. +5%). The country also achieved its 2020 target for emissions not covered by the EU ETS.

However, national projections indicate the country is not on a net-zero pathway (Figure 1.2). Most of the emission reductions by 2030 are expected to come from energy industries (with increased nuclear energy production) and to a lesser extent from industrial processes. GHG emissions in non-ETS sectors, especially transport, are projected to increase over 2020-30, even with additional measures. The expected decline of net carbon removals puts at risk the achievement of the LULUCF Regulation target for Slovakia in 2030 (Chapter 2) and of the net-zero goal. As Slovakia is revising its NECP, it should clarify and strengthen the measures envisaged to achieve its goals.

Figure 1.2. Slovakia is not on a net-zero pathway



Note: LULUCF: land use, land-use change and forestry. Dotted lines refer to national projections with existing measures. Dashed lines refer to projections with additional measures. ESD 2020 target: under the EU Effort Sharing legislation; 2030 target: under the EU amended Effort Sharing Regulation (EU 2023/857). ESD targets are calculated as a percentage change from the 2005 ESR base-year emissions, which differ slightly from the revised 2005 emissions. LULUCF 2030 target: under the LULUCF Regulation (EU 2023/839). ETS: emissions under the EU Emissions Trading System. 2022 data are estimates.

Source: MoE (2023), National Inventory Report 2022; EEA (2023), Member States' greenhouse gas (GHG) emission projections, 24 October.

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Box 1.1. Enshrining carbon neutrality in Slovak law

In early 2023, the MoE introduced a draft Law on Climate Change and Low-carbon Transformation of the Slovak Republic. It sets binding targets to achieve carbon neutrality by 2050 and establishes monitoring and enforcement mechanisms. The law reflects the targets of the EU "Fit for 55 package" and adds sectoral targets (Table 1.1). Government agencies that fail to meet their obligations could face penalties. In addition, the public could take legal action if they felt the government's inability or unwillingness to act could threaten them or future generations.

The law would also establish the Council for Climate Accountability, a monitoring and oversight body made up of government representatives and experienced experts. It would report on progress, advise on additional measures and issue recommendations on climate-related investments. The law would also require local and regional climate action plans.

Table 1.1. Objectives of the draft law on climate change

	GHG emissions target	Base year
Total gross emissions, by 2030	-55%	1990
ETS-covered emissions, by 2030	-62%	2005
Non-ETS emissions, by 2030	-22.7%	2005
Total emissions, by 2050	Net zero	
Total emissions, by 2055	Negative net emissions	
Non-ETS sectoral targets by 2030, of which		
Road transport	Not exceeding +29%	2005
Buildings	-12%	Average for 2018-20
Agriculture	-10%	2005
LULUCF	+25%	Average for 2016-18
Waste	-24%	2005
Industrial processes and product use	Not exceeding +40%	2005

Note: LULUCF: land use, land-use change and forestry.

Source: MoE (2023), draft Law on Climate Change and Low-carbon Transformation of the Slovak Republic (LP/2023/29).

The energy mix is less reliant on fossil fuels

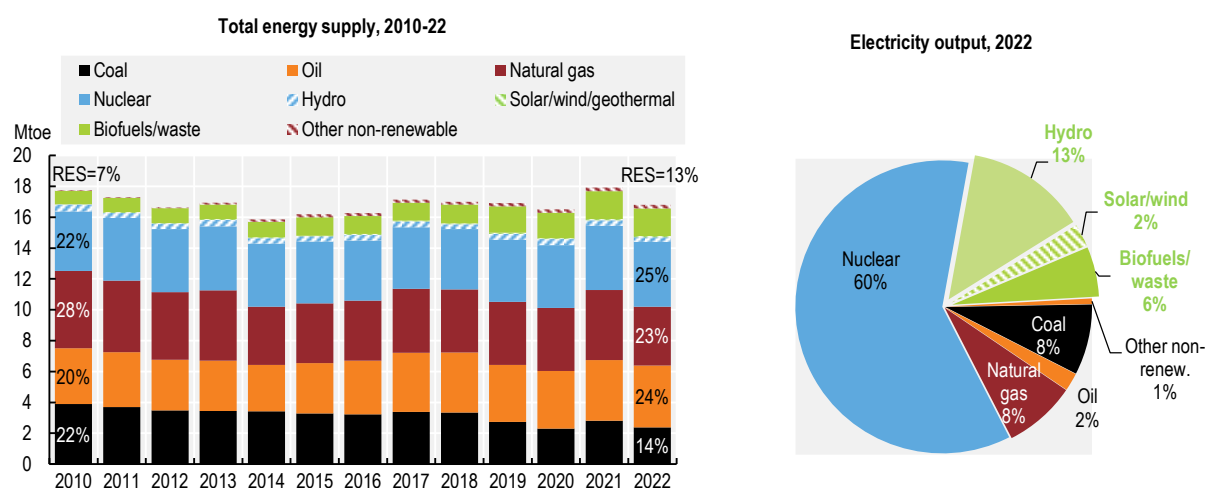
Although predominant, fossil fuels represent a smaller share of Slovakia's energy supply than the OECD average (60% vs. 78%) due to the importance of nuclear energy. Over the past decade, the energy mix has shifted progressively from coal to renewables (mainly biofuels and waste), which still account for a moderate percentage of supply (Figure 1.3). Slovakia is committed to phase out coal mining and coal-fired power generation by 2023.

With 17% of renewable energy in gross final energy consumption in 2020, Slovakia achieved its binding target of 14% set by the EU Renewable Energy Directive (Eurostat, 2023), mainly due to renewable heat development (IEA, 2018). The country was below its 2020 sub-targets for electricity (23.1% vs. 24.0%) and transport (9.3% vs. 10.0%); it met the sub-target for heating and cooling (19.4% vs. 14.6%).

When revising the NECP, Slovakia will have to increase its 2030 renewable target to match the new target of 42.5% for the whole European Union (EU 2023/2413). The draft update of the NECP proposes 23%, an increase on the previous national target of 19% (MoEco, 2023). However, the latest national projections with additional measures forecast 19%, which is below the 24% recommended to reach the previous European 2030 target of 32% (MoEco, 2023) (EC, 2020).

Several main barriers have been identified for developing renewable electricity (Valach and Tallat-Kelpšaitė, 2021). These comprise the partial moratorium on the connection of renewable electricity out of concern for grid stability; requirement for ministerial consent for large installations; unclear ownership and fragmentation of land; mandatory environmental impact assessment (EIA) for small wind projects; and obstructions to EIA (Section 1.3.3).

Figure 1.3. The energy mix has shifted progressively from coal to renewables



Note: The breakdown excludes electricity trade. 2022 data are estimates.
Source: IEA (2023), World Energy Statistics and Balances (database).

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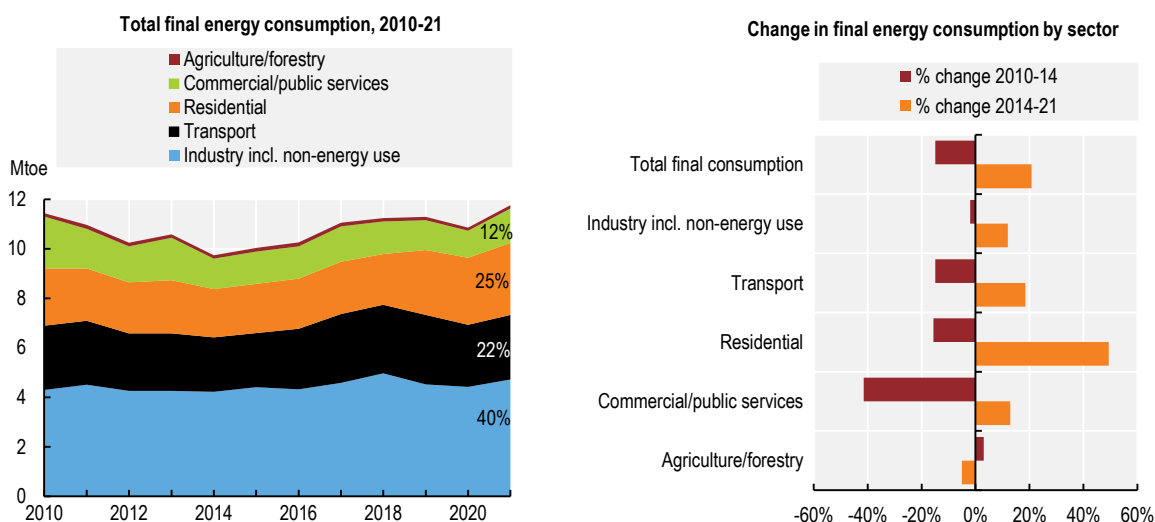
Electricity generation is highly decarbonised. Nuclear power generates more than half of electricity, a share that will increase with the commissioning of two new reactors (one was connected to the grid in 2023). Recent investments in cross-border interconnections, renewable energy and storage capacity under the Recovery and Resilience Plan (RRP) (Section 1.4.1) should help develop and integrate renewable

energies. Slovakia estimated it would need to invest EUR 5.3 billion over 2023-30 to achieve its renewable target on electricity and heat (MoEco, 2023).


Energy consumption has increased since the mid-2010s

Over 2010-22, the energy intensity of the economy declined by 26% thanks to improvements in energy efficiency in industry and buildings, as well as economic restructuring. However, the Slovak economy is over 40% more energy intensive than the OECD Europe average due to its larger industrial base. Since 2014, energy consumption has risen steadily, except during the COVID-19 crisis, reaching in 2021 a level equivalent to 2010 (Figure 1.4). Slovakia has met its 2020 target under the EU Directive on Energy Efficiency but is not on track to meet the more stringent requirements for 2030 (EC, 2023a).

Figure 1.4. Total final energy consumption increased mainly in buildings and transport sectors



Source: IEA (2023), IEA World Energy Statistics and Balances (database).

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Residential energy consumption grew by almost 50% between 2014 and 2021. Despite progress in renovating buildings, solid fuel combustion for domestic heating remains an air quality issue in some regions (Section 1.2.3). The 2020 long-term renovation strategy has set ambitious targets to decarbonise the building sector by 2050 (EC, 2022a). It identified the need to increase annual investment from EUR 900 million in 2020 to EUR 1.3 billion in 2030. Slovakia plans to use European funds to finance these investments. Energy efficiency in buildings is a priority of the RRP (Section 1.4.1).

Transport energy consumption has also risen significantly. Since 2010, the car fleet has increased by almost 60%. Newly registered cars have one of the highest average CO₂ emissions per kilometre among EU countries, reflecting large imports of second-hand cars. The diffusion of electric vehicles has been slower than anticipated. Although charging infrastructure is developing, higher purchase costs of electric vehicles is a barrier for customers. In 2022, only 4% of newly registered passenger cars were either battery electric vehicles or plug-in hybrid electric vehicles, among the lowest figures in the European Union (EAFO, 2023).

The industrial sector is the largest consumer of energy. Restructuring, modernisation and improved energy efficiency have contributed to a long-term reduction in its energy consumption. However, progress has

stalled over 2014-21 with increased energy consumption, particularly in the chemical and petrochemical industry.

Climate risks in municipalities have been identified

Since 1881, the average annual air temperature has increased by 1.7°C. While precipitation fell by 10% or more in the south, it rose by up to 3% in several northern locations. Extreme temperature and precipitation events have become more frequent, increasing the risk of droughts and floods. Temperatures are projected to exceed the 1961-1980 average by a further 2-4°C by 2050. Average rainfall is expected to remain stable, with variations depending on the season and the region (MoE, 2018). Slovakia approved an updated Strategy of Climate Change Adaptation in 2018 and an Action Plan in 2021. While ministries are supposed to cover costs of analyses, legislative changes and soft measures, investments depend on EU funding. Over 2021-27, funding will focus on water retention and nature conservation rather than grey flood protection infrastructure (OECD, 2023c).

In co-operation with the OECD, Slovakia identified municipalities most vulnerable to climate hazards. The joint study investigated risks for local communities stemming from heatwaves, droughts and extreme precipitation up to 2050. Extreme temperatures and droughts will mainly affect the southern part of Slovakia, including Bratislava. About 16% of the population live in municipalities with the highest risk level of heatwaves. While the share of population under threat from extreme precipitation is relatively low, northern regions are still heavily exposed (OECD, 2023c). The study could be used in the investment selection criteria.

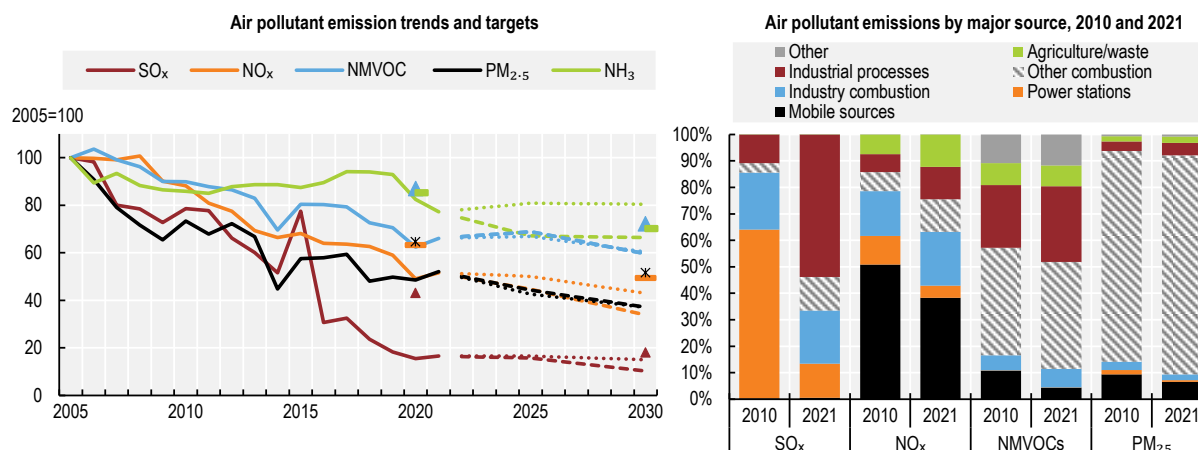
1.2.3. Despite progress, air pollution remains an issue

Slovakia has reduced major air pollutant emissions

After strong reductions in the previous decade due to industrial restructuring, fuel switching, stricter legislation and implementation of abatement technologies, the decline in emissions has slowed since the mid-2010s. Slovakia met its 2020-29 emission reduction commitments under the NEC Directive (Figure 1.5). It is on track to meet its 2030 targets, only with additional measures for ammonia emissions. The 2020 National Air Pollution Control Programme (NAPCP), to be updated in 2023, should model the effects of individual measures to identify the most cost-effective ones.

Improved manure management reduced ammonia emissions in the previous decade. However, growth in inorganic nitrogen fertiliser use has increased emissions over 2011-18. The NAPCP introduced requirements to reduce emissions from livestock and manure management (MoE, 2020b). However, the revised Air Pollution Charges Law (Box 1.2) freezes charges for ammonia.

Figure 1.5. Slovakia is on track to meet its air pollution reduction commitments



Note: Emission trends and reduction targets under the EU Directive (2016/2284/EC) on the reduction of national emissions of certain atmospheric pollutants (NEC). Dashed lines refer to a policy scenario with additional measures. The 2015 peak for SO_x emissions reflects high lignite consumption by substandard units during the partial reconstruction of a power plant.

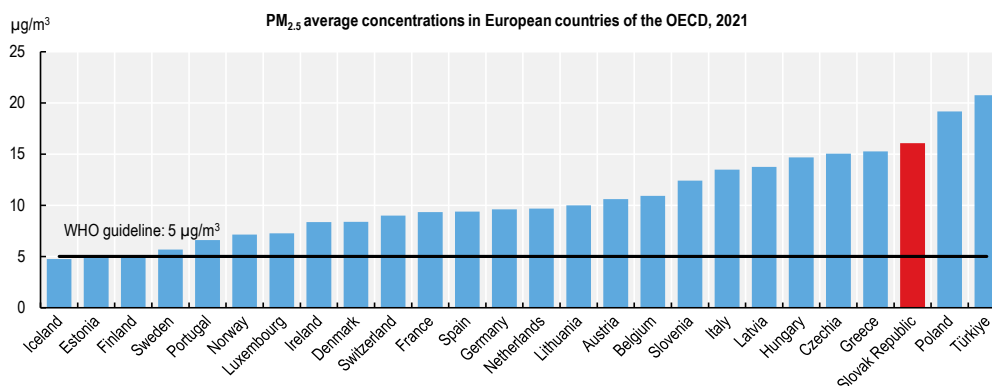
Source: MoE and SHMI (2023), Informative Inventory Report 2023.

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Air pollution remains a health concern


Exposure to air pollution remains high and associated health risks are significant. The entire population of Slovakia is exposed to concentrations of fine particulates (PM_{2.5}) exceeding the limit set by the World Health Organization. The average concentration is among the highest in OECD Europe (Figure 1.6). The welfare cost attributable to outdoor air pollution is equivalent to almost 7% of GDP, double the OECD Europe average. The country has faced several EU infringement proceedings for failing to meet limit value for PM₁₀.¹ Solid fuel combustion for domestic heating, road transport and metal production are the main sources of this pollution (SHMU, 2021). In 2022, exceedances of EU air quality standards were recorded for PM_{2.5}, PM₁₀, benzo[a]pyrene and tropospheric ozone (SHMU, 2023).

Figure 1.6. High levels of fine particulate pollution affect the population



Note: Data for the United Kingdom are not available.

Source: EEA (2023), Europe's air quality status 2023.

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Box 1.2. Slovakia has updated its air quality legislation

The Air Protection Law is expected to improve air management

The Air Protection Law approved in early 2023 (Act no.146/2023) focuses on authority, supervision and enforcement. It defines an acceptable level of pollution and states emission requirements for stationary sources. It also sets quality standards for fuels. The law strengthens competences of state and local authorities, and provides for local programmes to improve air quality. Municipalities acquire new powers to restrict or ban small installations within their administrative boundaries through a local decree. They may declare low-emission zones limiting access of the most polluting vehicles. For the first time, odour will be regulated and its sources potentially restricted. Stationary sources will only be allowed to operate with a special permit. Existing sources will be subject to a permitting procedure in the transient period. Large sources may face fines of up to EUR 1 million for violating the law.

The impact of the revised Air Pollution Charges Law is unclear

Air pollution taxes (“charges” in Slovak) are paid by medium and large pollution sources. The Air Pollution Charges Law, revised in 2023 (Act no.190/2023), aims to reflect inflation in tax rates; simplify the legislation and make it more predictable for businesses; and ease the regulatory burden borne by small businesses. The law was originally intended to reflect the social costs of air pollution in tax rates. However, these rates were negotiated downwards during the legislative process and some pollutants were excluded from its scope (Table 1.2). Except for ammonia, tax rates will double with the entry into force of the law (2024). They will gradually double again by 2030 and then be regularly adjusted for inflation. The revised law exempts operators whose charges are less than EUR 500.

Table 1.2. Development of air pollution tax rates

Air pollution tax rates in euros per tonne

	Particulate matter	Sulphur oxides	Nitrogen oxides	Carbon monoxide	Solid inorganic pollutants**	Gaseous inorganic pollutants**	Total organic carbon	Carcinogenic pollutants**	Persistent organic pollutants
Law in force in 2023	166	66	50	33	1 328/664	332/66*	130	1 328/664	1 328
Version submitted for public consultation (05/2021)	970	470	470	170	3 800	1 800/66*	1 000	7 000	7 000
Revised law (entry into force in 2024)	330	130	100	60		60*	260		

Notes:* Rate on ammonia. **The law in force in 2023 groups diverse chemical compounds.

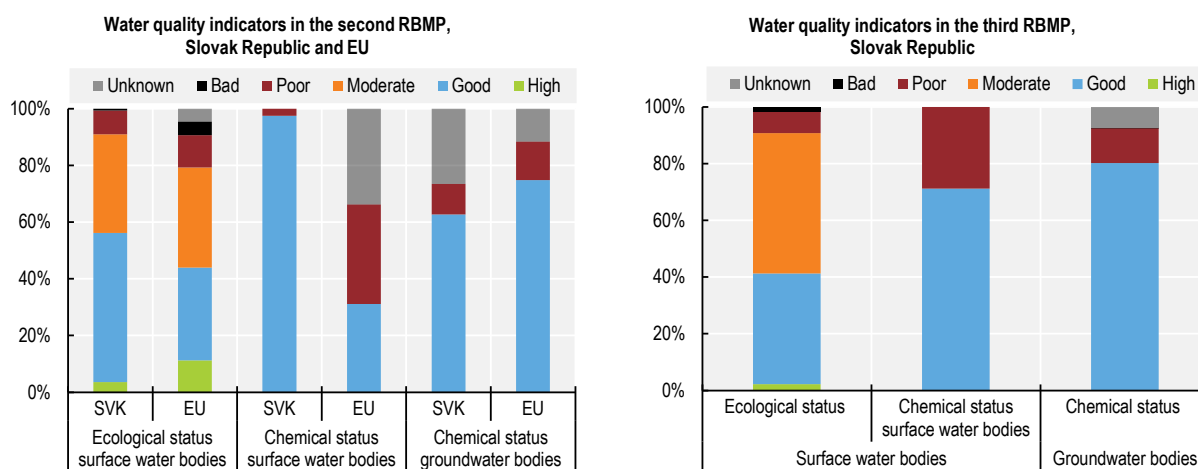
In a welcome step, the reform abolished preferential treatment for emitters with more than 30% of their annual coal consumption from domestically mined resources. The rates they pay will gradually be aligned with those of other polluters in 2025. On the other hand, businesses subject to the ETS will be exempted from tax on carbon monoxide emissions by 2025. Unlike the draft law submitted for public consultation, the impact of the revised law has not been assessed.

1.2.4. Further expanding wastewater treatment coverage is a challenge

Slovakia enjoys abundant freshwater resources and generally experiences low water stress. Nevertheless, climate change puts the southwest region, including the biggest drinking water reservoir (Žitný ostrov) at severe risk of drought (OECD, 2023c). Freshwater abstractions have remained broadly stable in the past decade. Per capita, they are among the lowest in the OECD and only 1% of renewable freshwater resources are withdrawn annually against 10% in OECD Europe.


According to the third River Basin Management Plans, 41% of surface water bodies achieved good ecological status and 71% good chemical status; 80% of groundwater bodies achieved good chemical status (Figure 1.7). The most significant pressures on these water bodies are agriculture (use of fertilisers and pesticides), hydromorphological changes, untreated sewage, point sources of pollution and climate change (MoE, 2022a).

Figure 1.7. Surface water quality must improve to achieve good status



Note: For Slovakia, surface water bodies only include rivers. The second and third River Basin Management Plans (RBMPs) cover 2009-13 and 2013-18, respectively. Periods should be compared with caution as data collection methods evolve. "Poor" corresponds to failure to achieve good status. Classification of water bodies by number. EU25 excluding Greece, Ireland and Lithuania.

Source: EEA (2023), WISE Water Framework Directive (database); MoE (2023), State of Environment Report 2021.

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Population connected to public wastewater treatment plant increased from 59% to 70% between 2010-21 (OECD, 2023b). However, this rate is one of the lowest in the OECD and is even lower in small municipalities. In 2018, 93% of urban wastewater (load generated) was treated according to requirements of the EU Urban Waste Water Treatment Directive (UWWTD), above the EU average of 82% (EEA, 2023). However, nearly 13% of wastewater load was treated through individual or other appropriate systems, the second highest rate in the European Union (EC, 2022b).

Slovakia will face challenges in complying with the more stringent requirements planned in the ongoing revision of the UWWTD: about 28% of the population live in municipalities with fewer than 2 000 inhabitants. Furthermore, the whole territory is designated as a sensitive area that needs advanced wastewater treatment. In addition, expected population decline will affect the revenues from utilities and investment planning in small service areas. The Strategy of Environmental Policy of the Slovak Republic until 2030 (Envirostrategy 2030) aims to connect 85% of the population to public wastewater treatment plants (all residents in agglomerations above 2 000 inhabitants and 50% in agglomerations below this threshold) (MoE, 2019).

