Council of the
European Union

Brussels, 23 June 2022
(OR. en)

10607/22
ADD 3

Interinstitutional File:
2022/0195(COD)

ENV 656
CODEC 1007
IA 104
CLIMA 317

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	23 June 2022
To:	Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2022) 167 final
Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the proposal for a Regulation of the European Parliament and of the Council on nature restoration

Delegations will find attached document SWD(2022) 167 final, part 1/12.

Encl.: SWD(2022) 167 final

EUROPEAN
COMMISSION

Brussels, 22.6.2022
SWD(2022) 167 final

PART 1/12

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the

proposal for a Regulation of the European Parliament and of the Council

on nature restoration

{COM(2022) 304 final} - {SEC(2022) 256 final} - {SWD(2022) 168 final}

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LIST OF ABBREVIATIONS

BDS2030	Biodiversity Strategy for 2030
BHD	Birds and Habitats Directives
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CFP	Common Fisheries Policy
EEA	European Environment Agency
ELD	Environmental Liability Directive
EMFAF	European Maritime Fisheries and Aquaculture Fund
HD	Habitats Directive
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
LAU	Local Administrative Unit
LULUCF	Land use, land use change and forestry
MAES	Mapping and Assessment of Ecosystems and their Services
MBIs	market-based instruments
MSFD	Marine Strategy Framework Directive
NEC Directive	National Emission reduction Commitments Directive (Directive (EU) 2016/2284)
NGO	Non-governmental organisation
NRP	National Restoration Plan
UNCCD	UN Convention to Combat Desertification
UNFCCC	UN Framework Convention on Climate Change
WFD	Water Framework Directive

GLOSSARY

Term	Meaning or definition
Biodiversity	**Biodiversity** means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are partand includes diversity within species, between species and of ecosystems.
Cities	Cities means Local Administrative Units where at least 50 % of the population lives in one or more urban centres, in line with the Methodological Manual on Territorial Typologies EUROSTAT 2018[1].
Ecosystem	An ecosystem is a dynamic complex of plant, animal, and microorganism communities and their non-living environment, interacting as a functional unit and includes habitat types, habitats of species and species populations.
Ecosystem condition	Ecosystem condition is the quality of an ecosystem measured in terms of its abiotic and biotic characteristics and defined via key ecosystem attributes.
Ecosystem degradation	Degradation (of an ecosystem) means a level of harmful human impact that results in the loss of biodiversity and simplification or disruption in its composition, structure, and functioning (i.e. condition), and generally leads to a reduction in the flow of ecosystem services.
Favourable reference area	Favourable reference area is the total area of a habitat type in a given biogeographical region or marine region at national level that is considered the minimum necessary to ensure the long-term viability of the habitat type and its species, and all its significant ecological variations in its natural range, and which is composed of the area of the habitat type and, if that area is not sufficient, the area necessary for the re-establishment of the habitat type.
Good (ecosystem) condition	Good condition means a state where the key characteristics of an ecosystem, namely physical, chemical, compositional, structural and functional state, and landscape and seascape characteristics, reflect a high level of ecological integrity, stability and resilience necessary to ensure the long-term maintenance of an ecosystem.
Good ecosystem status	Good ecosystem status means that the ecosystem is in good condition, the areas it covers are stable or increasing and sufficiently large, covering the natural range of the ecosystem.

[1] https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-gq-18-008

Term	Meaning or definition
Green urban space	Green urban space means groupings of 1) green urban areas, including trees and groups of trees, green roofs and green walls, 2) urban forests and 3) herbaceous vegetation associations, as defined according to the mapping guidance of the EU Urban Atlas[2], found within the Local Administrative Units;
Habitat types	Habitat types are sub-units of ecosystems as defined by the European Nature Information System (EUNIS) habitat classification or Annex I of the Habitats Directive (Directive 92/43/EEC).
Habitat of a species	A habitat of a species is an environment defined by specific abiotic and biotic factors, in which the species lives at any stage of its biological cycle.
Indicator	An indicator is a sign that shows the condition or existence of something.
Indicators of ecosystem recovery	Characteristics of an ecosystem that can be used for measuring the progress towards restoration goals or objectives at a particular site (e.g., measures of presence/absence and quality of biotic or abiotic components of the ecosystem).
Key ecosystem attributes of ecosystem condition	Key ecosystem attributes assist with the definition of an ecosystem and its condition and the evaluation of progress of ecosystem recovery. They relate to the highest attainable absence of threats, physical and chemical conditions, species composition, structural diversity, ecosystem function, and external exchanges.
Local administrative unit	Local administrative unit is a low-level administrative division of a Member State below that of a province, region or state, established in accordance with Article 4 of Regulation (EC) No 1059/2003 of the European Parliament and of the Council.
Nature-based solutions	Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions must benefit biodiversity and support the delivery of a range of ecosystem services.
Pollinator	Pollinator is a wild animal which transports pollen from the anther of a plant to the stigma of a plant, enabling fertilisation and the production of seeds.
Pollinator decline	Pollinator decline or decline of pollinator populations means a decrease in abundance or diversity, or both, of pollinators.

[2] https://land.copernicus.eu/user-corner/technical-library/urban_atlas_2012_2018_mapping_guide

Term	Meaning or definition
Restoration	**Restoration** is the process of actively or passively assisting the recovery of an ecosystem towards or to good condition, of a habitat type to the highest level of condition attainable and to its favourable reference area, of a habitat of a species to a sufficient quality and quantity or of species populations to satisfactory levels, as a means of conserving or enhancing biodiversity and ecosystem resilience. • Restoration is thereby considered the activity (which includes both active and passive restoration measures). • Recovery is thereby considered the outcome sought or achieved through restoration. Full recovery is defined as the condition whereby, following restoration, all key ecosystem attributes closely resemble those of the reference condition (**=good condition)** Ecosystem restoration includes measures taken for the **improvement of the condition** of an ecosystem but also **the re-establishment** (also referred to as 're-creation') of an ecosystem where it was lost as well as measures to improve **connectivity** of ecosystems. **Active/passive restoration:** • Passive restoration eliminates the factors of degradation and disturbance and permits natural regeneration of the ecosystem. • Active restoration eliminates the source of degradation and disturbance of an ecosystem and implements measures to accelerate its recovery and to overcome obstacles to that recovery.
Restoration measure	'Restoration measure' means any activity assisting ecosystem recovery actively or passively towards or to good condition and enhancing biodiversity, including measures taken for the improvement of the condition of an ecosystem or for the re-establishment of natural and semi-natural ecosystems, as well as measures to improve the connectivity of natural and semi-natural ecosystems, and to enhance species populations, also across national borders.
Restoration objectives	Restoration objectives are defined qualitative and quantitative aims regarding the desired condition and area of the ecosystems / habitat types to be restored.
Sufficient quality and quantity of a habitat of a species	Sufficient quality and quantity of a habitat of a species means the quality and quantity of a habitat of a species which allows the ecological requirements of a species to be fulfilled at any stage of its biological cycle so that it is maintaining itself on a long-term basis as a viable component of its habitat in its natural range.
Sufficient quality of a habitat of a species	Sufficient quality of a habitat of a species means the quality of a habitat of a species which allows the ecological requirements of a species to be fulfilled at any stage of its biological cycle.
Towns and suburbs	Towns and suburbs means LAUs where less than 50 % of the population lives in an urban centre, but at least 50 % of the population lives in an urban cluster, in line with the Methodological Manual on Territorial Typologies EUROSTAT 2018.

Term	Meaning or definition
Urban green space	Urban green space means all green urban areas, broad-leaved forests, coniferous forests, mixed forests, natural grasslands, moors and heathlands, transitional woodland-shrubs and sparsely vegetated areas found within LAUs classified as cities or towns and suburbs, calculated on the basis of data provided by the Copernicus Land Monitoring Service as established by Regulation (EU) 2021/696 of the European Parliament and of the Council.
Urban tree canopy cover	Urban tree canopy cover is the total area of tree cover within cities and towns and suburbs, calculated on the basis of the Tree Cover Density data provided by the Copernicus Land Monitoring Service[3], under the classification of 'vertical projection of tree crowns to a horizontal earth's surface' as established by Regulation (EU) 2021/696 of the European Parliament and of the Council[4], expressed as a percentage of the total LAU area.

[3] https://land.copernicus.eu/pan-european/high-resolution-layers/forests/tree-cover-density.

[4] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU (OJ L 170, 12.5.2021, p. 69).