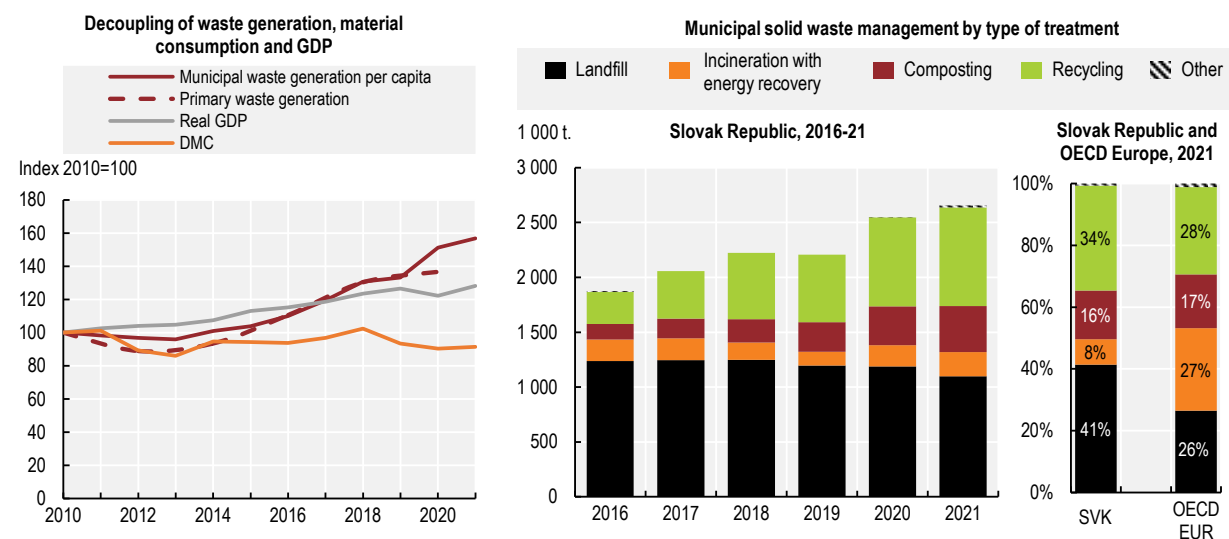
Slovakia has a large financing gap and high reliance on EU funding for water infrastructure (OECD, 2019). Responding to an OECD recommendation, it has developed the National Programme for Implementing the UWWTD to set priorities. It estimates investment needs at nearly EUR 1.6 billion by 2027 (MoE, 2021). The programme projects that around EUR 840 million will be financed by the 2021-27 Cohesion Policy funds and to a lesser extent by the Environment Fund, own resources and state budget, leaving an investment gap of EUR 750 million. Investment needs for improving public water supply have been estimated at EUR 660 million and the gap at EUR 370 million.

Slovakia should support municipalities with limited resources to build capacity to operate and maintain water infrastructure and to prepare and implement new investment projects (OECD, 2019). Tariffs for water services are too low to recover the full costs of service provision and contribute to infrastructure financing needs, especially for small municipalities and regulated entities. Consolidating municipal services would improve operational efficiency and financial sustainability. The OECD also recommended to incentivise connection to central sewer systems; further enforce the polluter- and user-pays principles in the water sector and reflect at least part of the environmental and resource costs in tariffs for water supply and sanitation services and abstraction charges. These charges are three times lower for groundwater than for surface water. The Water Policy Concept of the Slovak Republic plans a comprehensive reform of water pricing instruments by 2030 (Government of the Slovak Republic, 2022).

1.2.5. Slovakia is lagging on waste management

With almost 500 kg of municipal waste generated per inhabitant in 2021, Slovakia was slightly below the OECD Europe average of 520 kg. Although separate collection has improved in the past decade, municipal waste generation increased faster than GDP, and much of this waste still ends up in landfills (Figure 1.8).

Figure 1.8. Waste generation has increased, and the landfilling rate remains high



Note: Municipal waste: household and similar waste collected by or for municipalities, originating mainly from households and small businesses. Includes bulky waste and separate collection. DMC: domestic material consumption, i.e. sum of the domestic extraction of raw materials used by an economy and their physical trade balance (imports minus exports of raw materials and manufactured products).

Source: OECD (2023), OECD Environment Statistics (database); Eurostat (2023), Material flows and resource productivity (database).

Domestic material consumption fell between 2010 and 2021, improving material productivity of the economy (Figure 1.8). However, without additional measures, future materials consumption is projected to increase by more than 50% by 2050 compared to 2017 levels, with significant environmental impacts, including higher GHG emissions (OECD, 2022a).

The Slovak Republic has a relatively well-developed waste policy framework, including the Waste Management Plan 2021-25, the Waste Prevention Programme 2019-25 and the Food Waste Prevention Plan. It has integrated circular economy into recent key strategies (OECD, 2022a). However, it faces implementation gaps. The country has missed most of its 2020 waste objectives (Table 1.3). Moreover, data quality issues call into question its apparent progress in recycling (EC, 2023b). The country is at risk of missing two key targets: 55% for preparation for re-use and recycling of municipal waste by 2025, and landfilling no more than 10% of municipal waste by 2035.

Table 1.3. Insufficient progress towards waste targets

Selected objectives of the Waste Management Plan for 2016-20	Target 2020	Performance 2020	
Significantly divert waste from landfill	Not quantified	4% decrease in municipal waste landfilled over 2016-20	Not achieved
Municipal waste recycling	50%	45% (2021:49%)	Not achieved
Separate collection of municipal waste	60%	36% (2021:39%)	Not achieved
Biodegradable municipal waste in landfill from 1995 levels	35% reduction	n.a.	Not achieved
Recycling of overall packaging (%)	55%	71%	Achieved
Construction and demolition waste prepared for re-use, recycling and other material recovery	70%	81%	Achieved
Re-use and recycling of end-of-life vehicles	95%	96%	Achieved
Recycling efficiencies of portable batteries and accumulators	90% lead, 75% Ni-Ca, 60% other	91%, 75%, 61%	Achieved
Collection rate of waste electrical and electronic equipment	65%	62% (2021:65%)	Achieved

Source: MoE (2023) Enviroportal (database); MoE (2021), Waste Management Plan of the Slovak Republic 2021-25; MoE (2015), Waste Management of the Slovak Republic for 2016-20; Eurostat (2023), Waste Statistics (database).

The Slovak Republic has further engaged consumers in the circular economy by introducing a charge for the use of light plastic bags (2018) and a deposit-refund system for single-use PET bottles and cans (2022). However, the lack of economic incentives to sort recyclable waste and the fragmentation of municipal waste management have been hampering progress (EC, 2023b).

In 2018, the country reformed the landfill tax, increasing rates and linking them to municipal sorting levels. It required all municipalities to pay the tax even if a landfill is operated on their territory (previously an exemption) (OECD, 2022a). However, municipalities in this case receive compensation from landfill tax revenue. This weakens the incentive to divert waste from landfill and reduces potential support for sorting and recycling municipal waste. In addition, the reform does not provide for the tax rates to be adjusted for municipal waste after 2021 (2024 for industrial and construction waste²). The ban of landfilling untreated waste has been postponed repeatedly.

The OECD and the European Commission developed a circular economy roadmap for the Slovak Republic (OECD, 2022a). It recommends strengthening use of economic instruments to promote sustainable consumption and production. Actions would include further raising the landfill tax for municipal waste and reforming the distribution of its proceeds; improving extended producer responsibility schemes; extending the mandatory use of green public procurement criteria; and expanding pay-as-you-throw systems (only used by 6% of municipalities in 2018). The roadmap also recommends promoting a circular construction sector and a circular food and bio-waste value chain. For example, Slovakia could introduce quality

standard for recycled materials and minimum recycled content requirements for construction materials. It could also develop an awareness campaign on food waste prevention and a regulatory framework for bio-waste management.

1.3. Improving environmental governance and management

1.3.1. Slovakia has a vision for sustainable development, but policy integration needs to go beyond the strategic level

Slovakia integrated the Sustainable Development Goals (SDGs) into six national priorities for the implementation of the 2030 Agenda (education; knowledge-based and green economy; poverty reduction and social inclusion; sustainable settlements and countryside; rule of law, democracy and security; health). These were associated with regional development priorities in Slovakia's Vision and Development Strategy 2030, adopted by the government in 2021.

According to the 2023 Voluntary National Review, Slovakia demonstrates good performance on SDG 6 (clean water and sanitation) (Government of the Slovak Republic, 2023). Its performance on SDG 7 (affordable and clean energy) is also positive, although the ongoing energy crisis may put progress at risk. Progress towards SDG 9 (industry, innovation and infrastructure), SDG 11 (sustainable cities and communities) and SDG 17 (partnerships for the goals) is more uneven and requires increased attention and investment. The 2023 review notes that policy integration needs to go further than the strategic level and become a reality at the programme and project levels.

Several inter-ministerial councils have been established to ensure strategic co-ordination. They bring together experts and high-level representatives from line ministries, specialised government agencies, the Government's Office and stakeholders. These include the councils for the 2030 Agenda; for the European Green Deal (in charge of climate policy); for the RRP; and for the Cohesion Policy 2021-27. However, it seems that meetings of the Council for the European Green Deal have never been convened. By mid-2023, the government was considering merging the councils for the 2030 Agenda, the European Green Deal and the Cohesion Policy to improve co-ordination on sustainable development. Slovakia could also envisage creating an independent body such as the Council for Climate Accountability provided for in the draft Law on Climate Change, or mandating an existing one, to assess and report on the consistency of sectoral policies with climate objectives. The respected Slovak Council for Budget Responsibility could serve as a model.

The Envirostrategy 2030, approved in 2019, is the overarching document for the implementation of environmental policy. It sets an array of quantitative and qualitative commitments concerning all sectors (MoE, 2019). Government strategies, policies and legislation need to contribute to fulfilling its goals by 2030. In 2022, the MoE elaborated an implementation plan but did not make it public.

1.3.2. Environment-related responsibilities are fragmented

Slovakia is a unitary state composed of eight regions and 2 890 municipalities. Environment-related responsibilities are fragmented. The MoE develops and implements environmental policies through its specialised agencies (Box 1.3). It is responsible for climate protection but lacks powers over energy policy and forestry. These competences are carried out by the Ministry of Economy and Ministry of Agriculture and Rural Development, respectively. In addition, energy efficiency in the buildings sector falls under the authority of the Ministry of Transport. Annual budget appropriations for the MoE vary depending on EU funding.

Local state administration units receive guidance and support from the central authority. District offices include environmental protection departments, which implement policy at local level. However, these

departments are units of the Ministry of Interior (MoI). The MoE provides guidance and develops methodology for district offices to properly carry out their duties. Since the public administration reform in 2013, specialised departments have received less training and methodological support from line ministries (SAO, 2017).

Municipalities provide environmental services and develop and maintain environmental infrastructure. However, their tax revenues are insufficient, and a large part of their budget comes from national transfers. Slovakia is one of the most centralised OECD countries in terms of subnational expenditure and tax revenue (OECD, 2022b). The revenue-raising power, spending efficiency and overall capacity of municipalities are limited by their small size: just over 1 800 inhabitants per local government area. This suggests an opportunity for strengthening inter-municipal co-operation.

Box 1.3. Division of responsibilities within the Ministry of Environment

The MoE

As a central government authority, the MoE develops policy in the following areas:

- nature and landscape protection
- water management, flood protection, water quality and quantity protection, fishery (excluding aquaculture and maritime fishing)
- air protection, ozone layer and the Earth's climate
- ecological elements of urban planning
- EIA
- provision of a unified environmental information system, as well as monitoring
- geological research and survey
- endangered species protection and regulation
- prevention of major industrial accidents, environmental liability
- GMOs.

The Slovak Environmental Inspectorate carries out supervision and law enforcement tasks on behalf of the ministry.

Ministerial agencies

Subordinated agencies are mainly responsible for monitoring, reporting, consulting, researching and surveying activities. Individual agencies have ministerial contracts in the following areas:

- nature protection – State Nature Conservancy and respective National Park Offices
- water management – Slovak Water Management Enterprise and Water Management Construction Enterprise
- flood protection – Slovak Water Management Enterprise
- water quality – Water Research Institute and Slovak Hydrometeorological Institute
- water quantity – Slovak Hydrometeorological Institute
- air quality and climate – Slovak Hydrometeorological Institute
- geological research and monitoring – State Geological Institute of Dionýz Štúr.

1.3.3. The effect of the reform of environmental assessment and permitting is uncertain

Slovakia is reforming EIA and environmental permitting to shorten the time for granting permits, including for renewables. The MoE planned to separate the permit under the Industrial Emissions Directive (IED) from the building permit, and to combine the EIA process with the IED permit. For simple constructions, the EIA and building permit would be integrated into a single process. These reforms were disrupted by the reform of the construction law, which also changed the EIA and IED permit processes. Although speeding up the granting of building permits is necessary (OECD, 2024), a 2023 legislative amendment has been criticised for giving insufficient consideration to the environment, for limiting public participation and for lack of inter-ministerial consultation (President Zuzana Caputova, 2023) (MoE, 2023). The amendment was passed without the president's signature. The entry into force of the construction law and its amendments (due by April 2024) may be postponed due to the serious reservations expressed by stakeholders.

Slovakia has improved regulatory impact assessment (RIA) processes, but deficiencies remain. Legislation introduced through the standard procedure is subject to mandatory economic, social and environmental impact assessments. The country compares well with other OECD countries in involving business in the development of laws and regulations, although the public and non-governmental organisations are less consulted. However, RIAs focus mainly on impacts on the budget and on business (OECD, 2020a). The establishment of analytical units (Box 1.4) in key ministries is a good practice for improving the quality of assessments. However, they are not systematically involved in decision making.

An increasing number of laws have been enacted through a shortened procedure or directly by Parliament. Between 2020 and late 2022, members of Parliament initiated a quarter of the laws passed, including the 2023 reform of the construction law. While the COVID-19 pandemic and the economic and energy crisis justify extraordinary measures, this process reduces the quality of legislation and impact assessments, and limits stakeholder participation (OECD, 2020a).

Box 1.4. Analytical units support policy making

As part of public finance management reform, the Slovak Republic established analytical units to foster data-driven policy. In 2016, the Ministry of Finance established its Value for Money Department. It sought to evaluate costs and benefits of government investment projects, and to propose ways to improve efficiency. Although the department's recommendations are not binding, it enjoys a strong reputation and significant media coverage.

Line ministries have been creating their own units since 2015. In addition, a few central government agencies, such as the Supreme Audit Office or the Regulatory Office for Network Industries, have their own units. In general, state analysts carry out sector-specific spending reviews, regulatory impact assessments and on-demand economic and policy analyses to support decision making at the ministerial level. They also publish their own peer-reviewed papers to strengthen the public debate. It is envisioned that similar units will be established at the regional level and within the largest local municipalities.

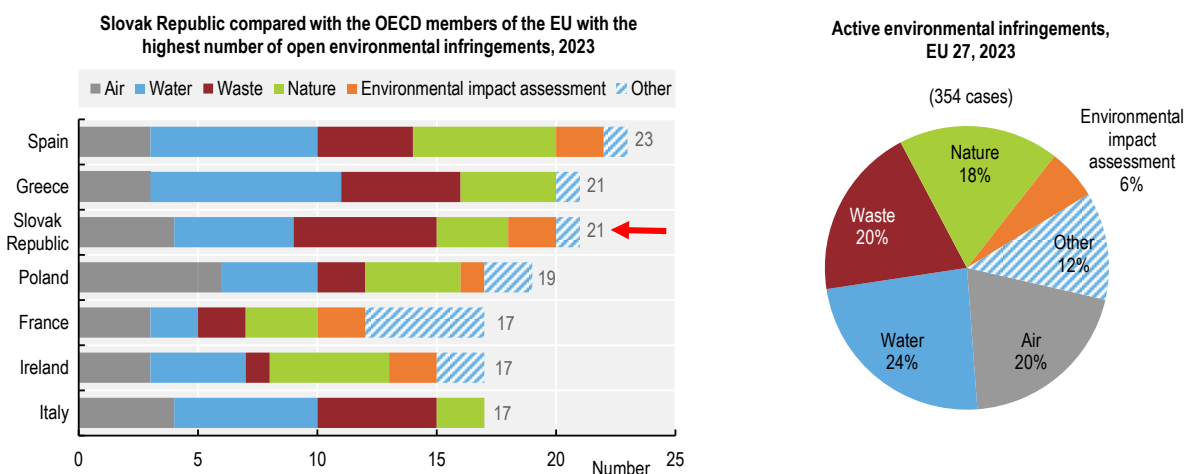
The Institute for Environmental Policy (IEP), an independent unit of the MoE, researches climate and energy policies, air pollution, waste and water management, nature conservation and biodiversity. It also delivers economic and financial analyses. The IEP spearheaded elaboration of the cost-benefit analysis methodology, Envirostrategy2030 and prioritisation of investment projects. IEP studies on low-carbon growth, marginal abatement cost curves and the impact of "Fit for 55" have supported the development of Slovakia's Low-carbon Strategy and the national position on EU-related legislation. The IEP results will be used in both the updated NECP and the NAPCP.

Source: MoF (2023), Methodology of Analytical Capacities Building in the State Administration.

1.3.4. Non-compliance with environmental legislation remains high


Slovakia has a significant number of EU directive infringements, particularly in the areas of water and waste (Figure 1.9). Recently, the country was referred to the EU Court of Justice for exceeding air quality standards, failing to close non-compliant landfills and non-conformity with the Habitats and Birds directives.

Figure 1.9. Slovakia has many infringements of EU environmental law, especially on water and waste



Note: Active infringements as of 28 August 2023.

Source: EC (2023), Environmental Infringements (database).

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The Slovak Environmental Inspectorate (SEI) and the district offices ensure compliance with national environmental legislation. Non-compliance rates are high: in 2021, almost half of all SEI inspections found instances of non-compliance (SIŽP, 2022). SEI departments elaborate their annual control plans based on available capacity, risks and legislative requirements. They also respond to complaints. The balance between planned controls and ad hoc responses varies among departments. While the Integrated Permitting and Control Department has strict multiannual plans, the Nature and Landscape department is heavily burdened with complaints. Audit bodies have highlighted the insufficient capacity of the SEI. They have recommended enhancing risk-based planning of inspections and separating SEI's permitting and inspection roles (IMPEL, 2019) (SAO, 2020). SEI is developing an information system to enable risk analysis of its inspections.

Legislative ranges for fines are often wide, but commonly imposed at the lower ends (LIFE-ENPE, 2017). The fine may not even exceed the marginal costs required by the offender to meet legislative requirements (Dráb, Engel' and Krištofóry, 2020). However, the revenue from fines imposed by the SEI doubled from EUR 1 million in 2016 to EUR 2 million in 2020, exceeding EUR 3 million in 2021.

In Slovak law, the difference between administrative infringements and criminal cases depends on the unlawfulness of the act and the damage caused (European Council, 2018) (WWF Slovakia, 2022). This includes environmental damage, property damage and the costs of restoring the environment. In general, for damage up to EUR 266, the act is considered an administrative offence. Above this amount, it is considered a criminal act. However, the damage cannot always be assessed at the beginning of the investigation, which can create uncertainty as to which authority is competent to deal with the offence. The MoE and the Mol have each developed an action plan to combat environmental illegal activities without

reaching a consensus (MoI, 2020) (MoE, 2022b). Since 2022, Slovakia has been reinforcing the police unit specialised in fighting environmental crime (EC, 2022c). The RRP will help develop its capacity to 200 police officers.

Progress of the state programme on contaminated sites in 2016-21 was slow (SAO, 2022). More than EUR 1 billion is needed to address the issue by 2027, of which 21% will be covered by EU funds. The main obstacles include the difficulty for district authorities to identify polluters or liable entities; insufficient state budget allocations; lack of legislative deadlines to decide which ministry will ensure remediation; and the length of public procurement processes. Remediation through real estate development has only partially materialised (e.g. in Bratislava's new city centre), as it requires significant private investments. A special fund was set up to finance the closure of landfill sites. Each operator is required to transfer funds regularly to a dedicated account administered by the MoE. In practice, however, the government must provide funds for the closure of landfill sites, particularly when an EU infringement is imminent.

The Slovak Environment Agency encourages sustainable business practices by advising companies seeking to adopt environmental management systems. The number of companies certified under ISO 14001 and Eco-Management and Audit Scheme has increased significantly in the past decade (MoE/SEA, 2023). The Ministry of Economy promotes energy efficiency improvements through voluntary agreements with energy-intensive industries. These agreements have been reported as a key measure to improve energy efficiency in industry over 2014-20 (MoEco, 2019). In 2018, 12 industrial corporations, including the largest steel mill, agreed to reduce energy consumption by 20% by 2030. The impact of these agreements remains difficult to assess, as they are accompanied by significant financial support.

1.4. Promoting investment and economic instruments for green growth

1.4.1. Climate is a priority of the recovery plan, but price support limits incentives to save energy

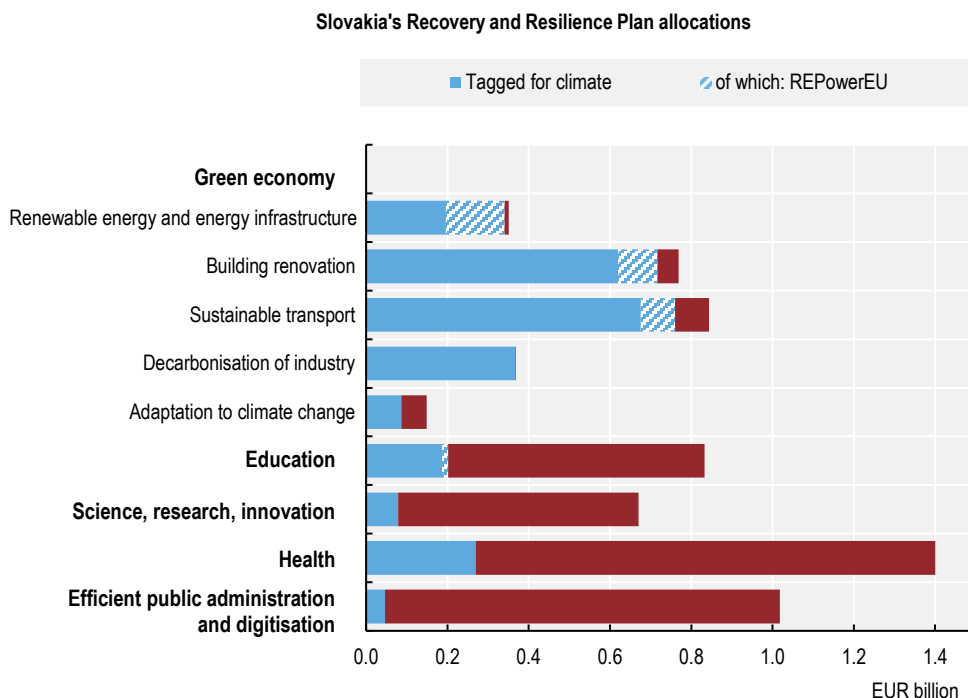
The Recovery and Resilience Plan promotes the green transition

Slovakia responded to the COVID-19 crisis with measures to protect employment and household incomes (EC, 2022d). Overall, the support amounted to 2.3% of GDP in 2020 and 3.4% in 2021 (MoF, 2023a). It planned to decrease support to 0.8% of GDP in 2022 and 0.1% in 2023. In 2021, the country submitted its RRP to boost its economy with Next Generation EU funds. In 2023, it revised the RRP to diversify energy sources and reduce the dependence on Russian fossil fuels, accelerate deployment of renewables and save energy, in line with the REPowerEU plan (Figure 1.10). Slovakia's RRP consists of reforms and investments supported by EUR 6.4 billion in grants³ (about 6.4% of 2021 GDP). It could increase GDP by between 1.3% and 2.1% by 2026.

The country dedicated 45% of its RRP budget to climate objectives (Figure 1.10), well above the EU requirement (37%) and average of 40%. Energy efficiency and sustainable transport are key priorities. This is positive as investment in rail infrastructure has been significantly lower than investment in roads (0.2% of GDP vs. 1.1% in 2021). The RRP aims to renovate at least 30 000 family houses, prioritising vulnerable households, improve energy efficiency and deploy innovative technologies in industry. It also subsidises the modernisation of railway, tram and trolleybus lines, the construction of cycle lanes and the roll-out of electric vehicle charging stations. Climate change adaptation measures will support nature protection, water management and landscape planning.

Slovakia has been among the EU countries with the fastest progress in implementation of the RRP. However, it should ensure sufficient administrative capacity and effective involvement of local and regional authorities for successful implementation of its RRP (EC, 2023a).