1. INTRODUCTION: POLITICAL AND LEGAL CONTEXT

1.1. Political context

The value of biodiversity and ecosystems has been globally recognised since the Earth Summit in Rio de Janeiro in 1992. Yet, despite efforts at European and international level, biodiversity loss and the degradation of ecosystems continue at an alarming rate in the European Union (EU) and globally. This is widely documented, notably by several IPCC reports[5,6], the Global Resources Outlook[7], the IPBES report[8], the Global Biodiversity Outlook 5[9], and the Dasgupta Review[10]. Ensuring healthy nature, through restoration and protection, is essential for our long-term survival, wellbeing, prosperity and security. Healthy ecosystems provide food, clean water, carbon sinks, protection against growing disaster risks due to climate change, as well as boosting resilience and preventing the emergence and spread of zoonotic diseases.

The 2022 IPCC report[6] highlighted that there is a brief, rapidly closing window to secure a liveable future, as the rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt. It calls for the implementation of urgent actions for the restoration of degraded ecosystems, to mitigate the impacts of climate change, notably by restoring degraded wetlands and rivers, forest and agricultural ecosystems. The report underlines that climate change and biodiversity loss are the biggest long term threats to food security in the EU.

Furthermore, recent geo-political developments have underlined the need to safeguard food security and the resilience of food systems[11]. Evidence shows that restoring agro-ecosytems has positive impacts on food productivity in the long-term, and more biodiverse and resilient agricultural ecosystems are needed to enhance food security and reduce dependence of imports. The restoration of nature acts as an insurance policy to ensure the EU's long-term sustainability and resilience, against all these challenges.

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[5] Intergovernmental Panel on Climate Change (IPCC): Special Report on the impacts of global warming of 1.5°C: https://www.ipcc.ch/sr15/,

[6] IPCC Sixth Assessment Report, Climate Change 2022: Impacts, Adaptation and Vulnerability: https://www.ipcc.ch/report/ar6/wg2/

[7] The International Resource Panel: Global Resources Outlook 2019: Natural Resources for the Future We Want: https://www.resourcepanel.org/reports/global-resources-outlook.

[8] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: 2019 Global assessment report on biodiversity and ecosystem services.

[9] Global Biodiversity Outlook 5, Convention on Biological Diversity: reporton on progress towards the Aichi Biodiversity Targets.

[10] Professor Sir Partha Dasgupta, final report of the independent review on The Economics of Biodiversity, 2 February 2021.

[11] COM(2022) 133 final

More decisive action is needed in the EU to protect and restore biodiversity – including through legal instruments – for the Union to achieve its own climate and biodiversity objectives. The evaluation[12] of the **EU Biodiversity Strategy to 2020**[13] shows that the EU did not manage to halt the loss of biodiversity in the EU in the 2011-2020 period. The voluntary target to restore by 2020 at least 15 % of degraded ecosystems, in line with the global commitment under the Convention on Biological Diversity, Aichi Target 15[14] was equally not met. The overall picture for biodiversity and ecosystems is bleak and points to the fact that the current approaches are not delivering.

The **European Green Deal**[15] underlined the importance of protecting and restoring nature. The **EU biodiversity strategy for 2030**[16] set targets to protect nature in the EU, but also underlined that protection alone will not be enough. To reverse biodiversity loss, much more is needed to bring back nature to good health across the EU in protected areas and beyond. The strategy thus includes an ambitious EU nature restoration plan. As part of this plan, the Commission committed to put forward a proposal for **legally binding EU nature restoration targets** in 2021 to restore degraded ecosystems, and in particular those with the most potential to remove and store carbon and to prevent and reduce the impact of natural disasters. The primary aim is to reverse biodiversity loss.

Other sectoral strategies of the European Green Deal such as the Zero Pollution Action Plan, the Circular Economy Action Plan, the Forest Strategy, the new Soil Strategy[17], the Farm to Fork Strategy, the EU Adaptation Strategy and the climate-neutrality ambition by 2050, and the so-called Fit for 55% package all will have a positive bearing on biodiversity. However, policy measures without enforceable restortation objectives are unlikely to halt and reverse the current trend of biodiversity degradation in the EU.