Figure 1.10. The green part of the Recovery and Resilience Plan focuses on energy efficiency and sustainable transport



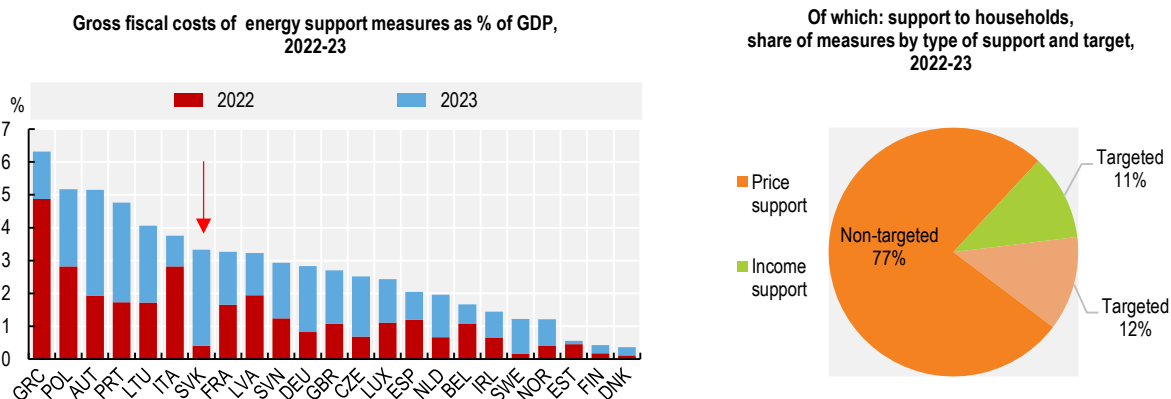
Source: EC (2023 and 2021), Analysis of the recovery and resilience plan of Slovakia.

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Measures taken to respond to rising prices limit incentives to save energy

Between 2022 and 2023, the government adopted measures amounting to 3.3% of GDP to mitigate the effects of the energy crisis, a level above the EU average (Figure 1.11). In 2022, these measures included one-off payments for pensioners, families with children and low-income households. In 2023, larger amounts have been allocated to cap electricity and gas prices for businesses, and electricity, gas and heating supply prices for households. Overall, Slovakia has focused on untargeted energy price support measures (Figure 1.11). These measures are partly financed by taxes on windfall profits of energy suppliers and unspent EU cohesion funds for 2014-20. However, they remain costly to the budget and limit the incentive to save energy.

Figure 1.11. Response to the energy crisis has focused on untargeted price support measures



Note: Not accounting for the effect of possible accompanying energy-related revenue-increasing measures, such as windfall profit taxes on energy companies.

Source: OECD (2023), OECD Energy Support Measures Tracker.

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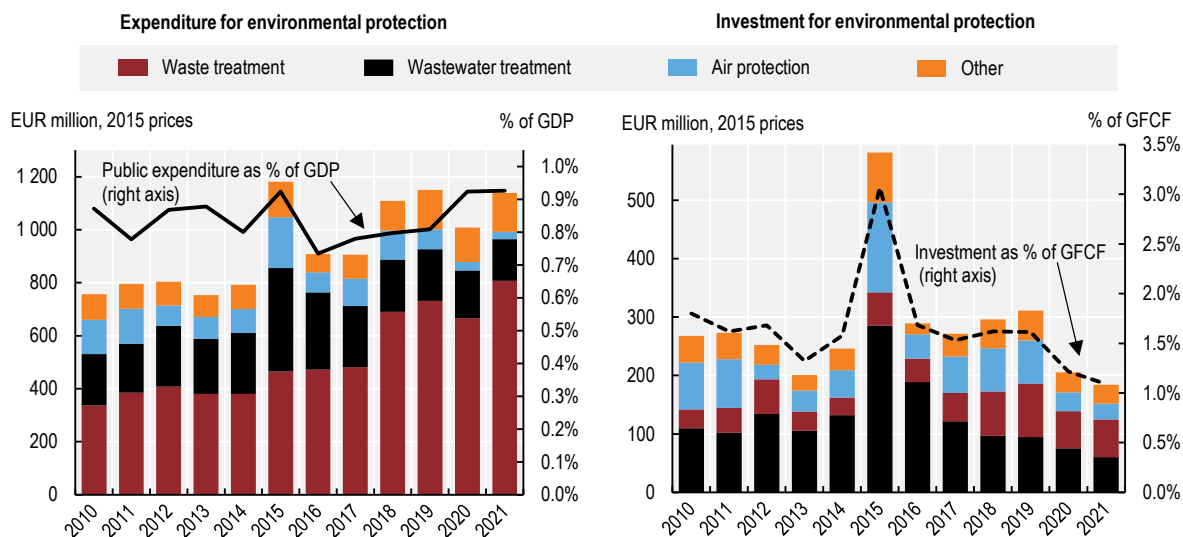
Targeting energy support requires identifying those most in need. Despite facing lower energy prices, Slovakian households spend a higher share of their income on energy than the European average, due to low incomes and a cold climate (EC, 2023c). This suggests they are more at risk of energy poverty. However, Slovakia has not yet assessed the population affected. Until recently, it has only considered the income aspect of energy poverty. Although some strategic documents mention energy poverty, they do not define the criteria for identifying the energy-poor population (MoEco, 2023). In 2023, the Regulatory Office for Network Industries set up an inter-ministerial group to agree on an operational definition⁴ and propose measures to combat energy poverty (URSO, 2023).

1.4.2. Effective use of EU funds is key for green investment

Environmental investments are mainly financed by EU funds

Public expenditure on environmental protection has hovered around 0.9% of GDP in the last decade (Figure 1.12), slightly above the EU average. Total spending by municipalities and businesses rose in real terms reflecting growth in current expenditure on waste management. By contrast, investment declined due to lower investment in wastewater treatment. Environmental investment is set to grow in 2023 with implementation of the RRP and the new round of EU structural funds. Around 70% of spending in environmental protection (mainly capital expenditure) is financed by EU funds, well ahead the state budget (18%) and the Environmental Fund (10%) (MoE/SEA, 2023).

Figure 1.12. Expenditure on waste has risen, while investment in wastewater treatment has fallen



Note: Expenditure and investment by municipalities and corporations with 2 000 or more employees. The increase in 2015 is due to the end of the 2007-13 Cohesion Policy programming period. Left panel: General government expenditure according to COFOG classification as a percentage of GDP.

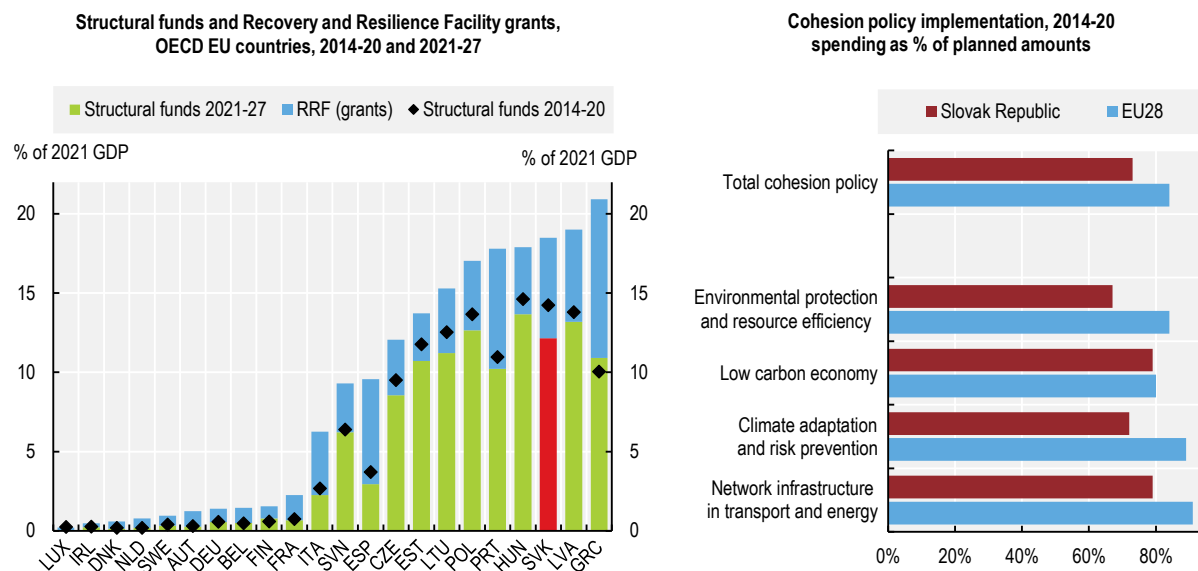
Source: OECD (2023), OECD National Accounts Statistics (database); NSO (2023), Environmental expenditures (database).

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Using EU funds remains a challenge

Slovakia is among the largest beneficiaries of EU funds per unit of GDP (Figure 1.13), but using these funds remains a challenge. Overall, the country had a lower absorption rate of structural funds than the EU average for 2014-20. Its performance was particularly poor for funds allocated to environmental protection and resource efficiency, climate adaptation and risk prevention, and network infrastructure in transport and energy.

Figure 1.13. Slovakia receives large amounts of EU funds, but their absorption is low



Note: In left panel: data refer to total allocations (excluding national co-financing) in current prices as a percentage of 2021 GDP. Structural funds: European Regional Development Fund, Cohesion Fund, European Social Fund, 2021-27: including Just Transition Fund; 2014-20: including Youth Employment Initiative. Recovery and Resilience Facility (RRF) grants: including REPowerEU grants.

Source: EC (2023), Cohesion Open Data Platform period covered up to 30/06/2023; EC (2023), Consolidated Regulation (EU) 2021/241 establishing the Recovery and Resilience Facility, 28 February; EC (2022), RRF: Update of the maximum financial contribution, June.

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The Operational Programme Quality of Environment was the main programme focusing on the environment in 2014-20. Several factors explain the low absorption of funds allocated to environmental infrastructure development and climate change adaptation. These comprise lack of flexibility in reallocation; the large number of small, demand-oriented projects affected by the COVID-19 pandemic and rising construction prices; implementation difficulties within the MoE; and lengthy public procurement procedures (MIRDI, 2023).

The low absorption of EU funds earmarked for marginalised Roma communities is also of concern (EC, 2023a). Slovakia has one of the largest Roma populations in the European Union. Around 200 000 people live in excluded areas, with no access to public drinking water supply and essential services. The country allocated more than EUR 900 million in Cohesion Policy funds for improving their living conditions over 2021-27.

Slovakia has streamlined the governance and management of EU funds. For 2021-27, a single operational programme “Programme Slovakia” is implemented by a single managing authority (the Ministry of Investments, Regional Development and Informatization), with line ministries and other agencies acting as intermediaries. The country has amended its legislation to simplify and accelerate public procurement procedures. Strengthening capacities, particularly at local and regional level, could bolster implementation of reforms and investment (EC, 2021).

The ongoing investment management reform aims to clarify the priorities of ministries’ investment plans and to improve their assessment to prioritise those with the highest social return (Haluš et al., 2023). In 2020, an investment authority was established within the Ministry of Finance to streamline project preparation and improve the quality of investments. A general cost-benefit methodology and sectoral methodologies were adopted. Since 2021, all ministries must publish investment plans based on a standardised methodology. In addition, only investment projects with a positive social return that conform

to the prioritised investment plan are included in the budget. Prioritising well-prepared projects with higher benefit-cost ratios should help implement investment spending and improve spending efficiency (OECD, 2024).

Management of the Environmental Fund has improved, but its resources are underused

The Environmental Fund has recently improved its strategy and management. Funding of water infrastructure, a large part of its expenditure, focuses on late-stage projects to facilitate their completion. A long-term support strategy for water infrastructure over 2020-30 has been set. The assessment of projects has improved and is increasingly based on measurable criteria. Since 2020, project evaluation criteria have included cost benchmarks elaborated with the IEP.

However, the Fund continues to lack a multiannual support strategy for areas other than water. Ministry of Finance limits on the use of proceeds from the auctioning of EU ETS allowances for environmental purposes have hampered budget planning (SAO, 2021). On average, this share reached only 22% between 2015 and 2022 (EC, 2023d), well below the 50% required by the ETS Directive⁵ and the 30% set by the Slovak Act on Emission Allowance Trading (414/2012). As a result, the Fund accumulated surpluses reaching more than EUR 1 billion by mid-2021. It is not clear how much of this amount will be spent on the green transition. In a positive step, Act 414/2012 was updated in 2023 to increase the share of auctioning revenue earmarked for the environment.

1.4.3. The green tax reform should be pursued

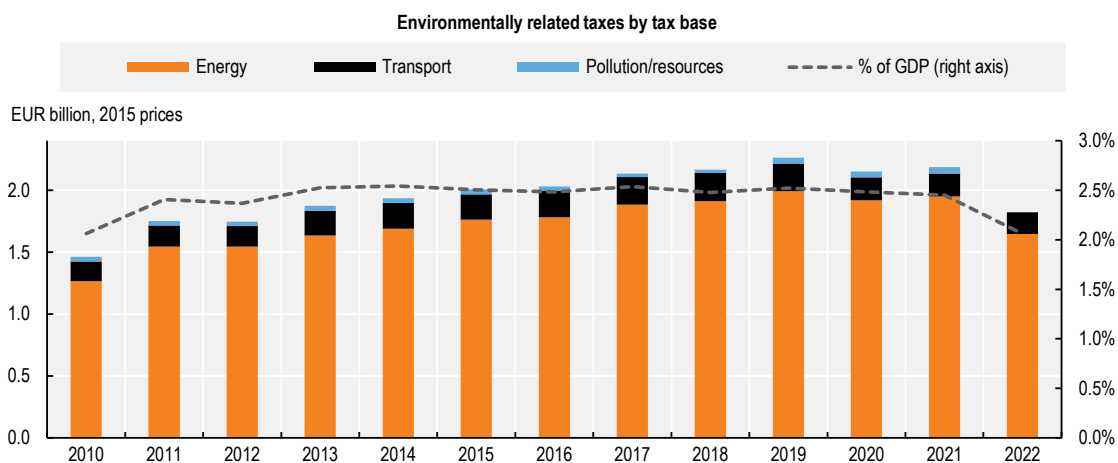
Slovakia has committed to strengthen green taxes

The Envirostrategy2030 has pledged a fiscally neutral green tax reform. The government has committed in its 2021 programme to strengthen the role of environmental taxes and review subsidies to promote environmentally friendly behaviour. Slovakia has increased the landfill tax and the air pollution tax for certain pollutants (Section 1.2.3). However, the environmental impacts of these changes remain to be assessed. There is still some way to go to implement a green tax reform.

The tax burden has not shifted from labour to environmentally harmful activities. The tax to GDP ratio increased from 28% in 2010 to 36% in 2021 (slightly above the OECD average), mainly due to increasing labour taxation (OECD, 2022c).

In real terms, revenue from environmentally related taxes (ERT) increased until 2019, driven by road fuel consumption while inflation eroded fuel taxes (Figure 1.14). ERT then remained broadly stable before falling in 2022 with the surcharge on electricity. As a share of GDP, revenue from ERT was above the OECD Europe average in 2021 (2.5% vs. 2.1%). While energy dominated (2.2% of GDP in 2021), the shares of taxes on motor vehicles (0.21% of GDP) and on pollution/resources (0.06%) were well below the OECD Europe respective averages (0.48% and 0.11%).

Figure 1.14. Revenue from environmentally related taxes has varied in line with transport activity



Note: Energy: includes revenue from a surcharge on electricity to finance feed-in tariffs for renewables and co-generation and subsidies for electricity generation from domestic coal. The decrease in 2022 reflects the fall in revenue from the surcharge (from EUR 560 million to EUR 270 million), as high market prices have led to a reduction in support for electricity and combined heat and power producers.

Source: EC (2023), National Tax Lists, 21 April.

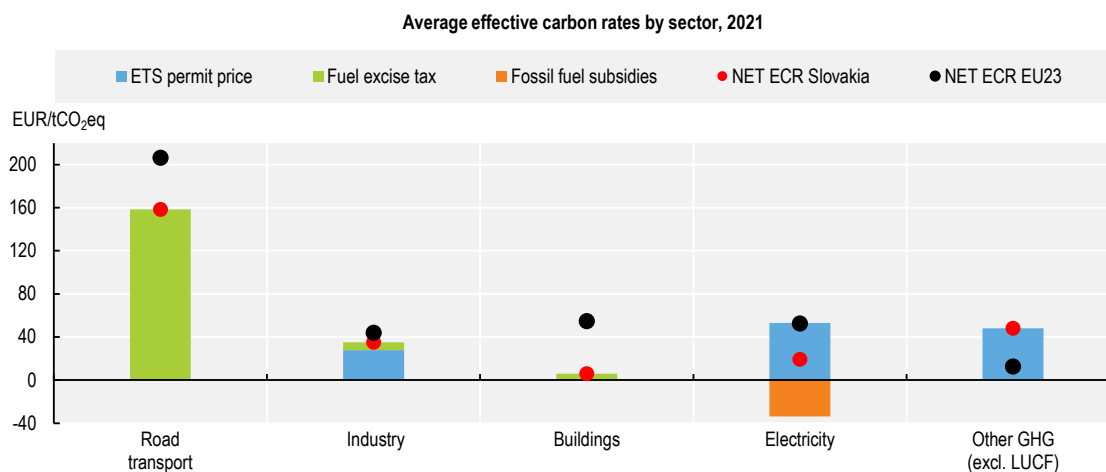
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Carbon prices are low and do not provide consistent incentives to cut GHG emissions

Carbon prices are low compared to EU countries that are all subject to the Energy Taxation Directive and the EU ETS. As Slovakia has no carbon tax, effective carbon rates (ECRs) consist of permit prices from the EU ETS, which cover half of GHG emissions, and fuel excise taxes (Figure 1.15). With an average net ECR of EUR 55 per tonne of CO₂, the Slovak Republic ranked in the bottom third of EU members in 2021. Although it priced about 79% of its GHG emissions, only 21% were priced at a net ECR above EUR 60 per tonne of CO₂, the midpoint benchmark for carbon costs in 2020.


ECRs do not provide a consistent carbon price across the economy. ECRs are highest in the road transport sector, which can be justified by the higher environmental and other social costs of road transport. However, they are low compared to most other EU countries. The excise duty on diesel is still well below that on petrol, despite the higher carbon content of diesel and its local air pollution cost. Carbon prices are also below the EU average in other key emitting sectors, particularly in buildings and electricity. Households⁶ benefit from tax exemptions on electricity, natural gas and coal. Energy sources used to generate electricity and combined heat and power are untaxed. In addition, part of electricity produced from domestic lignite is subsidised, although this support is to be phased out in 2023.

Figure 1.15. Effective carbon rates are below the EU average



Note: Excludes emissions from the combustion of biomass. The figure does not show sectors accounting for less than 1% of Slovakia's GHG emissions. LUCF: land use change and forestry.

Source: OECD (2022), Pricing Greenhouse Gas Emissions: Turning Climate Targets into Climate Action.

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The registration tax is greener, but road pricing could be extended

The Slovak Republic applies a one-off registration tax to all vehicles. Until 2022, the tax varied with engine power and vehicle age (reduced for older vehicles), which has made second-hand, more polluting cars attractive for customers. Since 2023, it has partly reflected vehicles' emissions (EURO standard) rather than its age (National Council, 2023). This is a positive move to rejuvenate the fleet and shift towards less environmentally harmful vehicles.

Only businesses pay the annual motor vehicle tax. Electric vehicles are exempted. Coupled with a preferential amortisation rate, this encourages entrepreneurs to renew their fleets with electric propulsion. However, the tax rate is based on cylinder capacity, number of axles and weight rather than on emissions (OECD, 2020b). In addition, as in other OECD countries, the taxable income from the personal use of company cars is only partially captured by the Slovak tax system, which encourages the use of cars. The budgetary impact of this favourable tax treatment was estimated at EUR 150 million in 2021 (EC, 2022e).

Vehicle taxes can steer towards cleaner vehicles, but they do not depend on actual vehicle use, which limits their effectiveness in addressing external costs (van Dender, 2019). While fuel taxes are effective to reduce carbon emissions, distance-based charges depending on vehicle emissions and the place of driving are the best option to address local air pollution. The Slovak Republic has an electronic vignette system on specific sections of motorways. Heavy vehicles are subject to toll payment depending on the distance travelled, vehicle and emission category, and number of axles (ACEA, 2022). The system could be extended to vehicles of up to 3.5 tonnes, which pay a flat rate. There are no low-emission zones in Slovakia. The 2023 Air Protection Law (Section 1.2.3) allows municipalities to introduce them.

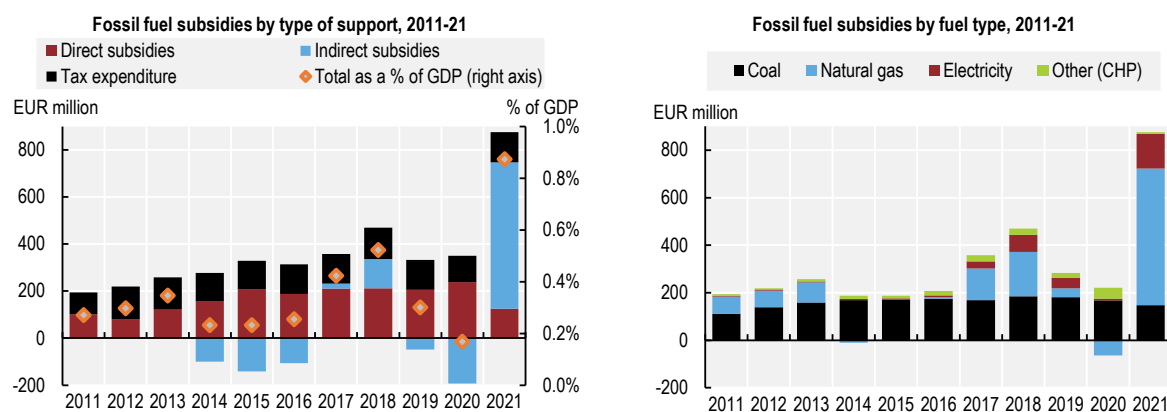
Slovakia to end subsidies for coal-fired power generation

Over 2011-21, Slovakia supported the use of fossil fuels at an average rate of EUR 308 million per year (Figure 1.16) (Hrčićinová and Boros, 2022). This aid mostly took the form of direct subsidies and tax expenditure, and mainly benefited coal rather than gas.

Subsidies for electricity generation from domestic coal are to end in 2023. This is a positive step to reduce GHG emissions and local air pollution. These subsidies amounted to more than EUR 100 million a year and were financed by a fraction of consumers' electricity prices. Apart from the environmental benefits of its abolition, the system was becoming increasingly inefficient, even before the energy crisis. While domestic coal-fired power generation fell, the subsidy rate per megawatt-hour rose from EUR 64 in 2018 to EUR 135 in 2021 (MoF, 2023b).

The Institute for Economic Analyses of the Ministry of Economy has mapped fossil fuel subsidies. It has proposed to start removing regulated energy prices, subsidies for electricity generation from domestic coal, and excise duty exemptions for energy-intensive businesses based on economic, environmental, social and fiscal criteria (Hrčičšínová and Boros, 2022). The analysis does not propose removing energy tax exemptions for households on social grounds. This runs contrary to recommendations of spending reviews, which suggest that eliminating these exemptions would only marginally affect households, including those most at risk of poverty (MoF/MoE, 2017) (MoF, 2023b). From an environmental and fiscal point of view, it would be justified to keep the price signal and support the most vulnerable households with support unrelated to energy consumption.

Figure 1.16. Until recently, fossil fuel subsidies have mainly benefited coal



Note: Indirect subsidies (mainly regulated gas prices) can take negative values when regulated prices are higher than market prices. CHP: combined heat and power. Electricity and CHP: only the estimated share for fossil fuels is included.

Source: Hrčičšínová. and Boros (2022), How do we subsidise fossil fuels?, Institute for Economic Analysis of the Ministry of Economy.

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Notes

¹ Early in 2023, the Court of Justice of the European Union condemned Slovakia for persistent exceedances at several sites.

² The landfill tax on construction waste more than tripled in 2022 to EUR 25/t. It will rise to EUR 35/t. in 2024.

³ Considering the 2022 downward revision of the Recovery and Resilience Facility, REPowerEU grants and Brexit Adjustment Reserve.

⁴ According to Act No. 250/2012 Coll. on Regulation in Network Industries, a household is energy poor when its average monthly expenditure on the consumption of electricity, gas, heating and hot water accounts for a significant share of its average monthly income.