The European Parliament and the Council have also highlighted the need to step up efforts to restore ecosystems, for instance in the **Council Conclusions of December 2019**[18] *(*the Council *" stressess the need for urgent additional commitments to halt biodiversity loss, protect and restore terrestrial, freshwater, wetlands and marine ecosystems within and*

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[12] Trinomics B.V. (2021) Support to the evaluation of the EU Biodiversity Strategy to 2020, and follow-up: Final study report (Publications Office of the EU, 2022). For a summary of main relevant findings: see Annex IX. Commission Report on the evaluation of the EU Biodiversity Strategy to 2020 due in April 2022.

[13] COM/2011/244 final.

[14] The Strategic Plan for 2011-2020 of the Convention on Biological Diversity included 20 'Aichi Biodiversity Targets'. Aichi Target 15 is: 'By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.'

[15] COM/2019/640 final.

[16] https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en#the-business-case-for-biodiversity.

[17] COM(2021) 323

[18] https://www.consilium.europa.eu/en/press/press-releases/2019/12/19/biodiversity-council-adopts-conclusions/.

outside protected areas […]") and in the **European Parliament's resolution of January 2020**[19] (which asked to "*move away from voluntary commitments and to propose an ambitious and inclusive Strategy that sets legally (and, consequently, enforceable) binding targets for the EU and its Member States*"*)*. In its **resolution of 9 June 2021**[20], the European Parliament *"strongly welcomes the commitment to draw up a legislative proposal on the EU nature restoration plan, including on binding restoration targets"*. The resolution emphasised that the legislative proposal, in addition to an overall restoration target, should also include ecosystem-, habitat- and species-specific targets, that it should include forests, grasslands, wetlands, peatlands, pollinators, free-flowing rivers, coastal areas and marine ecosystems, that restoration should contribute to biodiversity as well as to climate change mitigation and adaptation, and stressed the importance of ensuring non-deterioration of restored ecosystems.

Public support for nature restoration is very high and the engagement to protect and restore nature among citizens, and especially among youth, is on the rise. In the **Eurobarometer survey on biodiversity (2018-2019)**[21], respondents ranked restoration of nature among the most important actions that the EU should take to protect biodiversity. This public interest is also apparent in the replies (in number and in content) to recent public consultations on nature-related initiatives[22]. Healthy nature delivers a range of services to the society and businesses. Worldwide, the loss of ecosystem services is estimated at about ten trillion euros per year[3], more than five times the entire value of agriculture in the market economy. Yet nature's value goes beyond economic goods and services: most EU citizens highly value its very existence and recognise its intrinsic worth, consistently identifying ecological degradation as an urgent concern.

The restoration of ecosystems is high on the **international agenda**. The **2050 vision under the Convention on Biological Diversity**[23], the **United Nations Convention to Combat Desertification (UNCCD)**[24], the **2030 Agenda for Sustainable Development**[25] and the **UN Decade for Restoration**[26], all call for the protection and restoration of ecosystems.

The Convention on Biological Diversity – agreed at the Rio Summit – will hold an important Conference of the Parties (COP15 starting in October 2021) which is expected to conclude a

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[19] Resolution on the 15th meeting of the Conference of Parties (COP15) to the Convention on Biological Diversity 2019/2824(RSP).

[20] European Parliament resolution of 9 June 2021 on the EU Biodiversity Strategy for 2030: Bringing nature back into our lives (2020/2273(INI).

[21] Eurobarometer: Stronger EU action to protect nature.

[22] E.g. Fitness Check of the Birds and Habitats Directives: more than 552 000 replies, the combined consultation on the evaluation of the EU Biodiversity Strategy to 2020, the review of the application of the EU Regulation on Invasive Alien Species and the development of legally binding EU nature restoration targets: over 111 000 replies.

[23] First Draft of the Post-2020 Global Biodiversity Framework.

[24] https://www.unccd.int/.

[25] United Nations: Resolution adopted by the General Assembly on 25 September 2015.

[26] https://www.decadeonrestoration.org/about-un-decade.

new Global Biodiversity Framework including ambitious restoration targets to be agreed by the end of 2022. The EU is taking leadership on the global stage to mobilise the international community, all the stakeholders and society at large, to take action to halt the loss of biodiversity. The EU's Biodiversity Strategy for 2030 is a blueprint to make this a reality in the EU and to project the EU's commitment also at global level. The nature restoration proposal announced in the Strategy will send a strong signal to the global community that the EU is taking its commitment seriously and aims to enshrine ecosystem restoration targets into law.