⁵ Under the amended EU ETS Directive (2023/959), member states will have to use all auction revenues not attributed to the Union budget for climate-related purposes, with the exception of revenues used for the compensation of indirect carbon costs.

⁶ Households are exempted if they are the final consumers and are directly supplied with the commodity they use for their own consumption (i.e. no exemption if they live in multi-flat buildings).

Chapter 2. Biodiversity and forests in the context of climate change

As in most European countries, biodiversity in Slovakia is under pressure. Since 2011, the country has taken important steps to improve its biodiversity policy. However, it needs to now align its strategy with the Kunming-Montreal Global Biodiversity Framework and the EU Biodiversity Strategy for 2030. Most species and habitats are in an unfavourable state and biodiversity considerations are not sufficiently integrated into sectoral policies. This chapter reviews Slovakia's policy to promote the conservation and sustainable use of biodiversity, examining both its effectiveness and efficiency. It assesses progress in mainstreaming biodiversity considerations into sectoral and other policies, particularly those related to forestry and climate change.

2.1. Introduction

Slovakia is a mountainous landlocked country that spans two biogeographic zones: the Carpathian Mountains and the Pannonian Lowlands, which are adjacent to the Danube River. The predominant ecosystems are forests, cultivated land and grasslands. With about 40% of its territory covered by forests, Slovakia is among the most forested countries in Europe. Approximately 11 300 plant species and 28 800 animal species inhabit Slovakia (MoE, 2020a). Approximately 28% (66) of the habitat types and 425 species protected under EU law are found in Slovakia (EEA, 2023).

Slovakia has taken important steps to improve the strategic, legislative and institutional framework for biodiversity since its last review in 2011. Key areas of progress include mainstreaming biodiversity in agriculture and forestry, reforming protected areas (PAs) to enhance their effectiveness and combating invasive alien species (IAS). The development of a National Biodiversity Strategy and Action Plan (NBSAP) to 2030 is a key opportunity to further strengthen the strategic framework and ensure its alignment with the EU Biodiversity Strategy 2030 and the Kunming-Montreal Global Biodiversity Framework.

While there are examples of conservation successes, implementation remains a challenge. Considerable scope exists to further promote biodiversity mainstreaming across sectors; strengthen economic incentives; scale up and increase the efficiency of biodiversity finance; enhance capacity and co-ordination of government institutions; and improve stakeholder engagement. Completing the PA reform is critical. Slovakia has a strong case for protecting and restoring ecosystems: the total economic cost of ecosystem degradation is approximately EUR 20 billion per year in forgone ecosystem services (Černecký et al., 2021).

This review first examines the state of Slovakia's biodiversity and key pressures facing species and ecosystems. It then explores the strategic, institutional and legislative framework for nature in Slovakia and progress to mainstream biodiversity across policy areas. Next, the chapter reviews policy instruments and finance for promoting the conservation, sustainable use and restoration of biodiversity in Slovakia. Finally, it examines the links between biodiversity and climate change policy, with a focus on land use, land-use change and forestry (LULUCF) policy and climate change adaptation.

2.2. State, pressures and trends

2.2.1. State of Slovakia's biodiversity

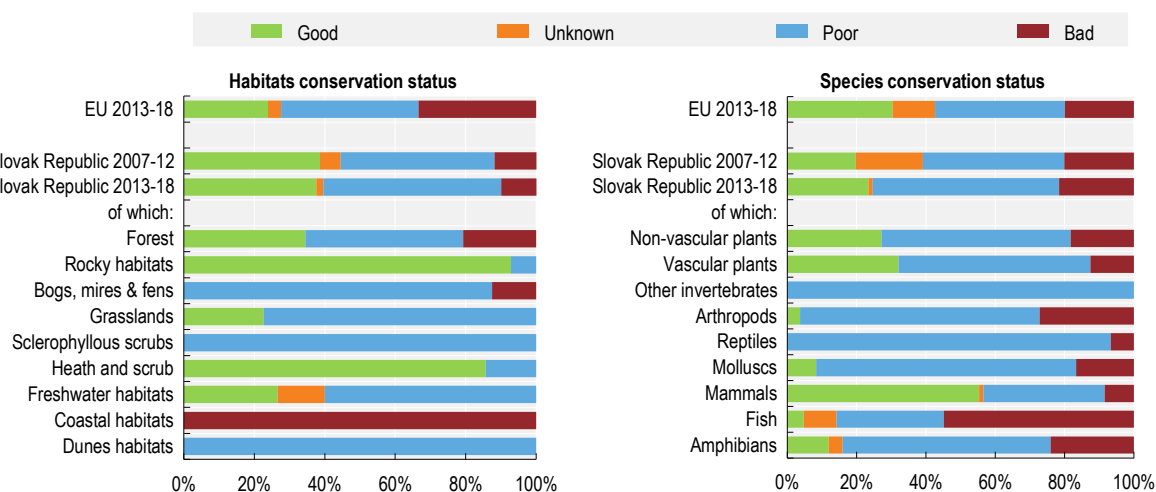
The conservation status of most habitats and species in Slovakia is unfavourable. Approximately 60% of habitats and 75% of species of European interest¹ in Slovakia are in a poor or bad state (Figure 2.1) (EEA, 2021). The share of habitats with an unfavourable conservation status in Slovakia is lower than the EU average, whereas the share of species with an unfavourable status is higher. The number of habitats and species evaluated to have an unfavourable conservation status increased during 2013-18 compared to 2007-12. However, this change is partly attributable to data improvements. The conservation status of habitats and species in aggregate has not significantly changed (MoE/SEA, 2023).

All of Slovakia's bogs, mires and fens, sclerophyllous scrubs, dune and coastal² habitats, and most grassland and forest habitats are in an unfavourable state. Of the freshwater habitats, 60% are in a poor state and just 27% are in a good state. Information is lacking on the conservation status of 13% of freshwater habitats. Rocky habitats and heath and scrub habitats, fare relatively well, with 93% and 86% in a good condition, respectively.

More than two-thirds of vascular plant species and almost three-quarters of non-vascular plants have an unfavourable conservation status. All reptiles, 86% of fish and 84% of amphibian species have an

unfavourable status. Most molluscs, arthropods and other invertebrates also have an unfavourable status. In contrast, most mammals have a favourable conservation status.

Figure 2.1. A significant share of habitats and species are in an unfavourable state



Note: The new report for 2013-18 is based primarily on data from the Complex Information and Monitoring System (KIMS). While the number of habitats and species with unfavourable conservation status increased between 2007-12 and 2013-18, this may be due to data improvements. Sclerophyllous scrubs: *Juniperus communis* formations on heaths or calcareous grasslands; Coastal habitats: Inland salt meadows and pannonic salt steppes and salt marshes; Dune habitats: Pannonic inland dunes.

Source: EEA (2021), Conservation status of habitat types and species: Datasets from Article 17, Habitats Directive 92/43/EEC reporting.

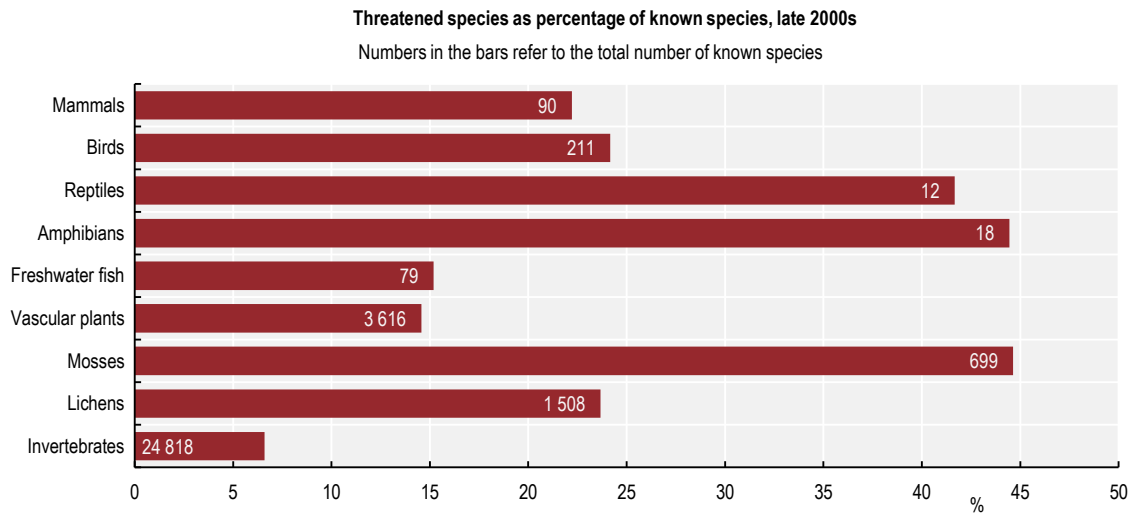
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The population sizes of some species have increased over the past decade, owing in part to targeted conservation measures. Examples include the Tatra chamois (*Rupicapra rupicapra tatrica*), maned bison (*Bison bonasus*), sea eagle (*Haliaeetus albicilla*) and great bustard (*Otis tarda*) (EEA, 2021). The wintering population of the great bustard, which is Slovakia's most threatened bird species, increased by 50-200 individuals between the 2007-12 and 2013-18 reporting periods (Černecký and et al., 2020). In 2022, Slovakia reported its first great bustard nest in 12 years (The Slovak Spectator, 2022).

However, the populations of many other species have declined. Examples include the European ground squirrel (*Spermophilus citellus*), steppe polecat (*Mustela eversmanii*), European pond turtle (*Emys orbicularis*) and western capercaillie (*Tetrao urogallus*) (EEA, 2021). An evaluation of 227 bird species in Slovakia found that the populations of 42 bird species (18%) were smaller in 2013-18 than in 2007-12, while the populations of 32 bird species (14%) were larger (EEA, 2021). Declines affected predominantly farmland birds but also some wetland and forest species. During 2013-18, 32% of bird populations declined, while only 13% increased.

Numerous plant and animal species are threatened with extinction. According to the Red List, almost one-quarter of Slovakia's vertebrates are threatened, including 44% of amphibians, 42% of reptiles and 24% of birds (Figure 2.2). Approximately 7% of the country's almost 25 000 known invertebrate species face extinction (OECD, 2023a). The most threatened invertebrates include cockroaches (44%), mayflies (34%), dragonflies (33%), and molluscs and spiders (up to 30%) (MoE/SEA, 2023). Almost 12% of non-vascular plants and 15% of vascular plants are threatened with extinction. Among plants, mosses stand out with 45% of the 699 known species in Slovakia under threat (OECD, 2023a).

Figure 2.2. More than a quarter of amphibian, reptile and moss species are threatened



Note: Threatened refers to the sum of “endangered”, “critically endangered” and “vulnerable” species, i.e. species that are at greatest risk of extinction.

Source: OECD (2023), OECD Environment Statistics (database).

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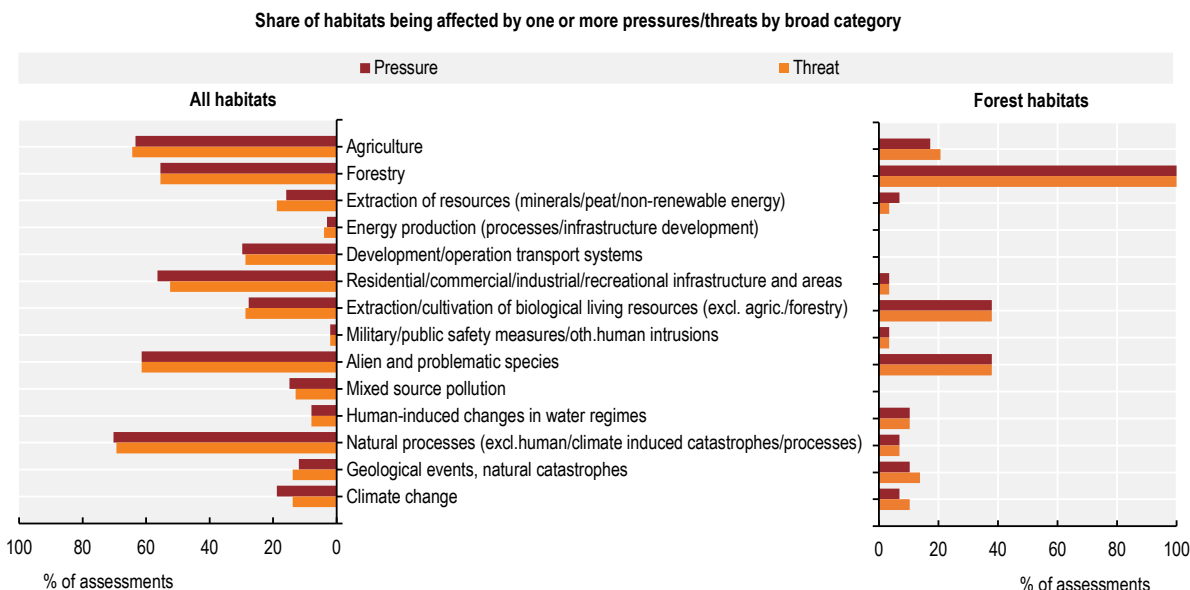
2.2.2. Pressures on biodiversity

The dominant pressures on biodiversity include unsustainable agricultural practices (Section 2.4.2), IAS and other problematic species, forestry (e.g. high volume of incidental logging in some forest areas) (Figure 2.3), infrastructure development (Section 2.4.4), which contributes to habitat fragmentation and soil sealing, and natural processes such as erosion and secondary succession.³ Secondary succession affects grasslands, peatlands and moors (EEA, 2021).

Agricultural activities and problematic species, including IAS, put pressure on approximately 60% of habitats. Forestry activities and the development of residential, industrial and recreational infrastructure negatively affect more than 50% of habitats. Infrastructure development is the main driver of land-use change, affecting primarily agri-ecosystems (Figure 2.3). The built-up area of Slovakia as a share of total land is higher than the EU and the OECD averages. The built-up ratio continues to increase, growing 4% from 2010-21 to reach 5% of total land use (OECD, 2023a).

Slovakia’s biodiversity also faces pressure from climate change. Average annual air temperature has increased by 1.7°C since 1881. Precipitation has decreased in the south and increased in the north, while the risk of droughts and floods is increasing (MoE, 2022a). Observed or expected impacts on biodiversity include shifts in vegetation zones and species distributions, phenological changes, extinction risk to species with a narrow ecological niche and increased risk of IAS and pest outbreaks (e.g. increased range or intensity of bark beetle outbreaks). Montane pine forests, swamps in the foothills and mountains and other aquatic systems are among the most vulnerable ecosystems (MoE, 2022a).

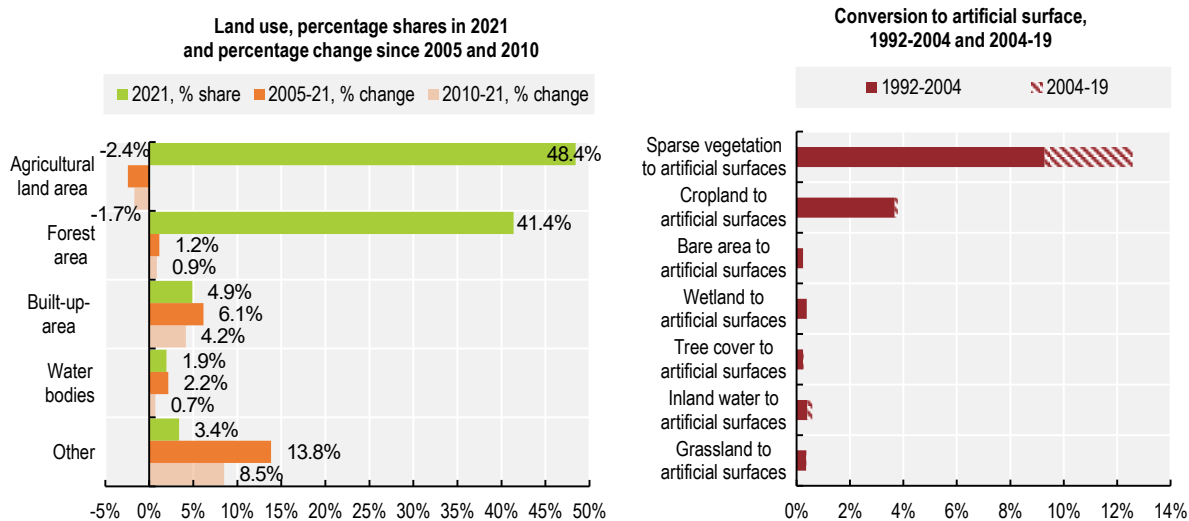
Figure 2.3. Agriculture, natural processes, infrastructure development, invasive species and forestry exert pressures on a large number of habitats



Note: Pressures refer to factors or actions currently impacting a habitat or species while threats refer to potential or future risks.
 Source: EEA (2023), Article 17 Habitats Directive 92/43/EEC, National Summary Dashboard.

StatLink <https://stat.link/owhbmh>

Figure 2.4. Agricultural land continues to decline in favour of built-up areas, while forest and water areas have increased slightly



Note: Forest area: including forests on agricultural and other lands. Agricultural land area: including non-utilised agricultural area.
 Source: MoE (2023), Enviroportal (database).

StatLink <https://stat.link/d2opue>

2.2.3. Monitoring information and data

Knowledge and data on biodiversity improved significantly over the past decade. Monitoring focuses on Slovakia's species and habitats of European interest. Between the 2007-13 and 2013-18 reporting periods, the share of habitats with unknown status declined from 6% to 2%, while the share of species with unknown status declined from 19% to 1.8% (Figure 2.1) (EEA, 2021). The data are recorded and approved through Slovakia's Complex Information and Monitoring System (KIMS), which is accessible to the public (ŠOP, 2013). In 2021, Slovakia conducted 2 237 field visits to permanent monitoring sites (MoE/SEA, 2023).

Knowledge and data gaps remain for freshwater habitats, fish and to a lesser degree amphibians and small mammals of European interest (EEA, 2021). Furthermore, monitoring and data are lacking for most species and habitats not of European interest. While data collection is systematised through the KIMS, monitoring for biodiversity tends to be project-based and dependent on project finance, rather than programmatic with dedicated long-term resources.

2.3. Strategic, legislative and institutional framework

Slovakia has continued to strengthen its strategic, legislative and institutional framework for biodiversity. In addition to addressing national priorities, changes to the framework promote alignment with EU requirements and strategies (e.g. EU Habitats and Birds Directive, EU Strategy for Biodiversity for 2020), as well as international commitments (ŠOP, 2023a). The priority for Slovakia now is to translate the EU Strategy on Biodiversity for 2030; the EU Strategy on Forests 2030 and the Kunming-Montreal Global Biodiversity Framework domestically. The ongoing development of the NBSAP 2030 and the draft National Forestry Strategy 2022-30, which is yet to be adopted, are key instruments for achieving this. This section summarises and examines the current state and recent developments in Slovakia's strategic, legislative and institutional framework.

2.3.1. Strategic framework: National goals, strategies and action plans for biodiversity

The protection and sustainable management of nature is a key pillar of Slovakia's Long-Term Strategy for Sustainable Development 2030 and EnviroStrategy 2030 (MoE, 2019). These overarching strategies set both qualitative and quantitative objectives for biodiversity. The Ministry of Environment (MoE) developed an internal implementation plan outlining measures to achieve the objectives of EnviroStrategy 2030. A web platform provides a snapshot of progress towards these objectives (SEA, 2023).

Table 2.1. Biodiversity commitments and measures are integrated into EnviroStrategy 2030

Priority area	Examples of commitments and measures
Effective protection of nature and landscape	
1. Stopping the loss of biodiversity	<ul style="list-style-type: none"> The zoning of national parks, along with their reassessment, will be implemented by 2025 By 2030, at least 15% of degraded ecosystems will be restored
2. Reform of the state nature conservation institutions	<ul style="list-style-type: none"> A comprehensive and sustainable system of funding for nature conservation organisations will be in place by 2030 The organisational structure of governmental authorities for nature conservation will be more efficient
3. Simplification of the system and the maintenance of non-interference in the area with the highest level of protection	<ul style="list-style-type: none"> By 2030, the entire framework of protected areas will be reviewed with the participation of all concerned parties Areas without human intervention will reach 50% of the total land areas of each national park by 2025 and 75% by 2030

Priority area	Examples of commitments and measures
Effective protection of nature and landscape	
4. Evaluation and sustainable use of ecosystem services	<ul style="list-style-type: none"> By 2030, all ecosystem services will be taken into account equally and included in the national accounting system The creation of a comprehensive system for assessing ecosystem services and their monetisation will be supported
5. Development and implementation of an integrated concept for nature protection	<ul style="list-style-type: none"> An integrated concept of nature protection will be developed based on the European Landscape Convention
Sustainable land management	
1. Supporting more environmentally friendly practices in agriculture	<ul style="list-style-type: none"> Organic farming will account for at least 13.5% of land in 2030 In nitrate vulnerable areas, compliance control will be reinforced
2. Protection and restoration of landscape elements on agricultural land	<ul style="list-style-type: none"> By 2030, a gradual restoration of landscape elements will take place on agricultural land Woody windbreaks and vegetation of domestic species will be planted to reduce water and wind erosion and soil drying
3. Addressing the status of white areas	<ul style="list-style-type: none"> By 2030, land register status will be harmonised with the actual state of the land
Production of forest environmental services	
1. Sustainable timber harvesting	<ul style="list-style-type: none"> Processing of timber due to damage caused by harmful factors will be subject to reporting obligations and may be stopped or restricted
2. Maintaining the prohibition of the logging in the area with the highest level of protection and near rivers	<ul style="list-style-type: none"> In the no-interference zones, prohibition of harvesting and processing of timber will be maintained Logging in protected areas where active management is applied will be implemented in accordance with conservation requirements
3. Effective control of timber harvesting	<ul style="list-style-type: none"> The integrated guard will be set up to monitor the implementation of the harvest in individual locations Transparency and public control in forestry management field will increase

Source: MoE (2019), Strategy of the Environmental Policy of the Slovak Republic until 2030.

The previous NBSAP to 2020 (updated in 2014) included a vision, 9 goals for 2020 and 167 tasks and actions to achieve these goals. The NBSAP was designed to reflect the Convention on Biological Diversity (CBD) Strategic Plan 2011-20 and the EU Biodiversity Strategy 2020. Progress towards the nine goals was evaluated in Slovakia's Sixth National Report submitted to the CBD in 2019 (Table 2.2). An evaluation published in 2020 and officially adopted by the government in 2022 concluded that 99 of the 167 tasks (59%) were fully implemented, 42 (25%) partially implemented and 26 (16%) unimplemented (MoE, 2020b).

In 2021, Slovakia initiated drafting of a new NBSAP for the period to 2030, which aims to align with the Kunming-Montreal Global Biodiversity Framework and the EU 2030 Biodiversity Strategy. The MoE shared the draft strategy in 2023 for comment by relevant stakeholders and intends to seek its adoption by government in 2024. Legally, Slovakia is required to have a Nature Protection Concept; the most recent one was prepared for 2007-15. A new concept to 2030 was drafted for adoption in 2019 but was never finalised. Instead, Slovakia plans to integrate the Nature Protection Concept into the NBSAP to avoid having two largely duplicative strategies.

Table 2.2. NBSAP to 2020 and progress as of 2018

Vision	
By 2050, the natural capital of the Slovak Republic – biodiversity, ecosystem services and goods – is adequately protected, regularly evaluated, wisely used and restored as appropriate, because of its intrinsic value and for its considerable contribution to the well-being and economic prosperity of the Slovak Republic. Measures and policies adopted at a national level prevent unfavourable changes brought on by loss of natural capital.	
Goal	Country self-evaluation of progress by end of 2018
1. Stop the deterioration of the status of all species and habitats, especially those covered by EU legislation and achieve a significant and measurable improvement in their condition	Progress, but insufficient rate to achieve target
2. Ensure that both general public and professionals are aware of the importance of biodiversity and the steps towards its protection and sustainable use	On track
3. By 2020, ensure the preservation of ecosystems and the enhancement of ecosystem services by means of green infrastructure and the restoration of at least 15% of degraded ecosystems	No significant change
4. By 2020, implement the measures of the Common Agricultural Policy that have positive effects on biodiversity at all cultivated areas so as to measurably improve the condition of species and habitat	Progress, but insufficient rate to achieve target
5. Implement national programmes of forest management so as to achieve a measurable improvement in the condition of species and habitats dependent on suitable forest environment and those, which are significantly affected by forestry practices, and to ensure a measurable improvement in the provision of ecosystem services in accordance with sustainable forestry practices as compared to the EU reference condition (2010)	No significant change
6. Ensure adequate protection of water and water-dependent habitats and species to achieve a good condition of aquatic ecosystems by 2020, and ensure that the development of aquaculture does not have adverse effects on aquatic species and ecosystems	No significant change
7. Ensure the reduction of negative effects of invasive species on biodiversity and ecosystems in Slovakia by 2020	On track
8. Reduce the intensity of negative factors affecting biodiversity; finalise, for this purpose, an effective legal framework and tools ensuring compliance with relevant legislation, and ensure fair and equitable sharing of benefits arising from the utilisation of genetic resources	On track
9. Engage a wide range of stakeholders and establish or re-establish partnerships to support the implementation of the national strategy for biodiversity; promote education, training, research and participation	Progress, but insufficient rate to achieve target

Source: MoE (2020), Sixth National Report to the Convention on Biological Diversity.

Another key strategy document for biodiversity is the Slovak Wetlands Management Programme 2024, which guides national implementation of the Ramsar Convention. The Wetlands Management Programme contains 4 overarching objectives and 18 goals. It is accompanied by an action plan. The action plan for 2019-22 included 65 measures, of which 43 (66%) were implemented or are continuously implemented, 15 (23%) partially implemented and 7 (11%) not implemented (MoE, 2022b). The action plan for 2022-24 includes 63 measures, estimated costs for some measures, potential sources of funding and responsible institutions (MoE, 2022b).

The Priority Action Framework (PAF) for the Natura 2000 System, which is mandatory under EU law, guides protection of Natura 2000 sites. Slovakia has developed a PAF for 2014-20 and 2021-27, which were approved by the European Commission. The document determines the goals, measures and activities necessary to ensure by 2030: i) no deterioration in trends and status in the case of species and

habitats of European interest; and ii) at least 30% of species and habitats whose status is currently unfavourable have reached a favourable status or have shown a significant positive trend. The PAF also outlines finance needs for implementing priority measures.

The European Union also requires an action plan to address pathways of unintentional introduction and spread of IAS (Article 13 of Regulation no 1143/2014). In 2021, Slovakia assessed the entry pathways of IAS of concern to the European Union and to the Slovak Republic and developed an action plan that was adopted in 2022 (Government of the Slovak Republic, 2022a).

Biodiversity is also addressed through sectoral strategies and programmes. These include the National Forestry Programme of the Slovak Republic (Section 2.4.1) and the Water Policy Concept of the Slovak Republic until 2030 with a view to 2050, which was adopted in 2022 (Government of the Slovak Republic, 2022b).

2.3.2. Legislative framework

Law no. 543/2002 Coll. on Nature and Landscape Protection (hereafter Nature Act) is the primary national legislation governing the conservation and sustainable use of biodiversity. The purpose of the Act is:

to ensure the long-term preservation of the natural balance and diversity of conditions and forms of life, natural values and beauties, and to create conditions for sustainable use of natural resources and provision of ecosystem services, taking into account economic, social and cultural needs, as well as regional and local conditions.

Slovakia has amended the Nature Act several times since OECD's previous review. The most significant amendments are a 2022 reform of national park governance and management and strengthening of sustainable forestry practices (Section 2.5.1). The Nature Act is complemented by Law no. 15/2005 Coll. on the protection of species of wild animals and plants by regulating their trade. This translates commitments of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) domestically.

Slovakia strengthened the legal basis for addressing IAS in 2019 through the adoption of Law no. 150/2019 Coll. on the prevention and management of the introduction and spread of invasive non-native (i.e. alien) species. The law on IAS is supported by Regulation no. 449/2019 Coll., which issues a list of IAS of concern to the Slovak Republic and Decree no. 450/2019 Coll., which establishes the conditions and methods of removing IAS.

Other relevant legislation includes Law no. 151/2002 Coll. governing the use of genetic technologies and genetically modified organisms, Law no. 263/2015 Coll. on the scope for the area of access to genetic resources and the use of benefits resulting from their use, and various sectoral legislations (e.g. the Forest Act; Section 2.4.1).

2.3.3. Institutional framework

Government

The Directorate of Nature and Biodiversity Protection (SOPB) of the MoE has overall responsibility for nature, biodiversity and landscape protection. SOPB co-ordinates biodiversity working groups to support implementation of nature-related international agreements such as the CBD in Slovakia, the Ramsar Convention (Slovak Ramsar Committee) and the Carpathian Convention.

The State Nature Conservancy (ŠOP) under the MoE implements biodiversity measures, conducts research and monitors biodiversity. The ŠOP is responsible for 14 protected landscape areas and used to oversee management of the nine national parks. Since March 2022, national parks have independent administrations co-ordinated through a new department in the MoE (Section 2.5.1). ŠOP continues to

support national parks by overseeing EU and international commitments and developing management guidance. The Slovak Environment Agency also works on biodiversity, including development of indicators, foresight studies and models.

Other key ministries for biodiversity include the Ministry of Interior, which plays a key role in environmental regulation and enforcement, and the Ministry of Agriculture and Rural Development (MoA). The MoA and its subordinate organisations (e.g. Slovak Land Fund), own and govern much of Slovakia's state-owned forest and agricultural land.

Non-governmental organisations and the private sector

Since the 1990s, non-governmental organisations (NGOs) have played a key role in nature management in Slovakia. NGO activities include advocacy and policy formulation, project implementation, awareness raising and education. In recent years, the MoE, ŠOP and the MoA have worked more closely with NGOs (e.g. Daphne – Institute of Applied Ecology, WWF Slovakia, SOS/Birdlife Slovakia, NGO Vlč/Wolf, Prales) in the formulation and implementation of biodiversity-related policy (MoE, 2020a).

Recent examples of successful collaboration between government and NGOs include the development of the Water Policy Concept and Plan 2030 and the Common Agricultural Policy (CAP) Strategic Plan 2023-27. Slovakia intends to co-operate with NGOs and other non-state actors through its Biodiversity Working Group to formulate the new NBSAP. The working group, which was established to help prepare the NBSAP 2014-20, comprises ministries, academic institutions, NGOs and private landholders, but not private companies.

Co-operation between the government and private sector on biodiversity issues is relatively weak. A notable exception is the fruitful collaboration among the MoE, environmental NGOs and power companies to mitigate biodiversity risks from powerlines (MoE, 2020a) (Section 2.4.3). No platform exists to facilitate collaboration across the government and private sector. Furthermore, Slovakia is not represented in the EU Business and Biodiversity Platform. Participating in this platform and establishing a national business and biodiversity initiative, drawing on other countries' experience, could help strengthen private sector engagement.

International co-operation

The ŠOP co-operates closely with conservation organisations and agencies of the five bordering countries (Austria, Czechia, Hungary, Poland, Ukraine) and three other European countries (the Netherlands, Germany and the Flanders region of Belgium). Co-operation entails preparing and implementing joint projects, co-ordinating monitoring, sharing data and information, organising meetings and field trips, bilateral research activities and environmental education programmes. Areas of focus include management and monitoring of PAs (particularly transboundary areas), the conservation of large carnivores and avian monitoring. International co-operation and exchange could be beneficial as Slovakia pursues nature restoration. Czechia for example, has more than two decades of experience in restoring (revitalising) river systems. Additionally, it boasts a successful restoration project in the White Carpathians (Bilé Karpaty), where orchid meadows have been restored at scale. The project was financed by a state fund for environment programme called the "Programme of Landscape Care" (*Program péče o krajinu*).

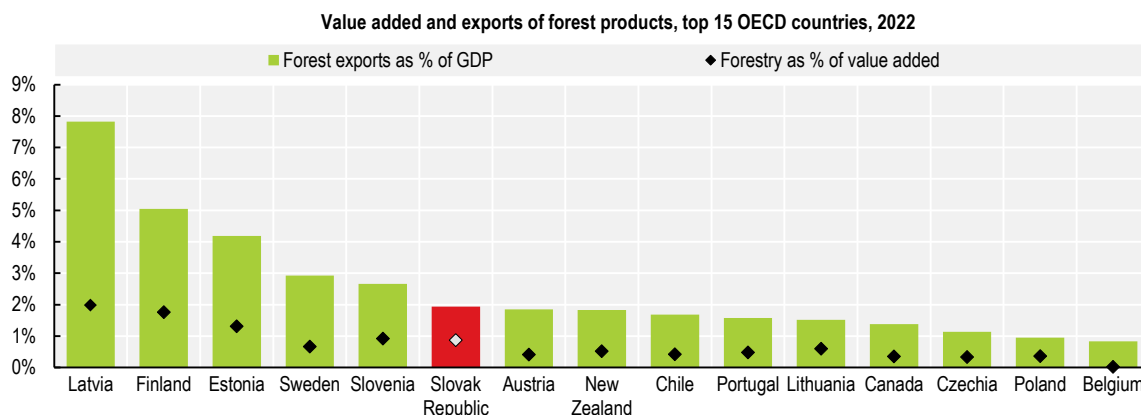
2.4. Mainstreaming biodiversity into sectoral policies

2.4.1. Forestry

Slovakia is among the most forested countries in Europe. Forest area, which covers about 40% of its territory, increased slightly from 2010-21 (Figure 2.4). Forestry has contributed between 0.7-0.9% of

annual GDP since 2010, which is more than in most OECD countries (Figure 2.5). The sector employs 73 000 people (FISE, 2022).

Figure 2.5. Forestry provides a relatively large contribution to Slovakia's economy



Note: Forestry as a percentage of value added: 2022 or latest available year.

Source OECD (2023), OECD National Accounts Statistics (database); FAO (2023), FAOSTAT (database).

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The government owns approximately 40% (779 863 ha) of forest land, but state enterprises manage more than half of Slovakia's forests (MoA, 2023a). Non-state forestry entities own and manage private, community, church, municipal and agricultural co-operative forests. The arrangement of ownership and use of forests in accordance with restitution laws is ongoing. Approximately 21% of forest area has unclear ownership status (MoA, 2023a).

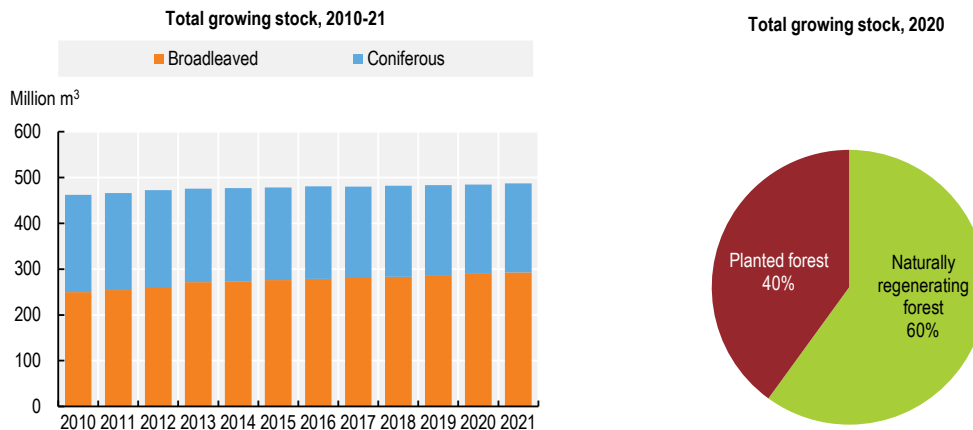
The principal regulation and strategies governing forestry and forest management are the Forest Act (2005) and the National Forestry Programme (2022-30), which is yet to be adopted. All forests are under valid ten-year forest management plans, which are prepared by third party certified experts and funded by the government. Plans are registered with an official body and publicly available.

Although monoculture plantations exist (mainly Norwegian spruce), overall Slovakia's forests are diverse and their species composition can be classified as predominantly natural. Introduced species cover 3% of forest area and remain stable. The most abundant tree species are European beech (35%), Norway spruce (21%), English/sessile oak (13%) and pine (7%) (MoA, 2023a). The share of deciduous trees compared to conifers is increasing, which is positive as it more closely reflects Slovakian forests' natural state. Furthermore, deciduous broadleaved forests tend to be more resilient to disturbances (e.g. bark beetle outbreaks) (MoE/SEA, 2023). Of the total growing stock, 60% is naturally regenerating forest and 40% planted forest (Figure 2.6). The share of naturally regenerating forests has been marginally increasing over the previous decade (FAO, 2023).

Nonetheless, Slovakia's forests face challenges. The current age structure of forests is skewed. Mature forest stands over 70 years old and young trees under 20 years old are disproportionately represented. Due to the age structure of forests, the volume of growing stock and carbon stocks has been increasing but is peaking. Both are projected to decline in the coming years (Section 2.7.1). Furthermore, almost half of trees have a high degree of defoliation (i.e. more than a quarter of leaves damaged), which is higher than the European average. This includes about 40% of deciduous trees and 58% of coniferous trees (MoA, 2023a) The quantity of deadwood is approximately 87 million m³ (MoA, 2023a), which is among the

highest in Europe (Forest Europe, 2020). The high amount of deadwood provides habitat for biodiversity and is an important part of forest ecosystems. However, in some parts of Slovakia's forests, it reflects the impact of increasing abiotic and biotic disturbances and declining forest health (MoA, 2023a).

Figure 2.6. The share of broadleaved species and naturally regenerating forests is increasing



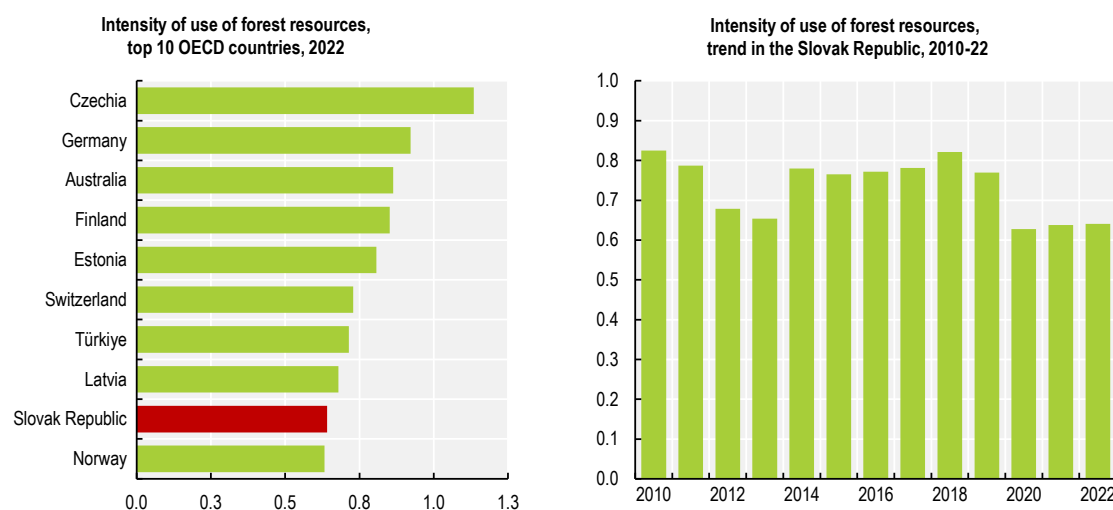
Note: Over bark volumes. Percentages in the right panel are based on 2017 data.

Source: MoE (2023), Sustainable forest management, Enviroportal (database); FAO (2023), FAOSTAT (database).


StatLink  <https://stat.link/cpd1n6>

Slovakia's logging intensity (ratio of fellings to gross increment) is higher than in most OECD countries, sitting consistently above 60% of gross increment since 2010 (Figure 2.7). Logging intensity has a long-term increasing trend but declined from 2020-21 owing to COVID-19 restrictions. The high intensity is mainly due to two factors. First, owing to the skewed age structure of Slovakia's forests, many tree stands are reaching the end of their rotation. Second, levels of incidental logging (salvage logging and sanitary felling) are high as a result of climate-related damage (e.g. drought and wind) and pest infestations (particularly bark beetles). Incidental logging accounted for 51% of total felling on average since 2010 and 36% of felling in 2022, among the highest shares in the European Union (OECD, 2023a). The high intensity of logging has contributed to the unfavourable conservation status of two-thirds of forest habitats of European interest (EEA, 2021).

Figure 2.7. Slovakia has a high intensity of logging



Note: Data refer to the ratio of fellings to productive capacity (gross increment).
Source: OECD (2023), OECD Environment Statistics (database).

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Notably, high levels of incidental logging have driven the loss of western capercaillie (*Tetrao urogallus*) habitat. Since Slovakia joined the European Union, the capercaillie population has declined by 49% in the 12 Special Protection Areas classified for its protection under the Birds Directive. The EU Commission referred Slovakia to the Court of Justice in 2020 for failure to assess the impact of forest management plans and sanitary logging on Natura 2000 sites (EC, 2020). Slovakia has taken steps to resolve this issue. Amendments to the Forestry Code and the Nature Act, in 2020, stipulate that environmental authorities can restrict salvage or sanitary logging in certain areas. Furthermore, new provisions require forest management plans covering Natura 2000 sites to undergo an environmental assessment.

Independent of the infringement process, Slovakia has started adapting its forestry approach to better support the long-term resilience of its forests and the provision of multiple ecosystem services such as habitat provision, water flow, erosion regulation and carbon sequestration. Through 2019 amendments to the Forest Act and Nature Act, Slovakia promotes close-to-nature⁴ management as the preferable forest management approach. This includes use of environmentally suitable and nature-friendly technologies and natural forest regeneration. The “production of forest environmental services” is also a priority of EnviroStrategy 2030.

These legislative changes combined with changes to PA legislation (Section 2.5.1) are positive developments for Slovakia’s forests. However, Slovakia could take additional steps to support and balance the multiple functions of forests. For example, forest management plans could better integrate biodiversity, ecosystem services and climate change considerations. Guidance and training for foresters could be developed to help them implement close-to-nature and climate-smart forestry practices, as well as to promote the multiple functions of forests.

Furthermore, Slovakia could further leverage economic incentives to support the transition to close-to-nature forest management and incentivise biodiversity protection and restoration. Foresters have little incentive to promote the full range of public goods that forests can provide because these goods are not reflected in market prices. Slovakia introduced the Forestry Support for Non-Productive Forest Functions in 2017 to help support foresters who adopt certain sustainable forestry practices. While this is an encouraging development, the instrument could be refined (Section 2.5.3) and supplemented with other financial mechanisms and economic instruments.

Voluntary forest certification also has a role in promoting the multiple societal values of forests. As of 2020, over 66% of forest area was certified under the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). The area of certified forests fluctuates across years but has been declining since 2009 (SEA, 2021). From 2019 to 2020, certified forest area declined by 3 000 ha, despite FSC and PEFC reporting an increase in certified area. This is due to the overlap of the two schemes (i.e. forests certified under both FSC and PEFC). Renewed efforts are needed to increase the uptake of forest certification.

2.4.2. Agriculture

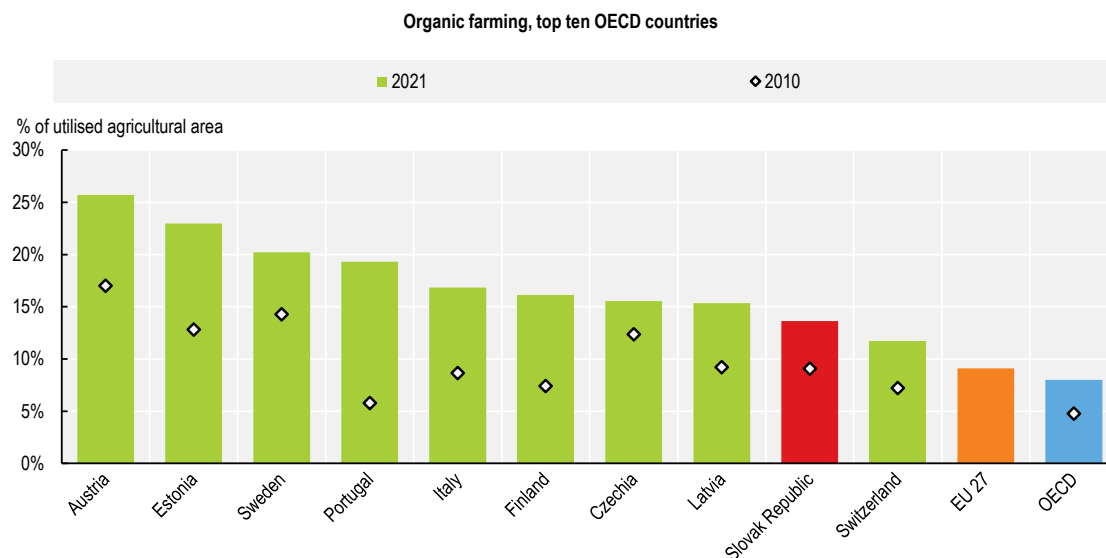
Agricultural land covers nearly half of the Slovak territory (Figure 2.4). Most agricultural land is arable land (59.2%) and permanent grassland (35.8%) (MoE/SEA, 2023). The remaining area is gardens (3.2%), vineyards (1.1%), fruit orchards (0.7%) and hop farms (0.02%). The average farm size in Slovakia is 95 ha, which is much larger than the EU average of 17 ha (EC, 2023a). During 2010-21, agricultural land declined slightly, while agriculture's contribution to GDP fluctuated between 2-3% (OECD, 2023b).

Promoting sustainable management of agriculture is critical for halting and reversing declines in Slovakia's biodiversity. More than 60% of habitats and 70% of species assessed are under pressure from agriculture (EEA, 2021). The Common Farmland Birds index declined by 28% in Slovakia over 2010-21 and by 16% in the European Union (EC, 2023a). The diversity of crops and farm animal breeds has also declined.

Key challenges include lack of landscape elements that provide habitat for species (e.g. field groves, hedgerows, dense strips of wooded area, solitary trees), the cultivation of monocultures (e.g. oilseed rape, maize), soil compaction due to agricultural machinery, and the excess or incorrect use of industrial fertilisers and pesticides. As a result of collectivisation and land consolidation, following the Second World War, Slovakia's average field size (10.6 ha) is the largest in Europe and significantly higher than the average (3.5 ha) (OneSoil, 2020). This contributes to the low landscape diversity and lack of landscape elements. Grassland habitats and species face the additional threats of woody succession and invasive alien plant species, owing to the abandonment of land and reductions in low-intensity grazing (EEA, 2021).

Consumption of nitrogen-based inorganic fertilisers increased by 24% from 2010-21, reaching 70 kg/ha of agricultural land (above the EU average). Pesticide application increased by 30% from 2011-21 reaching 1.2 kg/ha in 2021. While the rate of increase is faster than in most European Union countries, the overall volume remains lower (Eurostat, 2023). The expansion of organic farming may dampen further increases in industrial fertiliser and pesticides. In 2022, 13.6% of agricultural land was farmed organically, which is more than the EU average and surpasses the 2030 target of 13.5% set in *EnviroStrategy 2030*. The National Action Plan for the Development of Organic Agricultural Production 2023-27 sets a target of 14% by 2030 (MoA, 2023b). Considering the EU target of 25% of agricultural land organically farmed by 2030 and the current share, this seems unambitious.

Figure 2.8. Organic farming as a share of total agricultural area is relatively high in the Slovak Republic



Note: 2021 or latest available year. Data for the Slovak Republic refer to 2022.

Source: OECD (2023), OECD Agriculture Statistics (database); ÚKSÚP (2023), Register of agricultural area under organic farming (database).

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The key legislation for the agriculture sector is the Act on the Protection and Use of Agricultural Land 220/2004 Coll., as amended. The Act stipulates that owners, lessees and managers of agricultural land must ensure that “the ecological stability of the territory is not threatened and the functional connectivity of natural processes in the landscape environment is preserved”. Since Slovakia’s accession to the European Union, the EU’s CAP has formed the backbone of the country’s agricultural policy.

The performance of the CAP 2014-20 has been mixed for Slovakia’s biodiversity (Alliance Environnement, 2020) (MoE, 2020b). A previous co-operation agreement between MoA and MoE was not renewed in the run-up to 2014-20 because the ministries disagreed on the extent to which the CAP should fund environmental actions. While environmental NGOs helped shape the CAP, they considered their participation to be restricted (Alliance Environnement, 2020).