Restoration will also help meet the EU's commitments under the United Nations Framework Convention on Climate Change (UNFCCC), and its **Paris Agreement**[27], as ecosystems such as peatlands, wetlands, oceans and forests can, when they are in good condition, remove and store large amounts of carbon dioxide and are also instrumental in contributing to climate change adaptation. Nature and the restoration of ecosystems was one of the **five main priorities**[28] for the 26th United Nations Climate Change Conference of the Parties (COP 26).

Restoring nature across the EU is among the core pillars of the European Green Deal. It is intrinsically linked to achieving the Union's biodiversity and climate change objectives. The restoration objectives are specifically spelled out in the Biodiversity Strategy's headline ambition to ensure that that Europe's biodiversity is on the path to recovery by 2030 and that by 2050 all ecosystems are restored, resilient, and adequately protected. The EU Adaptation Strategy[29] also calls specifically for scaling up nature-based solutions such as ecosystem restoration as they will help adapt to climate change in a cost-effective way. Restoring nature would thus significantly contribute to the EU's climate mitigation and adaptation objectives, and to the EU's international commitments.

1.2. Legal context

1.2.1. Existing EU legislation relevant to ecosystem restoration

EU environmental law includes legislation that has a positive bearing on the restoration of EU ecosystems. For instance, the **Birds Directive**[30] (BD) requires Member States to not only maintain bird habitats but also re-establish destroyed biotopes for birds. The **Habitats Directive**[31] (HD) aims to maintain or restore, at favourable conservation status, natural habitats and non-bird species of wild fauna and flora of Community interest. The **Water**

[27] https://unfccc.int/sites/default/files/english_paris_agreement.pdf.
[28] https://ukcop26.org/.
[29] COM(2021) 82 final
[30] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
[31] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Framework Directive[32] (WFD) aims at achieving good status[33] of all EU freshwaters, ground waters, transitional waters and coastal waters by 2015 (with extensions up to 2027). The **Marine Strategy Framework Directive**[34] (MSFD) currently under review, aimed at achieving and maintaining good environmental status of all the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The **Environmental Liability Directive**[35] (ELD) establishes a framework based on the polluter pays principle to prevent and remedy environmental damage. The **Invasive Alien Species Regulation**[36] provides for a set of measures to be taken acrosse the EU in relation to invasive alien species included in the Union list. All these pieces of legislation contribute to the improvement and restoration of ecosystems but together the outcomes are largely insufficient to address the extent and scale of the problem. Further details of the reasons for some of the policy and legislative failures are given in chapter 2.

As part of the European Green Deal, a variety of initiatives are underway which will be relevant to the restoration of ecosystems. These include the new legal framework for the **Common Agricultural Policy**[37], the **European Climate Law**[38], as well as the set of proposals put forward in July 2021 that form the Fit for 55 package, which comprises notably the proposals to revise the Regulation on land use, land use change and forestry (**LULUCF**[39]), the Energy Efficiency Directive, the Renewable Energy Directive[40] as well as the EU Forest Strategy. Ecosystem restoration will also be facilitated by the new carbon farming initiative[41] and by the law on soil health which is announced in the EU Soil Strategy for 2030. An overview of existing and forthcoming initiatives and explanation of their relevance is included in Annex X.

2. PROBLEM DEFINITION

2.1. What are the problems?

2.1.1 General problem: biodiversity loss and degradation of ecosystems in the EU

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[32] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy..

[33] Good ecological status or potential and chemical status for surface water, good quantitative and chemical status for groundwater.

[34] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy.

[35] Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage.

[36] Regulation (EU) 1143/2014 on invasive alien species.

[37] The new common agricultural policy: 2023-27.

[38] COM/2020/80 final.

[39] https://ec.europa.eu/clima/policies/forests/lulucf_en, COM(2021)554

[40] https://ec.europa.eu/info/news/commission-presents-renewable-energy-directive-revision-2021-jul-14_en

[41] Communication on sustainable carbon cycles: COM(2021) 800; Have your say: Climate change: restoring sustainable carbon cycles.

Recent assessments[42] of the state of biodiversity in the EU show that biodiversity loss and the degradation of ecosystems, continue at an alarming rate, across the broad range of ecosystem types in the EU. These include forests, wetlands, rivers and lakes, heath and scrub, sparsely vegetated land, agro-ecosytems (grassland and cropland), urban and marine ecosystems. Their restoration is central to ensuring human health, wellbeing and for tackling and adapting to climate change. It is necessary to halt biodiversity loss to ensure that future generations can continue to benefit from the services that nature provides to the society including to a broad range of economic sectors.