Large monoculture fields persist under the CAP and little progress has been made to restore landscape features (Gális, 2020). Furthermore, the implementation of agri-environmental-climate measures (AECMs) has been patchy. From 2015-18, Slovakia received 11 applications covering about 750 ha to protect ground squirrels (Alliance Environnement, 2020), 5 applications for multifunctional field edges/biostrips covering 25 ha (MoE, 2020b) and a single application to protect the great bustard (Alliance Environnement, 2020). A key issue was the unattractively low payment rate (Alliance Environnement, 2020). In contrast, support measures for the protection of grassland habitats were widely adopted, with 1 156 applicants covering an area of 153 889 ha (MoE, 2020b). Payments for ecological (organic) agriculture were also well subscribed.

The adopted 2023-27 CAP Strategic Plan provides an opportunity to improve outcomes for biodiversity in agricultural land. Following EU negotiations, the EU CAP has been revised for 2023-27 to better support the environment. Additionally, Slovakia has taken steps to ensure the CAP is translated effectively nationally. The CAP Strategic Plan was developed through a participatory process involving different ministries, environmental NGOs, hunters and landowners.

While it is too early to assess its impact, the Strategic Plan includes several features to promote biodiversity. First, eligibility criteria for direct payments allow for more landscape features (unproductive land) within the hectares eligible for payments than under the previous CAP. Second, baseline environmental requirements for beneficiaries of area- and animal-based CAP payments (i.e. the good agricultural and environmental conditions – GAECs) have been strengthened, although some stakeholders consider them still too lax (EEB and BirdLife International, 2022). Third, Slovakia's CAP Strategic Plan allocates EUR 560 million (28% of pillar 1) to farmers that voluntarily commit to more environmentally ambitious actions as part of a new Whole-Farm Eco-Scheme. This initiative aims to support biodiversity by dividing large parcels of land by biobelts of a minimum of 12 m in width and setting aside non-productive landscape elements beyond mandatory requirements. Fourth, the plan encompasses AECMs (pillar 2) for protecting great bustard, ground squirrel, grassland habitat and Natura 2000 sites, and support for adopting and maintaining organic farming on 14% of agricultural land. Payment levels for the Eco-Scheme and AECMs were calculated carefully and certified by an independent body (MoA, 2023c).

To further promote positive biodiversity outcomes from the CAP, Slovakia could continue to build and disseminate knowledge about biodiversity-friendly and climate-smart farming practices, including through the European Innovation Partnership for Agricultural Productivity and Sustainability. Additionally, it could examine the potential benefits of using the flexibility mechanism to increase the share of pillar 1 going to the Whole-Farm Eco-Scheme and to transfer funding from pillar 1 to pillar 2 AECMs. Piloting results-based with larger compensation rates or hybrid results-based and management-based AECMs could also be beneficial. Results-based payments have several advantages such as increased cost effectiveness, although they can present challenges such as an increased monitoring burden (OECD, forthcoming) (OECD, 2022). Slovakia could also explore the potential for spatially co-ordinated, collective action from farmers, which can improve the performance and efficiency of AECMs (OECD, forthcoming).

Beyond CAP payments, Slovakia could consider other policy measures to promote biodiversity in the agriculture sector. For example, the Slovak Land Fund could introduce terms into agricultural leases requiring specific biodiversity measures in key areas such as PAs. It could also consider favourable lease rates where additional demands are placed on farmers. Additionally, to manage increased pesticide use, Slovakia could work through the farm advisory services to establish and apply economic thresholds to inform decisions on pesticide application (Keasar et al., 2023) (Pecenka et al., 2021), or consider risk-based pesticide taxes (OECD, 2023c). To manage the adverse effects of fertilisers, strengthened nitrate testing and compliance control in areas threatened by nitrates (as indicated in the EnviroStrategy), would be beneficial.

2.4.3. Energy

Energy production

Most of Slovakia's primary sources of energy are imported. Domestic sources are mainly renewable energy (primarily hydropower and bioenergy, but also geothermal and increasingly wind and solar power) (Chapter 1). Slovakia has faced challenges managing the impacts of hydropower and bioenergy but is taking steps to address these. As a late mover on solar and wind, Slovakia has an opportunity to learn from other countries' experiences in harnessing synergies and minimising trade-offs between climate-energy and biodiversity objectives when scaling up these technologies (OECD, 2024).

Slovakia's large hydropower schemes installed last century dramatically altered the landscape, fragmenting freshwater habitats and altering hydrology. Slovakia committed to remove barriers and improve the connectivity of freshwater ecosystems in its EnviroStrategy 2030 and has initiated work (e.g. Norway Grant Project ACC04P06). Recent hydropower developments are smaller scale. While typically less harmful than traditional schemes, small-scale developments can also negatively affect biodiversity and therefore demand caution. Slovakia received formal notice from the European

Commission for failing to conduct an SEA of the national plan on the usage of hydropower (EC, 2022a). Only 4 of 37 small hydropower plants listed in the plan were subject to an SEA. Furthermore, at the project level, authorities did not conduct the necessary environmental impact assessments (EIAs) for several already constructed hydropower plans in line with the EIA and Water Framework Directives (EC, 2022a).

In the last decade, demand for bioenergy increased owing in part to renewable energy subsidies in the state budget and EU structural funds. In 2017, the total consumption of solid fuelwood biomass in Slovakia (fuelwood, wood chips, woody residue, briquettes and pellets) reached over 3 million tonnes (ENRD, 2020). The increased bioenergy demand contributed to logging beyond the volumes specified in management plans, removal of forest logging residues for bioenergy production and cutting of wood vegetation outside of forest areas (windbreaks, trees along the rivers and roads, for example). The Slovak Regulatory Office for Network Industries confirmed that several power stations were producing electricity using forest wood of high quality (ENRD, 2020).

Slovakia has taken important steps to address the negative impact of bioenergy. Notably, the government amended Act no. 309/2018 on the Promotion of Renewable Energy Sources and High-efficiency Cogeneration. This legislation forbids state subsidies for all wood burned in biomass energy facilities, except for wood originating from energy crops and waste from the wood processing industry. Power stations may only burn chips made from low-grade timber not suitable for other industrial purposes. Only wood of the lowest quality can be used for energy purposes. Furthermore, the government has adopted criteria for the sustainable energy use of wood biomass in two EU-funded programmes: the Operational Programme Quality of Environment and the Rural Development Programme in 2017. The criteria focus on i) the proof of origin of fuel dendromass; ii) its transportation and distribution; and iii) the effectiveness of wood biomass energy conversion (ENRD, 2020).

The EnviroStrategy 2030 sets an objective of binding sustainability criteria and rules for every renewable energy resource that accounts for impacts on PAs and protected species of plants and animals. Criteria are yet to be developed for solar PV and geothermal. Criteria for wind were developed more than a decade ago and would benefit from a review to ensure they reflect the latest knowledge and are fit-for-purpose. Industry reports the criteria as overly burdensome (WindEurope, 2022).

In addition to sustainability criteria, the EnviroStrategy 2030 states that all projects should undergo EIAs and must prove they will not have significant adverse impacts on the environment. Direct, indirect and cumulative biodiversity impacts should be considered as part of these environmental assessments and mitigated effectively in accordance with the mitigation hierarchy.

Upstream planning will be essential for maximising synergies and minimising trade-offs across renewable power, climate and biodiversity objectives. Identifying renewable energy zones where risk to biodiversity is low (e.g. abandoned agricultural land, brownfield sites) can help reduce biodiversity impacts and project delays, while allowing for accelerated permitting (OECD, 2024). For solar energy, policy should promote integration of solar PV into the built environment, including roofs and car parks as highlighted by the EnviroStrategy 2030.

Energy transmission

Slovakia has taken effective steps to mitigate the risks of powerlines to biodiversity (electrocution, collision, and habitat fragmentation or disturbance), particularly to birds. An EIA is required for the construction of power lines. Furthermore, under Law no. 543/2002 Coll., the construction or repair of electric power lines requires the use of technologies that prevent bird electrocution. If the death of birds on power lines is documented, electricity companies must adopt measures to prevent this recurring (Raptor Protection of Slovakia, 2021).

Electric companies, the ŠOP, Raptor Protection of Slovakia and other environmental interests have established a strong working relationship and mutual trust. Electric companies generally consider avian

protection at early stages of planning, and some have internal guidelines (e.g. the Eastern Slovakia Electricity Company issued an internal technical norm called: “Construction and amendment of aerial 22kV power lines with respect to bird protection”) (Raptor Protection of Slovakia, 2021). The Raptor Protection of Slovakia co-ordinates field surveys and preparation of mitigation solutions. The combination of clear policy and co-operation has led to development of mitigation solutions (e.g. low-risk siting; new “Antibird” construction design; new types of insulation; bird diverters). A methodology for monitoring of high-risk powerlines has also been developed.

2.4.4. Infrastructure – transport, residential and industrial

The construction and operation of infrastructure for transport, residential and industrial purposes in Slovakia are linked to habitat loss and fragmentation, IAS spread and direct species mortality (e.g. collision with vehicles). They are the main cause of land-use change in grassland and cropland areas (Section 2.2.2). Integration of biodiversity into infrastructure decisions is improving but not systematic.

Positive developments include monitoring of transport impacts on land-use change; strengthened governance of IAS; improved knowledge on migratory routes of large mammals that could be affected by infrastructure development in the Carpathian Mountains; and integration of biodiversity considerations into Transport Strategy 2030. Transport Strategy 2030 was itself subject to an SEA and most transport projects also require EIA by law. Clear targets and indicators for biodiversity within the transport sector are needed to ensure effective implementation of the strategy. Slovakia could draw lessons from the recently completed EU Biodiversity and Infrastructure Synergies and Opportunities for European Transport Networks (BISON) project.

2.4.5. Tourism

Poorly regulated tourism has put pressure on Slovakia’s ecosystems. This is apparent in national parks, with notable examples including the development of the ski resorts and associated infrastructure at Donovaly and Jasná in the High Tatras (Gáliš et al., 2022). The potential benefits of sustainable ecotourism for biodiversity, local economies and people have not been fully realised. Slovakia is starting to address these concerns through EnviroStrategy 2030 and development of its Strategic Plan for the Development of Green Tourism. Tourism and biodiversity links have also been promoted through projects under the Interreg Centralparks initiative and the Slovak Republic-Hungary Cross-Border Cooperation Program. The EEA Norway Grants is also supporting work by NGOs under its Active Citizens Fund. These aim to provide recommendations and lessons learnt from other parts of the world on how to improve conditions for ecotourism for the benefit of national parks and tourism businesses.

2.4.6. Other sectors

Co-operation between the health and environment sectors improved over the last decade, although mainstreaming is at an early stage. Further efforts are needed to translate guidance from the CBD and the World Health Organization on health and biodiversity into national policies and projects.

Little to no progress has been made on mainstreaming biodiversity into manufacturing and processing sectors, cosmetics and pharmaceuticals. A new NBSAP provides a key opportunity to address this gap. Stakeholders from these sectors should be involved in its development and implementation; concrete measures for mainstreaming biodiversity should be identified and implemented.

2.5. Instruments for biodiversity conservation and sustainable use

Slovakia deploys various regulatory, economic and other instruments that may contribute directly or indirectly to the conservation, sustainable use and restoration of biodiversity (Table 2.3). PAs form the cornerstone of biodiversity policy. The PA network is extensive but faces shortcomings that the government seeks to address through ongoing reform. Effective delivery of this reform is fundamental for achieving Slovakia's biodiversity objectives. While Slovakia has some biodiversity-relevant economic instruments, considerable scope exists to scale up their use and effectiveness.

Table 2.3. Policy instruments supporting the conservation, sustainable use and restoration of biodiversity in Slovakia

Regulatory Approaches	Economic Instruments	Information and Other Instruments
Spatial and landscape planning	Financial compensation for limitations placed on land management	Ecolabelling (sustainability certification): FSC and PEFC for forests; organic farming certification
Protected areas and associated restrictions on access and economic activities	Levy on the withdrawal of land from agriculture or forest use	Conservation and recovery programmes
Restrictions or prohibitions on use (e.g. trade in endangered species and CITES; hunting bans)	Fee for hunting rights	Complex Information and Monitoring System (KIMS)
Environmental assessment requirements (SEA, EIA, Appropriate Assessment)	Environmentally-motivated subsidies in the agriculture and forestry sectors (under the Common Agricultural Policy)	State of Environment Reports; public website with environmental indicators and information
Permits and quotas (e.g. timber harvesting permit; hunting quotas)	Tax credits on expenditure on environmental protection activities (e.g. forest cultivation, restoration of land affected by mining, landfill closure and remediation)	Forest management plans
	Exemption of property tax for forest cultivation, restoration of land affected by mining, landfill closure and remediation	
	Charges addressing water quality and quantity (water tariffs; groundwater abstraction and surface water abstraction charges)	

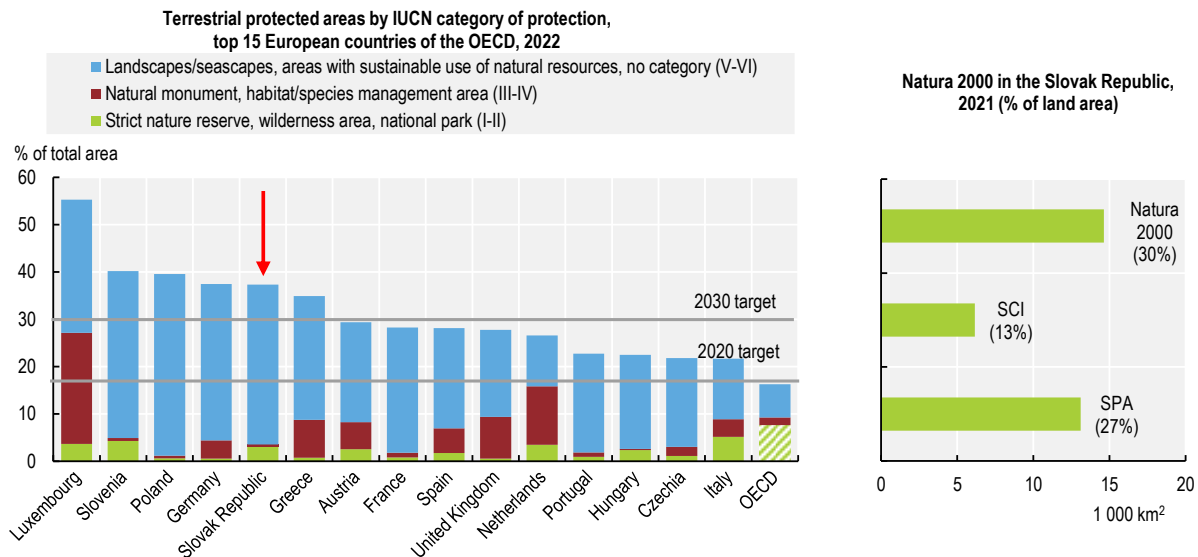
Source: Author based on multiple references.

2.5.1. Protected areas

Extent of protected areas

Slovakia has an extensive PA network. With over 37% of its territory designated for protection, it has exceeded the 2020 target for PA coverage of 17% (Aichi Target 11) and the 2030 target of 30% under the Kunming-Montreal Global Biodiversity Framework (Target 3). Slovakia's PA coverage is significantly higher than the OECD average (Figure 2.9).

Figure 2.9. The share of protected land is high in Slovakia in international comparison



Note: Natura 2000 sites cover 30% of total land area and partially overlap with the national system of protected areas.

Source: OECD (2023), OECD Environment Statistics (database); EC (2022), "New EU Proposal for Nature Restoration", Nature and Biodiversity Newsletter Natura 2000, N. 52, August.

StatLink  <https://stat.link/39rwrte>

The PA network comprises domestic, European (i.e. Natura 2000) and international (Box 2.1) PAs. Domestic PAs cover almost a quarter of the territory. They consist of 9 national parks, 14 protected landscape areas and 1 166 small-size PAs (ŠOP, 2022a). The national parks form the backbone of the PA system, covering 3 157 km². They vary considerably in size from under 40 km² (Pieniny National Park) to greater than 760 km² (Low Tatras National Park) (Gális et al., 2022).

While the number of national parks and protected landscape areas has remained constant, Slovakia has extended the number and area of small-size protected areas. Notably in 2021, the country declared 76 new nature reserves to protect 65 km² of old growth forest – some of the last remaining primary forest in Europe (MoE/SEA, 2023).

Natura 2000 sites cover 30% of Slovakia's territory, which is approximately 80% of the area under protection.⁵ Natura 2000 sites comprise 642 Sites of Community Importance (SCI), collectively covering 13% of the territory, and 41 Special Protection Areas (SPA), which cover 27% of the territory. Natura 2000 sites cover 230 species and 66 habitats protected under the EU's Nature Directives. The designation of SCI as Special Conservation Areas (SCA), which is required by EU law, has been slow in Slovakia but is accelerating. According to EC (2022b), 446 SCIs are yet to be designated as SCA. In 2022, Slovakia published "Conservation principles for habitats of European interest, and habitats of species of European interest, in sites of European importance" (ŠOP, 2022b).

Box 2.1. Protected areas of international significance

UNESCO: The Slovak Republic has two natural sites on the World Heritage List: 1) Slovak Karst, which forms a bilateral Slovak-Hungarian World Heritage Site with Aggtelek Karst. The Slovak Caves Administration of the ŠOP manages and protects the Slovak Karst and co-operates with Hungary on monitoring and research, exchange of data and information, implementation of projects, conferences, publications and reporting. 2) The “Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe”, which is a transnational serial property comprising 94 component parts across 18 countries. Slovakia co-operates with other UNESCO members to harmonise management in the property and the buffer zone, raise awareness, and conduct research and fundraising.

UNESCO Man and the Biosphere Programme: Within the UNESCO Man and the Biosphere Programme, the Slovak Republic has one bilateral Tatry Biosphere Reserve (Slovakia-Poland) and one trilateral Východné Karpaty Biosphere Reserve (Slovakia-Poland-Ukraine). In both reserves, co-ordination boards comprise representatives of partner-protected areas in Poland and Ukraine, relevant institutions and stakeholders. The boards handle co-operation and communication at national and international levels with partners and stakeholders. They also implement projects, exchange data and information, publish materials and prepare reporting questionnaires, among other activities.

Ramsar sites: Slovakia has 14 sites designated as Wetlands of International Importance (Ramsar sites). Together, the sites have a surface area of 407 km², including marshes, lakes, fishponds, rivers, caves, floodplains, peatbogs and swamps. The Management Plan of Wetlands in Slovakia and its Action Plan are updated every three years. Austria, Czechia and Slovakia have co-operated since 2001 on the Trilateral Ramsar Platform for the Transboundary Trilateral Ramsar Site “Floodplains of the Morava-Dyje-Danube Confluence”. Through the platform, the partners exchange information, and prepare joint projects and joint management approaches. They also co-operate on biodiversity protection, forestry, water-borne transport, water management and environmental education. Carpathian countries are co-operating within the Carpathian Wetland Initiative.

European Diploma for protected areas: Two sites in Slovakia received the European Diploma for protected areas: 1) Dobročský prales Primeval Forest, an undisturbed ecosystem of the Carpathian forests where species such as fir and spruce are of exceptional size and volume; 2) Poloniny National Park, which has a high degree of preserved primary forest dating to the glacial period.

Source: Country submission.

Effectiveness of protected areas

While Slovakia has a large PA network, it is not functioning optimally (Gális, 2017) (Gális et al., 2022). For example, a satellite-based analysis of forest cover found that Slovakia lost 12.2% of forest cover across the nine national parks from 2000-16, compared to just 6.4% outside of national parks (Gális, 2017). Several shortcomings undermine the performance of protected areas.

First, the PA system is complex, with different systems of protection. National, EU and international sites of importance often overlap but do not have identical borders and protection levels. This creates confusion among stakeholders and challenges in harmonising objectives.

Second, most of the area of Slovakia’s PAs is under low levels of protection. Slovakia’s land is divided into five protection levels. The territory of national PAs falls within protection levels 2-5, with each level imposing increasing restrictions on land use. Two-thirds of Slovakia’s national PAs are at the second level of protection, while only 10% are in the highest two levels of protection (4 and 5) (Gális et al., 2022). More

than three-quarters of the area of the nine national parks is in the third level of protection, while less than 20% of the area is in the highest level of protection and these areas are fragmented. The situation varies across national parks, for example, 42% of the Tatra National Park is under strict protection compared to just 4% of the Slovak Karst National Park (Gális et al., 2022). None of the national parks meet the condition of the predominance of areas undisturbed by human activity under International Union for Conservation of Nature (IUCN) category II – National Parks.

Table 2.4. Slovakia's protected areas by degree of protection

Protection level	Category of protected areas	Area (hectares)	% coverage of Slovakia's PAs
1st level	SPAs=Special protection areas (Natura 2000 sites) and "free country" (outside from the other protected areas)	3 764 578	76.8
2nd level	Protected landscape areas, buffer zones of national parks and (D zones/parts of) other categories of protected areas	731 983	14.9
3rd level	C zones of national parks and other categories of protected areas	274 531	5.6
4th level	B zones of national park and (B zones/parts of) other categories of protected areas	32 750	0.7
5th level	A zones of national park and other categories of, protected areas	99 658	2.0
Levels 2-5	Protected areas in the national system	1 138 922	23.2

Source: ŠOP (2022), Overview of Protected Areas.

Third, zoning of PAs is yet to be completed. Zoning is necessary for consolidating areas of the same protection level and clarifying management objectives across the multiple systems of protection. However, zoning is complete for just three of the nine national parks (Slovenský Raj [2016], Pieniny [2022] and Muránska planina [2022]), and one protected landscape area (Horná Orava). Zoning for a further three national parks began in December 2022.

Fourth, management plans are lacking for most PAs. For example, management plans have been approved for fewer than 100 PAs in the national system (ŠOP, 2023b) and 23 of the 41 SPA (MoE, 2023a). Most national parks do not have approved management plans for their entire territory. For some PAs, management plans exist on paper but are not implemented effectively.

A fifth reason, which is linked to the lack of implementation of management plans, is the low capacity of the state to manage protected areas. For example, the number of employees and the budget per 100 km² of Slovakia's national parks has been consistently below the average for the region for national parks of similar size (Gális et al., 2022). Funding has been largely dependent on EU funds and has fluctuated. Despite an increase since 2018, state funding is insufficient (Gális et al., 2022).

Protected area reform

Recognising the challenges facing its PA system, Slovakia has launched a reform. EnviroStrategy 2030 outlines commitments and actions to simplify and strengthen the PA network, promoting alignment with the IUCN PA categories and EU commitments. It sets an ambitious target of expanding no-intervention zones in national parks to 50% by 2025 and 75% by 2030. Due to the degraded state of parks, this target will not be attainable for all parks. Active management will first be required to restore degraded ecosystems to a more natural state. The EnviroStrategy therefore notes that in national parks where human intervention will be required to achieve biodiversity protection objectives, the non-interference zone can be less than 50%.

A 2021 amendment to the Nature Act established nine independent national park administrations under the MoE, which are responsible for park management, administration and strategic planning. State land in national parks in the two highest protection levels was transferred from the MoA to the MoE. However, the transfer of the remaining state land is conditional upon completion of national park zoning. Prior to this amendment, the management of state lands in national parks was carried out almost exclusively by organisations subordinate to the MoA.

The amended Nature Act also strengthens the legal basis for zoning of national parks in line with international standards. It recognises four categories within national parks: A zones (equivalent to national protection level 5), which are mainly unaltered natural ecosystems where no-intervention management is applied; B zones (protection level 4), which are partially altered ecosystems that seek to gradually restore the site to a natural state; zones C (protection level 3) and D (protection level 2), which are significantly altered and where the objective is to conserve, sustainably use and restore biodiversity to ensure the integrity of the PA.

Slovakia's priority is to complete national park zoning. However, zoning is complex due to longstanding tensions between landowners and the state, conflicts between economic interests (predominantly forestry) and biodiversity interests, lack of information (or misinformation) and the large share of national parks under private ownership. Fragmentation of land ownership, which is yet to be fully resolved by the unfinished land reform, makes it difficult to reach consensus and agreement. Furthermore, the requirement for zoning to be completed before state land in lower levels of protection is transferred to the MoE provides an instrument for opponents to the national park reform to undermine zoning to maintain the status quo.

Stakeholders need clear information about the zoning process, its objectives and implications. National park zoning may restrict some activities, while creating new business and employment opportunities in the region. The potential socio-economic benefits of zoning need to be clearly communicated and trade-offs carefully managed. Strengthening participatory approaches in protected area zoning, governance and management is fundamental. Such approaches should ensure meaningful engagement of landholders, forestry interests, biodiversity experts and other stakeholders. The national park councils required by the amended Nature Act is one tool through which Slovakia could promote wide stakeholder participation, including from local communities and landholders, as is done in Estonia's national park development boards.

The development strategies required for each national park provide an important opportunity for clearly articulating the park's vision, mission and strategic goals. These strategies should consider not only environmental, but also social and economic concerns. National park development strategies and regional economic and social development plans should be consistent. Both should support a transition to sustainable local economies that benefit from, and contribute to, the protection of national parks. Slovakia could draw on its experience developing the post-mining transition plan for the Nitra region.

Slovakia must address the high share of private land in national parks. The EnviroStrategy recognises several options, including exchange of private and state land, purchase or lease of land, and contractual care arrangements. The government should seek cost-effective approaches that are also socially and politically viable. The appropriate solution may differ across national parks and landholders. To support these efforts, RRP component 5 dedicates EUR 77.5 million to financing property settlements with private landowners in national parks.

National parks require sufficient, predictable and long-term funding to hire more staff (e.g. foresters/land managers, guards, tourism service providers) and invest in park infrastructure (e.g. visitor centres, trail development or maintenance). An effective financing strategy would draw on state funding, EU and international funds, and national parks' own revenues. In 2023 an amendment to Act 414/2012 allows earmarking of auction revenues from ETS to support carbon sequestration measures in PAs. This could provide a new source of financing. However, the criteria for these projects and modalities for disbursing funds are yet to be defined. It will be critical to ensure that such funds are used efficiently and support both

climate and biodiversity objectives. Additional funding has also been secured through component 5 of the RRP, which earmarks EUR 16 million for sustainable tourism projects for NP Poloniny and NP Muránska plainina.

To complement state and EU funding, national parks could secure additional funding through revenue-generating mechanisms such as entrance fees, accommodation tax, issuance of concessions and payments for ecosystem services (Table 2.5), but these are yet to be leveraged. An exception is the use of PA entrance fees at Slovenský Raj National Park. However, these fees are set lower than the willingness-to-pay (Gális et al., 2022).

Table 2.5 Potential revenues from innovative forms of financing national parks

	Amount (EUR)	Explanation	National Parks
Entrance fee	6.6-11.1 million	Charging entry for most visited sections and places of national parks	Most visited national parks
Accommodation tax	1.5-3.2 million	Tax in municipalities in national parks and their protection zones	Most visited national parks
Issuance of concessions	A few million	Business fee for catering services, parking lots, ski resorts, other services	Most visited national parks
Tourist services of administration parks	Hundreds of thousands	Guide, attractions and more	All national parks
Voluntary contributions	Hundreds of thousands		All national parks
Charging ecosystem services	3.7 million	Payments for limiting management in protective zones of water resources	Poloniny andotehrs
Forestry	8.4-10.5 million	Close-to-nature forestry in state lands	Larger parks with high share of state land
Common agricultural policy	A few million	Payments for close-to-nature forestry and management of permanent grasslands in Natura 2000 sites	Any national park. More suitable for parks with high proportion of permanent grasslands

Source: MoE (2022), National Parks for the 21st Century: The economic potential of national parks and the possibilities of their alternative financing.

2.5.2. Spatial and landscape planning

Slovakia has four tiers of spatial planning to determine and regulate the use of its territory, with an objective of sustainable development. Its basic spatial planning document is the Slovak Land Development Concept 2001, which was updated in 2010. At the regional level, all self-governing regions have valid land-use plans, which they continuously update. Municipalities of more than 2 000 inhabitants and small municipalities planning extensive developments must develop local land-use plans. More detailed zoning plans are developed if required by local land-use plans (OECD, 2017). The spatial plans consider nature and landscape protection. They are also subject to SEAs.

To better integrate nature, biodiversity and landscape protection into spatial planning, Slovakia developed the Territorial System of Ecological Stability (ÚSES in Slovak) concept and methodology. The ÚSES, adopted in the 1990s, is underpinned by landscape ecology and the landscape-ecological planning (LANDEP) methodology (Izakovicova and Laszlo, 2010). ÚSES, which is supported by the Nature Act and other legislation, delineates “green infrastructure” such as biocentres, biocorridors and interactive landscape elements. Biocentres are habitats providing food, shelter and sites for reproduction, while biocorridors and interactive elements ensure ecological connectivity and stability. The ÚSES outcome is a

set of maps with a projection of green infrastructure, eco-stabilising measure, potential conflicts of interests and hazards (Izakovicova and Laszlo, 2010).

In practice, landscape planning is not systematically applied. Challenges identified include misunderstanding the importance of landscape-ecological documentation within spatial planning processes; complexity of the methodology; lack of capacity to implement the methodologies, low quality control; and lack of willingness to integrate landscape-ecological documentation into territorial planning and land consolidation projects (Izakovičová et al., 2019).

Nonetheless, Slovakia has continued to advance landscape planning during the review period, developing 50 regional and local ÚSES projects under the Operational Programme Quality of the Environment: “Processing projects of regional territorial systems of ecological stability for the needs of creating a basic starting point for the regulation of the proposal for building green infrastructure RÚSES II” (MoE, 2020b). Automation of the generation of local ÚSES documents also progressed.

Moreover, landscape planning is identified as a priority in the EnviroStrategy and the RPP dedicates funding for a landscape planning reform. The reform intends to strengthen the link and co-ordination between spatial and landscape planning. A new law on landscape planning, which has been drafted but not yet adopted, is a key pillar of this reform (MoE, 2020b).

Slovakia should pursue its efforts to promote integrated landscape planning to improve species’ habitat, water retention and carbon stocks through biological corridors, vegetation belts and other green infrastructure. Effectively implemented landscape planning could provide multiple benefits to biodiversity, climate change adaptation and climate mitigation. As part of these efforts, it would be beneficial to review and refine the LANDEP and ÚSES methodologies and how they are applied in practice.

2.5.3. Economic instruments

Compensatory payments for restrictions on management

Under the Nature Act (§ 61), landowners who face restrictions on normal management due to prohibitions and other conditions of nature and landscape protection are eligible for financial compensation. In 2021, more than EUR 10 million was paid in compensation (MoE/SEA, 2023). As aforementioned, the government is exploring purchase, exchange, lease of land, contractual care, or payments in the form of a simple annual annuity as a sustainable alternative (MoE/SEA, 2023) (MoE, 2022c).

Forestry support for non-productive forest functions

Forest managers with more than 5 ha of forest can apply for a subsidy under the MoA’s Forestry Support for Non-Productive Forest Functions⁶ programme. The payments aim to promote the non-timber ecosystem services by supporting sustainable silviculture measures and close-to-nature forest management⁷ (Sarvašová et al., 2019) (Báliková and Šálka, 2022). The scheme is management-based (i.e. based on adoption of specific practices) rather than results-based (i.e. based on change of ecosystem services).

The subsidy is closely linked to the mandated forest management plans. Forest managers can apply for the payments after the first five years of the plan and again after ten years when the plan terminates. As the payments are made retroactively for management actions agreed when the plan was adopted, they are unlikely to have driven behavioural change. However, forest managers may be motivated to emphasise sustainability and close-to-nature forest management when preparing new forest management plans (Báliková and Šálka, 2022).

Support is calculated based on legislation (Decree no. 226/2017 Coll., Annex 1). The per hectare rate of the subsidy is 50% higher for areas under close-to-nature management, providing an additional reward to

foresters that promote resilient, multifunctional forests. Total payments per recipient are capped at EUR 200 000 over three years, in line with the EU's *de minimis* regulation. However, the demand for payments consistently outweighs supply. A shortening ratio is applied to all applications to account for the limited budget. In the fourth call for applications, for example, recipients requested EUR 10.8 million in total. Payments were subsequently reduced by a ratio of 0.28.

While the instrument fills a gap in Slovakia's policy mix, it has several limitations beyond the limited availability of funds (Báliková and Šálka, 2022). First, subsidies have been provided to all applicants who thinned forest stands according to their forest management plans, including some applicants who did not fulfil some of the pre-defined criteria (e.g. tree species composition). Second, in the absence of information on the costs of close-to-nature measures and the public benefits provided by ecosystem services, the subsidy level may not be optimal. Third, while the Forest Act defines "close-to-nature" (since a 2019 amendment), commonly agreed measures for close-to-nature forestry are missing. Finally, random controls of forest management practices are insufficient due to staff shortages. Furthermore, ecosystem service changes are not systematically monitored and evaluated to understand the impact of this scheme (Báliková and Šálka, 2022).

Forest land tax relief

Land tax requirements differ depending on the forest category. Land tax must be paid on economic or production forests but not on protective forests, special purpose forests and forests in national parks. In addition to these obligatory tax exemptions, optional tax exemptions can be granted for some other types of land, including swamps, salt marshes and forests in water sanitation zones.

Protective forests and special purpose forests are primarily managed to provide non-timber ecosystem services (e.g. watershed and habitat protection, recreation). By reducing land tax for these forests, the government essentially subsidises a bundle of ecosystem services provided by these forests. However, landholders and beneficiaries tend not to associate the tax relief with the provision of these services (Sarvašová et al., 2019).

The advantage of the instrument is its low administration burden, transparency and political feasibility (Sarvašová et al., 2019). However, its effectiveness in promoting biodiversity protection and restoration is unclear. Forest owners must already respect the restrictions on the different forest categories. Furthermore, the economic incentive from the land tax relief is unlikely to be sufficient to stimulate a change of categories from production to protection forests, given the opportunity costs associated with timber harvesting. However, in certain cases it may help incentivise reclassification of production forest to special purpose forests, which allow some degree of production (Sarvašová et al., 2019). It also serves to strengthen and help compensate for regulatory requirements. In the absence of the tax relief, forest owners may be incentivised to recuperate their costs through more intensive economic activities elsewhere (e.g. increased harvesting in their production forests) (Sarvašová et al., 2019).

Protected area entrance fees and tourism taxes

PA fees could help finance national park management and address tourism pressure but are underused in Slovakia. Only one of the nine national parks in Slovakia – Slovenský Raj – has PA fees. The entrance fee is set at EUR 1.5 per adult for a day and EUR 0.5 per child (6-15) and pensioner (over 64 years). Citizens of local municipalities are exempt. The fees generate tens of thousands of euros in annual revenue for the municipality, some of which supports efforts to run and operate the national park.

Scope exists to increase the fee at Slovenský Raj, which is lower than the willingness-to-pay. Additionally, Slovakia could introduce PA entrance fees at other heavily visited national parks such as TANAP, NAPANT and Mala Fatra. A 2021 survey in Mala Fatra National Park found that people would be willing to pay EUR 4 to enter (Gális et al., 2022). By one estimate, appropriately priced PA fees would generate

EUR 6.6-11.1 million per year in revenue for national parks (Gális et al., 2022). PA fees could be tiered as in NP Slovenský to provide favourable rates (or exemptions) to local communities compared to other domestic and international visitors.

Scope exists to use tourism taxes to raise revenues for national parks. The average annual revenue of accommodation facilities in national parks in 2020 was more than four times the Slovakian average. Local accommodation tax already exists in Slovakia, but revenues are not earmarked for nature protection. Slovakia could consider linking this tax to national park protection. For example, Spain's Balearic Islands levies an accommodation tax of EUR 0.13-4, depending on the type of accommodation and the season. The revenue from the tax is used for ecosystem restoration, land acquisition, infrastructure improvements and similar purposes (Gális et al., 2022).

Levies on removing land from forest use or agricultural use

Slovakia places levies on the removal of land from forest or agricultural uses. While neither instrument explicitly targets biodiversity, by preventing land-use change in forests and agri-ecosystems the levies can contribute to nature protection. Forest owners are required to manage forests for their defined function (e.g. production or protection). However, district authorities may grant exemptions in exchange for a fee. The fee aims to incentivise maintenance and sustainable management of forests, and to generate revenue for the state budget. In 2021, fees for the removal for forest land amounted to EUR 1.22 million (MoE/SEA, 2023). Levies for the exclusion of forest land declined over the past decade, mainly due to fewer exclusions (MoE, 2022c).

Similarly, agricultural land can be used for other purposes if justified and deemed necessary (Act 220/2004 Coll.). However, the applicant must pay a fee for the permanent or temporary withdrawal of agricultural land (Regulation 58/2013 Coll.). The fee aims to protect high quality agricultural land. As such, the rate of the fee depends on the quality of the agricultural land. Annual fees for the removal of agricultural land for non-agricultural purposes fluctuated during 2010-20. In 2021, fees totalled EUR 2.5 million (MoE/SEA, 2023). Several activities are exempt from the levy. These include constructions to support agricultural land access and protection; construction of water reservoirs, wastewater treatment plants, road and railways; public buildings whose investor is the municipality; defence; and land under family houses of certain sizes.

Biodiversity offsets

Biodiversity offset schemes are based on the polluter pays principle. Designed effectively, they can incentivise developers to avoid and minimise their impacts on biodiversity. At the same time, they can provide a source of funding to compensate for any residual adverse impacts on biodiversity and ecosystem services. They can also be designed to deliver net-positive outcomes for biodiversity.

Slovakia does not have an active biodiversity offset scheme. However, the Nature Act stipulates, in line with EU legislation, that compensatory measures must be taken for projects that have adverse impacts on Natura 2000 sites but are authorised for imperative reasons of overriding public interest. In this situation, the compensatory measure shall be targeted, to a comparable extent, at the species and habitats adversely affected. It shall provide functions comparable to those performed by the area affected by the plan or project.

Given the ongoing and projected expansion of infrastructure in Slovakia, scope exists to develop a biodiversity offset scheme. Such a scheme should draw on other countries' experiences and follow best practices such as in OECD (2016). The mitigation hierarchy should emphasise avoidance of impacts. Slovakia could also consider a no-net loss or net-positive gain requirement for future developments and a suitable metric for determining net impacts. In the United Kingdom, the 2021 Environment Act requires new developments in England seeking a planning permit to demonstrate a 10% increase in biodiversity at or near the project site, measured using Defra's Biodiversity Metric (UK, 2021).

2.5.4. Reform of harmful subsidies

Slovakia aims to phase out environmentally harmful subsidies by 2030 (Chapter 1). It is focusing its efforts on harmful subsidies in the energy and transport sector, covering fossil fuels and unsustainably sourced biomass. As climate change and pollution contribute to biodiversity loss, reforming these harmful subsidies will benefit global biodiversity. Harmful subsidies to biomass have already been reformed and helped to reduce logging intensity in Slovakia (Section 2.4.3).

Slovakia has also taken steps to reduce environmentally harmful subsidies in the agricultural sector by including better targeted and environmentally more rigorous measures in the CAP Strategic Plan 2021-27 (Section 2.4.2). Slovakia should closely monitor implementation of the new CAP and assess its impact on environmental values.

Slovakia is yet to systematically evaluate all harmful subsidies and other incentives that could potentially impact biodiversity. This is a key step for aligning with Target 18 of the Kunming-Montreal Global Biodiversity Framework.

2.5.5. Rescue and management programmes for endangered and protected species

Slovakia implements rescue and management programmes for selected threatened and protected species. These programmes are developed in compliance with the Nature Act. Their goal is to stabilise and increase target species' populations by identifying and addressing main pressures.

Rescue and management programmes are continuously adopted and implemented. However, they depend on funding and the number of active programmes declined over the past decade. Since 2010, rescue programmes have been approved and implemented for eight threatened animal species. No new programmes have been approved for plant species. Management programmes have been established for three large mammals. These aim to amend legislation, implement practical management measures (e.g. quotas and hunting conditions, applying compensation for damages, implementing measures to eliminate damage to livestock caused by these animals), monitoring, educating the public and research.

Table 2.6 summarises active rescue and management programmes in 2022.

Various species targeted by rescue and management programmes have seen positive population trends. For example, the populations of golden eagle, maned bison and beaver increased during the last decade following implementation of rescue programmes in the late 2000s (EEA, 2021). The three mammals for which dedicated management programmes were established during the last decade have also seen positive population trends.

Table 2.6. Rescue and management programmes

Overview of programmes active in 2022

Species	Implementation period
Rescue programmes	
<i>Falco vespertinus</i>	2018-22
<i>Tetrao urogallus</i>	2018-22
<i>Botaurus stellaris</i> and <i>Aythya nyroca</i>	2019-23
<i>Tetrao tetrix</i>	2018-22
<i>Colias myrmidone</i>	2021-25
<i>Parnassius apollo</i>	2022-26
Management programmes	
<i>Ursus arctos</i>	2016-25
<i>Lynx lynx</i>	2017-26
<i>Canis lupus</i>	2016-25

Source: ŠOP (2022), Rescue and Management Programmes for Protected Animals.

2.5.6. Ecosystem service valuation and natural capital accounting

As an EU member, Slovakia must evaluate its ecosystems and the services they provide. In EnviroStrategy 2030, Slovakia commits to "evaluate and sustainably use ecosystem services". By 2030, it aims for all ecosystems to be treated equally and reflected in the national accounting system. Ecosystems are to be evaluated and quantified, and options for monetising ecosystem services considered.

Evaluation of ecosystem services in Slovakia has progressed, although these assessments do not yet inform decisions. At the site level, ecosystem services have been evaluated at the national parks of Vel'ká, Slovenský Raj and Muránska planina. Additionally, as part of Interreg Central Europe, Slovak experts led the development of the Carpathian Ecosystem Services Toolkit. This aims to guide nature protection authorities and organisations in the Carpathian countries to account for ecosystem service values in their decision making. In the scope of the LIFE 2020-30 IP project, an evaluation of socio-economic benefits and ecosystem services in the Natura 2000 framework is ongoing.

At the national level, notable achievements include publication of the *Catalogue of Ecosystem Services of Slovakia* (Mederly and Černecký, 2019) and *Value of Ecosystems and their Services in Slovakia* in 2020 (Černecký et al., 2021). The former contains a pilot evaluation of 18 ecosystem services (5 production, 10 regulatory/support and 3 cultural). The latter constitutes the first monetary evaluation of selected ecosystem services for individual ecosystems in Slovakia, and the first overall economic evaluation of services provided at the national level. It examines the capacity of Slovak ecosystems to deliver 11 regulatory, 10 provisioning and 2 cultural services (Box 2.2). The establishment of ecosystem pilot accounts (extent, condition, capacity) and their monetisation are planned but not under way.

Box 2.2 The value of ecosystems and their services in Slovakia

The *Value of Ecosystems and their Services in Slovakia* mapped ecosystems across Slovakia's entire territory. The map integrates various data sources, including global information systems and field surveys. It comprises 1 033 905 unique polygons with an average size of 4.9 ha. The report estimated supply of ecosystem services from nine ecosystem types. For each ecosystem service, a score from 0-5 was ascribed depending on the ecosystem, following the methodology of Burkhard et al. (2014). These scores were then adjusted to reflect ecosystem degradation. The monetary value of each ecosystem service per ha/year was ascertained mainly using the value transfer methodology. The report estimates ecosystem service values to be at least EUR 187-225 billion/year, which is more than twice Slovakia's GDP. However, due to ecosystem degradation, Slovakia loses about EUR 20 billion/year per year in potential ecosystem service value. Table 2.7 provides an overview of a subset of the ecosystem services assessed and their values for the ecosystem category "woodland, forest and other wooded land".

Table 2.7. Slovakia's forests contribute a variety of economic benefits to society

Selected ecosystem services and estimated values for the ecosystem category "woodland, forest and other wooded land"

	Selected ecosystem services	Potential value (EUR)	Supply value (EUR)	Forgone value (EUR)
Regulatory services	Global climate regulation	12 876 396 746	10 580 324 938	2 296 071 808
	Water flow regulation	2 659 570 003	1 874 455 754	785 114 249
	Water purification	3 862 299 479	3 170 085 443	692 214 036
	Erosion regulation	18 490 207 681	15 193 085 990	3 297 121 691
	Flood control	21 746 352 925	16 911 401 217	4 834 951 708
	Pollination	3 612 798 190	2 824 472 910	788 325 280
Provisioning services	Biomass for energy	274 336 904	9 697 213	264 639 691
	Fodder (feed for cattle)	110 236 147	83 861 474	26 374 673
	Fibre	7 738 758 708	5 207 808 994	2 530 949 714
	Timber	22 163 258 160	18 211 168 466	3 952 089 694
	Wood fuel	38 637 693 738	31 747 929 149	6 889 764 589
	Wild food and resources	181 641 415	148 930 376	32 711 039
Cultural services	Recreation and tourism	7 059 339 311	5 806 875 957	1 252 463 354
	Landscape aesthetics and inspiration	19 148 709 524	15 734 165 641	3 414 543 883

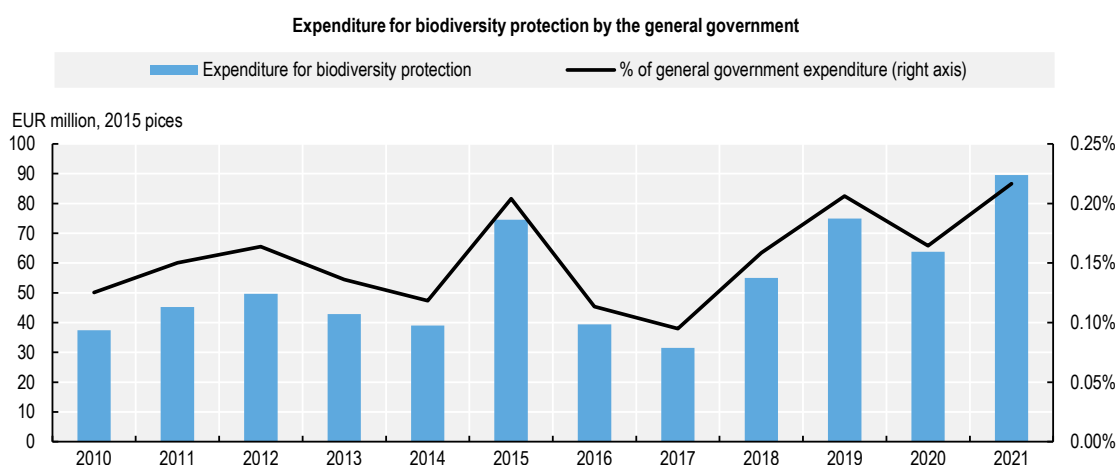
Source: Černecký et al. (2021), Value of Ecosystems and their Services in Slovakia.

2.6. Biodiversity financing and innovation


2.6.1. Domestic financing

For the CBD Strategic Plan 2011-20 period, annual general government expenditure on biodiversity averaged EUR 52 million per year (2015 prices), or 0.15% of annual general government expenditure. Government expenditure on biodiversity protection fluctuated considerably from 2010-21 (Figure 2.10). It dropped to EUR 31.5 million in 2017 (0.09% of government spending) and peaked at EUR 89.5 million in 2021 (0.22% of government spending).

Figure 2.10. Government expenditure on biodiversity protection has fluctuated



Source: OECD (2023), OECD National Accounts Statistics (database).

StatLink  <https://stat.link/4gceyd>

The European Union is an important source of funding for nature and biodiversity in the Slovak Republic. Investment priority 1.3 of the Operational Programme Quality of Environment (2014-20), which is the programme document for drawing environmental aid from EU structural funds and the Cohesion Fund, is on “Protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure”. Projects on biodiversity have also been supported through the Interregional cooperation programme (Interreg Europe) and LIFE funding. For the period 2010-21, for example, LIFE co-financed 15 biodiversity projects in Slovakia (EC, 2021). The EEA and Norway grants have supported climate projects in Slovakia that promote ecosystem-based approaches.