The **EU-wide ecosystem assessment**, also called MAES-report, published by the European Commission in 2021, brings together for the first time EU-wide and commonly agreed data sets that can be used to assess the state and trends of ecosystems and their services as well as the pressures and their trends they are exposed to. It contributes substantially to our understanding of ecosystems, their degradation and threat so as to guide priority and cost-effective restoration efforts.

The assessments indicate that substantial efforts are needed to put ecosystems on a path to recovery, so that they can deliver benefits to society. The EU Ecosystem Assessment[43] demonstrated that most habitats listed in Annex I of the Habitats Directive and water bodies in the Water Framework Directive are not in favourable conservation status (Figure 1). Ecosystem degradation threatens the supply of vital ecosystem services such as food security and carbon sequestration (see 2.1.3).

[42] The European environment — state and outlook 2020 (EEA), The State of Nature in the EU report (COM/2020/635 final) and the EU Ecosystem Assessment, 2021.

[43] The EU Ecosystem Assessment is an analysis of the trends in pressures on ecosystems, ecosystem condition, and ecosystem services of ecosystems in the EU using 2010 as baseline. The scientific report is available here; a summary for policy makers is available here. For simplicity, the SWD cites both documents as 'EU Ecosystem Assessment'.

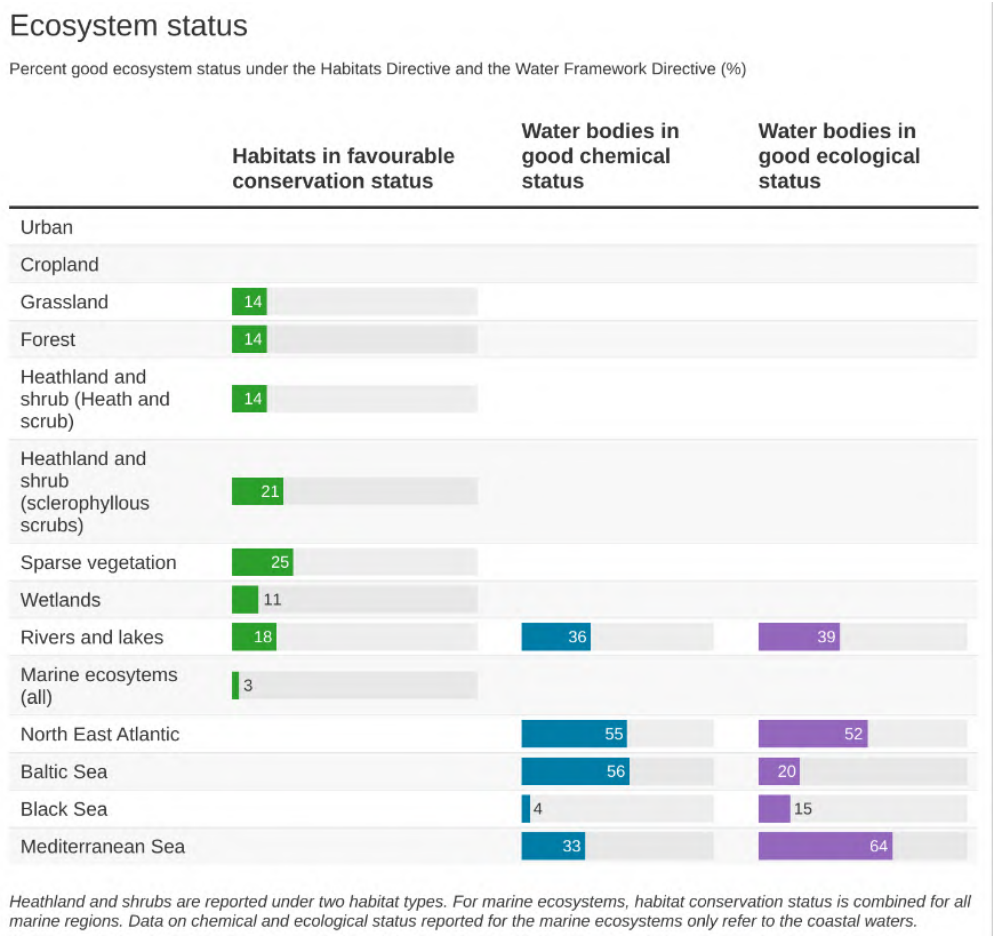


Figure 1: The share of habitats in favourable conservation status and the share of water bodies in good chemical and ecological status (counted in percentage of number of habitat assessments). (EU Ecosystem Assessment, 2021)

All terrestrial Annex I habitats represent 24 % of the EU land territory and the marine Annex I habitats cover 240 030 km^2 (4.8 %) of the EU seas[44].