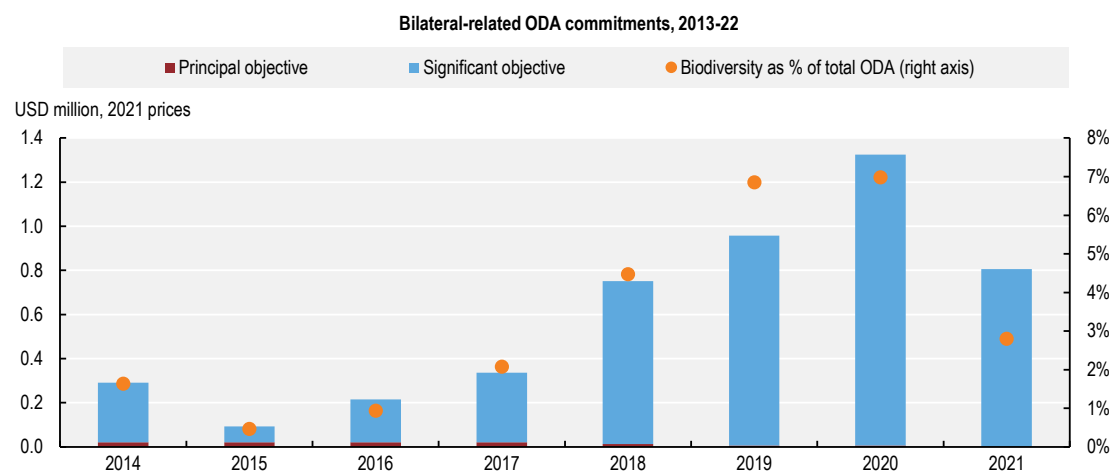
Slovakia recognises a shortfall in financial resources, and lack of a systematic approach to mobilise and allocate finance (MoE, 2020a). EU funds too often substitute for, rather than complement, state funding (Gáliš et al., 2022). At the same time, Slovakia does not harness the full potential of EU and other international funds for biodiversity and other environmental objectives (Chapter 1).

2.6.2. International biodiversity finance (development aid)

Slovakia has made progress in integrating biodiversity into its official development assistance (ODA) and prepared an ODA strategy for 2019-23. Biodiversity-related ODA increased both in real terms and as a percentage of overall ODA from 2013 to 2021 (Figure 2.11). On average, Slovakia committed USD 1.3 million in biodiversity-related ODA per year from 2019-21. This is equivalent to 7% of its overall ODA contribution for this period, which is in line with other Development Assistance Committee members. However, only 0.4% of this USD 1.3 million had biodiversity as a principal objective.


Efforts to consider biodiversity in ODA allocations have been facilitated by enhanced co-operation between the MoE, Ministry of Foreign Affairs and the Ministry of Finance. However, work is needed to identify biodiversity priorities in Slovakia’s bilateral aid and increase biodiversity-related ODA, particularly in activities where biodiversity is a principal objective.

Figure 2.11. Slovakia is better integrating biodiversity into ODA commitments but is yet to identify biodiversity priorities



Note: Data refer to screened bilateral allocable commitments of ODA; three-year moving average data.

Source: OECD (2023), "Aid activities targeting Global Environmental Objectives", Creditor Reporting System (database).

StatLink  <https://stat.link/r2ndow>

2.6.3. Research, development and innovation

Slovakia ranks 21st in the EU-27 on the EU's eco-innovation index,⁸ which looks at environment-related innovations beyond biodiversity (EC, 2023b). While Slovakia addresses biodiversity in research, development and innovation agendas, it does so in an ad hoc way. Short- and long-term priorities and research goals have not been clearly defined, making it difficult to secure finance for biodiversity research and development (R&D). While the MoE joined the Horizon Europe and Biodiversa+ partnership in 2020, Slovakia is yet to harness the full potential of the partnership to promote research and innovation.

Co-operation between the MoE and the Slovak Academy of Sciences has improved, but co-operation between the MoE and Ministry of Education remains limited. A key challenge to improving integration is reported to be the lack of capacity to engage effectively. Lack of engagement with the private sector on biodiversity issues also makes it challenging to identify priorities and to ensure R&D is connected with companies that can then apply the results (Malega et al., 2021).

2.7. The links between biodiversity, climate mitigation and climate adaptation policies

Climate change is increasingly threatening Slovakia's biodiversity and exacerbating existing pressures. At the same time, the loss of biodiversity contributes to greenhouse gas (GHG) emission and has increased the vulnerability of Slovakia's ecosystems to climate impacts. For example, forest stands with unnatural species composition are disproportionately affected by drought, intense storms and increased bark beetle infestation. The lack of landscape elements in agricultural land, contributes to the agriculture sector's vulnerability to extreme rainfall events and drought.

Slovakia needs to scale up action to reduce GHG emissions and increase carbon removals from LULUCF and to adapt to climate change. Opportunities exist to harness synergies across biodiversity protection/restoration, climate change mitigation and climate change adaptation through nature-based

solutions⁹ (ecosystem-based approaches to mitigation and adaptation). The following section examines LULUCF emissions/removals and Slovakia's policy response. It then examines adaptation policy and its links to biodiversity.

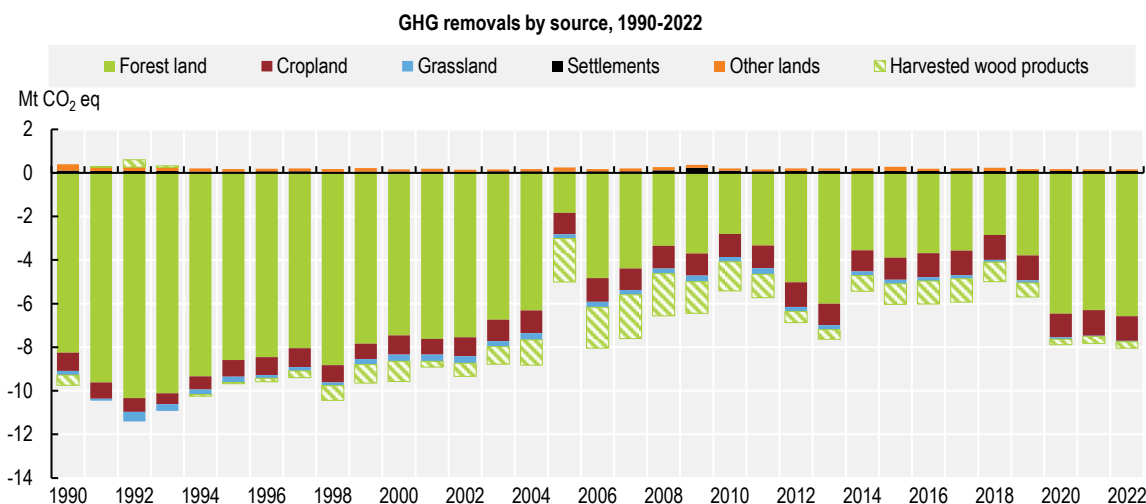
2.7.1. Climate mitigation and biodiversity – LULUCF

State of LULUCF emissions

Net carbon removals from LULUCF averaged 7 774 gigagrammes of carbon dioxide equivalent per year (Gg CO₂e/year) during 1990-2022 and 6 223 Gg CO₂e/year during 2010-22. Forests account for 78% of removals since 1990 and 71% of removals since 2010 (MoE, 2023b). Changes in carbon removals from forests largely explain the annual fluctuations and declining trend in LULUCF removals. Other net sinks are cropland, permanent grassland and harvested wood products. The categories “settlements” and “other lands” are net sources of GHG emissions, mostly due to the construction of transport infrastructure, industrial sites and municipal development.

The skewed age structure of Slovakia's forests (Section 2.4.1) has three important implications for carbon removals. First, while mature stands store more carbon than younger stands, they have lower annual wood mass growth and hence sequester less carbon. Second, planned and actual felling has increased as stands mature and reach the end of their rotation. During 2000-20, the volume of planned felling increased by 85% to reach 9.8 million m³ in 2020 (MoE, 2023b). Third, mature trees, particularly those in monoculture stands, may be more susceptible to disturbance from bark beetles and wind throw. Average removals from forests dropped to 1 831 Gg CO₂e in 2005 (MoE, 2023b). This was due to a large loss of trees (predominantly spruce) from wind damage at the end of 2004 in the High Tatras, effectively halving annual LULUCF removals. In 2020 and 2021, LULUCF removals increased, presumably due to COVID-19 restrictions, which resulted in less forestry activity.

Figure 2.12. GHG removals from land use, land-use change and forestry have declined



Note: Removals dropped by half in 2005 due to wind damage to forests in the High Tatras. Increased removals in 2020/21 likely reflected reduced forestry activity owing to COVID-19. Settlements and other lands are net sources of GHG emissions, mostly due to the construction of transport infrastructure, industrial sites and municipal development.

Source: MoE (2023), National Inventory Report 2022; EEA (2023), Member States' greenhouse gas (GHG) emission projections, 24 October.

LULUCF targets, measures and projections

In 2023, the European Union adopted a more ambitious EU-wide target for net GHG removals in the LULUCF sector. The revised LULUCF Regulation (EU 2023/839) requires Slovakia to increase net GHG removals in the LULUCF sector by 504 kilotonnes (kt) of CO₂e by 2030 compared to the 2016-18 average. The draft Law on Climate Change and Low Carbon Transformation of the Slovak Republic sets a binding commitment to increase LULUCF net removals of GHG emissions in 2030 by 25% compared to 2005. The commitment in the draft law is consistent with the LULUCF Regulation target.

Slovakia has developed two scenarios for the LULUCF sector. The first scenario – “with existing measures” (WEM) – is based on policies and measures adopted by the end of 2020 and how they will affect emissions/removals after 2020. These measures are derived from the Programme of Rural Development 2013-20 and extended to 2022, the National Forestry Programme and Slovakia’s Low-Carbon Strategy (Table 2.8). The second scenario – “with additional measures” (WAM) – also includes application of policies or measures planned after 2020. The additional measures are derived from the draft National Forestry Programme of the Slovak Republic 2022-30, the Strategic Plan of the Common Agricultural Policy 2023-27 and the Act on the Protection of Nature and Landscape amended in 2022.

According to the WEM scenario, in 2030 LULUCF removals will be 2 277 kt CO₂e (48%) lower than in 2005. Removals will continue to decline to 2042 before gradually increasing to 2050, when annual removals will be 75% lower than in 2005 (MoE, 2023c). In the WAM scenario, LULUCF net removals in 2030 are 314 kt CO₂e (7%) higher than in 2005. However, they fall short of Slovakia’s draft law target and commitment under the EU LULUCF Regulation (MoE, 2023c).

To fulfil its commitment under the EU LULUCF Regulation, Slovakia will need to ensure the effective implementation of the identified measures, while also identifying and adopting new measures to reduce emissions and/or increase removals across all land-use sectors. Work is underway to enhance modelling and methodologies to estimate the impact of measures across the different land-use categories and inform their prioritisation.

Table 2.8. Policies and measures in different LULUCF scenarios

Policies and measures	Scenario	Category	Measure
National Forestry Programme/ Rural Development Programme/ Low carbon strategy	WEM	CO ₂ /forest land, cropland, permanent grassland	Afforestation of unused cropland, establishment of stands of fast-growing trees on cropland, measures to reduce fires
National Forestry Programme	WEM	CO ₂ /forest land	Prevention of deforestation (as an integrated part of sustainable forest management)
National Forestry Programme/ Rural Development Programme	WEM	CO ₂ /forest land	Protection of existing forests against natural disturbances (as an integrated part of sustainable forest management)
National Forestry Programme/ Adaptation strategy	WAM	CO ₂ /forest land	Promotion of measures to increase carbon sinks as part of sustainable forest management. Adjustment of tree species composition to increase the resilience of stands to drought and reduce vulnerability to biotic and abiotic agents.
Low carbon strategy/Envirostrategy	WAM	CO ₂ /forest land	Increased forest cover through afforestation of agriculturally unused land while maintaining the diversity of non-forest habitats. Creation of conditions for the settlement of the status of the so-called white areas.
Low carbon strategy	WAM	CO ₂ /forest land	Maintenance of vital forests by limiting the negative impacts of climate change on forests through measures aimed at forest adaptation (support for the use of alternative management models to adjust tree species composition, use of suitable provenances).
Low carbon strategy	WAM	CO ₂ /harvested wood products	Increased share of long-life wood products, including for construction purposes.
Low carbon strategy	WAM	CO ₂ /cropland	Implementation of measures to increase carbon sequestration in

Policies and measures	Scenario	Category	Measure
			agricultural soils and maintain high levels of organic carbon in carbon-rich soils.
Low carbon strategy	WAM	CO ₂ /permanent grassland	Maintenance and restoration of grasslands.

Source: MoE (2023), Report on GHG Emission Projections 2023 Under the Regulation 2018/1999.

Mitigation in the land-use sector: addressing synergies and trade-offs

Many of the additional LULUCF measures involve the conservation, sustainable use and restoration of forest and agri-ecosystems, with the potential to harness synergies for biodiversity. For example, the National Forestry Programme is promoting close-to-nature approaches of forest management that are expected to lead to high biomass stocks. The Low-Carbon Development Strategy promotes conservation and restoration of grasslands. Furthermore, increasing no-intervention management in national parks where ecosystems are in a good state, in accordance with the Nature Act amendment, will help maintain carbon sinks while supporting biodiversity. However, some LULUCF measures could pose a risk to biodiversity if not carefully managed. For example, afforestation of non-forest land, including agricultural land, could come at the expense of habitat important for species of conservation concern. It is therefore critical that such practices are adopted judiciously, accounting for and managing potential impacts on biodiversity.

Prioritising a diverse mix of native species in afforestation, reforestation and restoration projects could help to maximise benefits of LULUCF measures for biodiversity and minimise trade-offs. Additionally, it could increase the long-term viability of climate interventions. This is because the contribution of forests, grasslands and other ecosystems to GHG removals and adaptation in the long term will depend on their resilience to climate-related impacts (drought, higher temperatures, wind, fires, pathogens, etc.). Maintaining and enhancing the species diversity of ecosystems can enhance their resilience to such disturbances (Seddon, 2022).

In the context of carbon removals in the forestry sector, potential trade-offs exist between short-term and long-term mitigation goals that need to be further assessed and managed. On the one hand, studies indicate that adjusting harvest volume (e.g. by decreasing harvesting rates or modifying rotation periods) may be the most effective measure for increasing removals in the short-run (Barka, Priwitzer and Pavlenda, 2020). On the other hand, reducing harvest rates and modifying rotation periods could slow the transition from even-aged stands (particularly monocultures) to close-to-nature forestry, which is necessary for ensuring forest resilience and therefore longer-term mitigation objectives (MoE, 2023b). Slovakia should further assess these potential trade-offs with a view to striking a balance between short- and long-term objectives at the national level and at the level of individual forest stands.

2.7.2. Climate change adaptation and biodiversity

In addition to mitigating climate change, Slovakia faces the challenge of adapting to the increasing impacts of climate change (Table 2.9). The country's key strategies and policies for adaptation recognise the need to help biodiversity adapt to climate change and to promote ecosystem-based approaches to support societal adaptation. The EnviroStrategy promotes development of green infrastructure, such as greening of public spaces, promotion of biodiversity and green spaces in urban areas, and greening agricultural land to help adapt to climate change. It underscores the need to protect ecosystems and ecosystem services to mitigate and adapt to climate change impacts. Furthermore, it identifies the need to reconcile strategies that address climate change and ecosystem conservation to remove inconsistencies.

Table 2.9. Brief overview of climate vulnerability in Slovakia for biodiversity, agriculture, forestry and water management

Policy area	Potential impacts (vulnerabilities)
Biodiversity	<ul style="list-style-type: none"> • Invasions of certain insects as agricultural pests. • Invasions of vector-borne diseases threatening human health. • Vulnerable ecosystems such as pine forests in the mountains, swamp ecosystems in the foothills and mountains, as well as aquatic systems are most at risk.
Agriculture	<ul style="list-style-type: none"> • Gradual increase in aridity of maize-growing areas • Increased water, wind and soil erosion, as well as deterioration of soil structure, poorer water availability in the soil profile and intensified salinisation and sodification processes are expected. • Occurrence and spread of pests and diseases of agricultural plants, trees and animals.
Forestry	<ul style="list-style-type: none"> • Increased frequency and severity of droughts and heat waves with impacts on forest health, productivity and susceptibility to secondary biotic damage. It threatens particularly at low and medium altitudes. • Occurrence of new pests and diseases, development of several generations of spruce bark beetle. It threatens throughout the forest area. • Continued decline of secondary stands of Norway spruce, potentially exacerbated by climate change, particularly in mid-altitudes. • Moderate increased severity of storms affecting mountain forests in particular. • Moderate increased risk of forest fires, particularly at low and medium altitudes
Water management	<ul style="list-style-type: none"> • Threat to water resources for water supply and power generation. • Decline of water sources in the south and east of the Slovak Republic. • Decline in electricity generation at large hydraulic power plants. • Increase in the incidence of droughts and floods. • Change in the hydrological cycle.

Source: MoE (2022), The Eight National Communication of the Slovak Republic on Climate Change under the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

The National Adaptation Strategy (NAS) establishes an institutional framework and co-ordination mechanism to ensure effective implementation of adaptation measures at all levels and in all areas. It aims at reducing vulnerability and increasing the adaptive capacity of natural and artificial systems to the present and future impacts of climate change. At the same time, it strengthens societal resilience by fostering public awareness to climate change and building knowledge towards more efficient adaptation. The NAS recognises that the conceptual and legislative frameworks for adaptation must integrate all areas considered relevant for adaptation, including the natural environment and biodiversity. The NAS outlines 12 adaptation measures for the natural environment and biodiversity outside protected areas, 8 measures targeting protected areas and 4 additional legislative and regulatory measures.

The National Adaptation Plan (NAP) has short- and medium-term adaptation measures for 2021-23 and 2024-27. It outlines seven priority domains with objectives and measures to achieve them.¹⁰ The domain of natural environment and biodiversity, for example, aims to increase the adaptive capacity and ecological stability of the country. To that end, it targets better management of water for biodiversity and improved adaptive management of all types of land, considering the dynamics of ecosystem development.

Table 2.10. Priority measures for the natural environment and biodiversity under the NAP

Specific measures	Examples of tasks
Priority Area 3: Natural environment and biodiversity	
Objective: To increase the adaptive capacity and ecological stability of the country through better management of water for biodiversity and improvement of adaptive management of all types of land, taking into account the dynamics of ecosystem development	
Ensuring water for nature, biodiversity and landscape	Protecting, restoring and managing wetlands
Protecting and adapting biodiversity in the agricultural landscape	Diversifying cultivated crops on smaller land blocks and integrating woody plants into land management systems (agroforestry)
Protecting and adapting of forests in protected areas	Conserving or enhancing biodiversity, resilience, productive and regenerative capacity of forests to fulfil all their functions Supporting water retention and slowing runoff
Ensuring stability of ecological networks and strengthening adaptation of the management of protected areas	Optimising and streamlining the system of protected areas in Slovakia and their proper management with the inclusion of adaptation measures that will contribute to their increased stability and resilience
Supporting rehabilitation of ecosystems and the natural development of biotopes using spatial planning and land management	Processing of the conceptual document and the implementation plan for the revitalisation of ecosystems, together with attention to improving or maintaining the status of species (including migratory species) and habitats in changing conditions Supporting basic and applied research in the field of biodiversity adaptation, improving knowledge and introducing innovations into practice
Supporting adaptive management by strengthening monitoring and systems evaluations	Assessing ecosystems and their services in Slovakia for assessing contributions to adaptive capacity and the need to connect different monitoring systems, including monitoring of climate impacts on biodiversity
Consistent and systemic removal and management of the spread of non-native invasive species	Implementing EU regulation that faces barriers that can be solved by developing a strategic approach and implementing measures for preventing, controlling and removing IAS, including effective tools (finance) assistance to owners, land users and municipalities and an early warning system

Source: MoE (2021), Action Plan for the Implementation of the Updated National Adaptation Strategy.

The sustainable management and restoration of ecosystems is also integrated into other priority areas. For example, the domain of water protection, management and use includes restoration of floodplains and wetlands, planting of riparian vegetation, support of natural measures to retain water and rehabilitation of hydrological regimes of habitats. The sustainable agriculture domain includes measures such as crop diversification, promotion of organic farming, mosaic agricultural land and establishing suitable habitats for pollinators. Adapted forestry includes conservation and sustainable use of genetic resources of forest trees threatened by climate change, protection, research and monitoring of primeval forests, forest protection against biotic and abiotic agents, tending to young forest stands and transitioning to close-to-nature forestry, particularly in monoculture forests. These and other measures in the NAP could also contribute to climate change mitigation.

Slovakia's RRP outlines a comprehensive package of reforms to promote adaptation, with a focus on ecosystem-based approaches. The goal is to increase the resilience of both ecosystems and human settlements to the impacts of climate change. Component 5 of the RRP allocates EUR 159 million to adaptation measures to finance reforms in water management, including restoration of watercourses and wetlands, landscape planning (Section 2.5.2) and national parks (Section 2.5.1).

The MoE co-ordinates development and implementation of adaptation policies, and their monitoring and evaluation. It promotes and mainstreams adaptation across other ministries and levels of governance. While adaptation measures have tended to be implemented on an ad hoc and project basis, there is a shift towards more integrated strategies, with increased multi-scalar co-operation across government levels and policy domains (OECD, 2023d).

OECD work highlights the opportunity for scaling up local adaptation and proposes a methodology for assessing climate risks (OECD, 2023d). As local governments look to address these risks, they should explore the potential of ecosystem-based approaches, including hybrid grey-green approaches, that deliver on multiple environmental and social objectives simultaneously.

Implementing ecosystem-based approaches may require the government to leverage various regulatory, economic and information instruments. In addition to the instruments discussed in Section 2.5, the MoA is developing a new concept for land protection that aims to improve water and soil quality to increase resilience, support biodiversity and contribute to carbon neutrality objectives. The MoA intends to implement the concept through three key instruments: a climate fund for soils, an information and monitoring system for soils, and a carbon and water bank. The approach could provide an innovative and additional incentive for land owners and users to contribute to multiple environmental objectives. However, it will be critical that appropriate safeguards and criteria are in place to ensure environmental integrity.

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Notes

¹ The Habitats Directive (92/43/EEC) protects habitats and species of Community interest, i.e. which are threatened to disappear in the European Union, have a small natural range, or present outstanding examples of typical characteristics of Europe's biogeographical regions.

² Coastal habitats include inland salt meadows and pannonic salt steppes and salt marshes of which small isolated patches remain in Slovakia (ŠOP, 2015).

³ Secondary succession refers to growth or change in an ecological community following a disturbance that does not remove all existing vegetation from a site (e.g. growth of woody vegetation in grasslands following farmland abandonment).

⁴ Close-to-nature forest management refers to a spectrum of cultivation practices aimed at forming a differentiated structure of natural forest ecosystems, while optimally using their economic, ecological and environmental potential. These procedures use the natural processes of forest ecosystems, their regenerative capacity, individual height and thickness. The total area of stands that meet the conditions of close-to-nature forest management was 64 992 ha in 2020 and 112 394 ha in 2021 (year-on-year increase of 72.9%).

⁵ Natura 2000 sites overlap with domestic and international protected areas in places.

⁶ Decree of the Ministry of Agriculture and Rural Development of the Slovak Republic dated 20 September 2017 no. 226/2017 on the provision of support.

⁷ Close-to-nature management was not defined during the initial years of the scheme but is now enshrined in the amended Act on Forests no. 355/2019 coll.: “silvicultural and restoration practices focused on creating more resilient forests with diverse age, species, genetic and spatial structure as close as possible to natural characteristics of forests related to specific conditions of the locality. Close-to-nature forest management relies on natural processes, especially on natural tree restoration, natural regeneration of forest ecosystem, individual height and diameter growth, the ability of auto-reduction and variation of tree species”.

⁸ A composite indicator based on five dimensions: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes and socio-economic outcomes.

⁹ Defined at UNEA 5.2 under Resolution 5 as: “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits”.

¹⁰ Water protection, management and use; Sustainable agriculture; Adapted forestry; Natural environment and biodiversity; Health and healthy population; Residential environment; Technical, economic and social measures.

OECD Environmental Performance Reviews

SLOVAK REPUBLIC

The Slovak Republic has reduced some environmental pressures over the past decade. However, it needs to do more to reduce air pollution, improve waste and wastewater treatment and move towards carbon neutrality. Since 2011, the country has taken important steps to improve its biodiversity policy. Slovakia needs to now align its strategy with the Kunming-Montreal Global Biodiversity Framework and the EU Biodiversity Strategy for 2030. Most species and habitats are in an unfavourable state and biodiversity considerations are not sufficiently integrated into sectoral policies.

This is the third Environmental Performance Review of the Slovak Republic. It provides an evidence-based assessment of the country's progress towards its environmental goals over the past decade. The 29 recommendations aim to help Slovakia improve its environmental performance, giving special focus to biodiversity and forests in the context of climate change.

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