Figure 2 below shows the proportion (area) of the EU ecosystem types which is covered by the Habitats and the Birds[45], Water Framework and Marine Strategy Framework Directives, and the area which is part of the Natura 2000 network. It also shows that large areas of EU ecosystems, primarily heavily modified ones such as urban, cropland and forests are not covered by those pieces of legislation due to their main use for production, habitation or

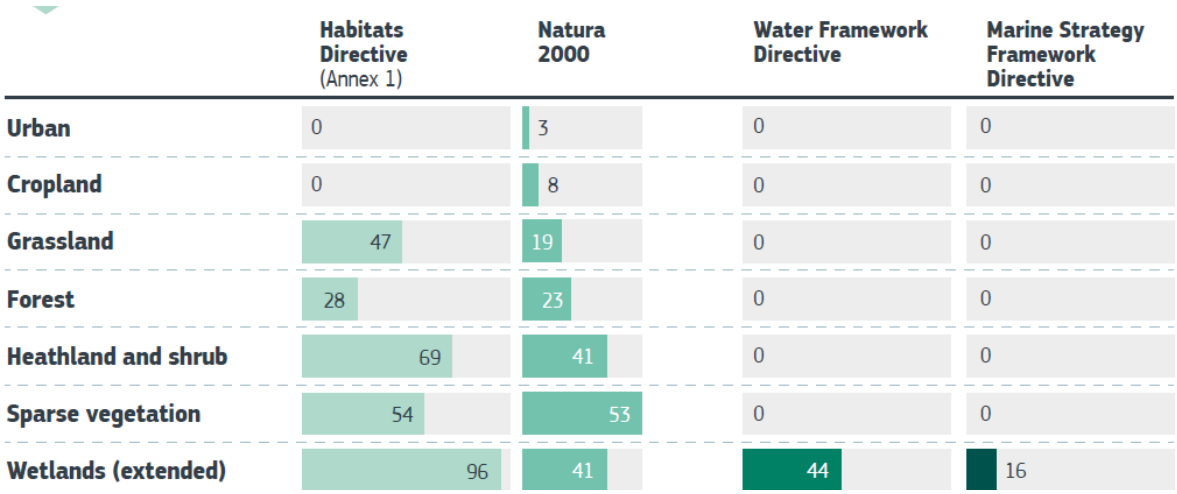


Figure 1: : The relative share (%) of ecosystems area covered by the Habitats and Birds Directives, the Water Framework Directive and the Marine Strategy Framework Directive. Natura 2000 is the nature protection network established under the Habitats Directive.

infrastructure and thus do not benefit from the same level of protection, restoration and monitoring requirements.

As a result, the condition of these ecosystems is less known. However,the continuous decline of common farmland bird species on agricultural land[46], the rise in clear-cut forest harvesting[47], evidence of soil degradation and erosion affecting 25% of agricultural land[48] and the dramatic decline of insects and pollinators[49] all point to a need for improvement. Evidence from the Horizon 'Soil Health and Food' Mission suggests that 60-70 % of EU soils are in unhealthy condition and costs associated with soil degradation in the EU exceed 50 billion € per year[50].

The **State of Nature in the EU report**[51] has shown that in 2018, 81 % of assessments[52] of **EU-protected habitats**[53] listed in Annex I of the Habitats Directive show an unfavourable ('poor' or 'bad') status (compared to 77 % in 2013), of which 36 % are deteriorating and only 9 % improving.

Figure 3 shows that large differences exist between Member States in conservation status of those habitats.

Many of the Annex I habitats requiring restoration (such as peatland, forests, grassland, cropland) are particularly carbon-rich, thus offering significant potential to store and sequestrate carbon in the above- and below- ground biomass and in the soil. Their restoration and maintenance could

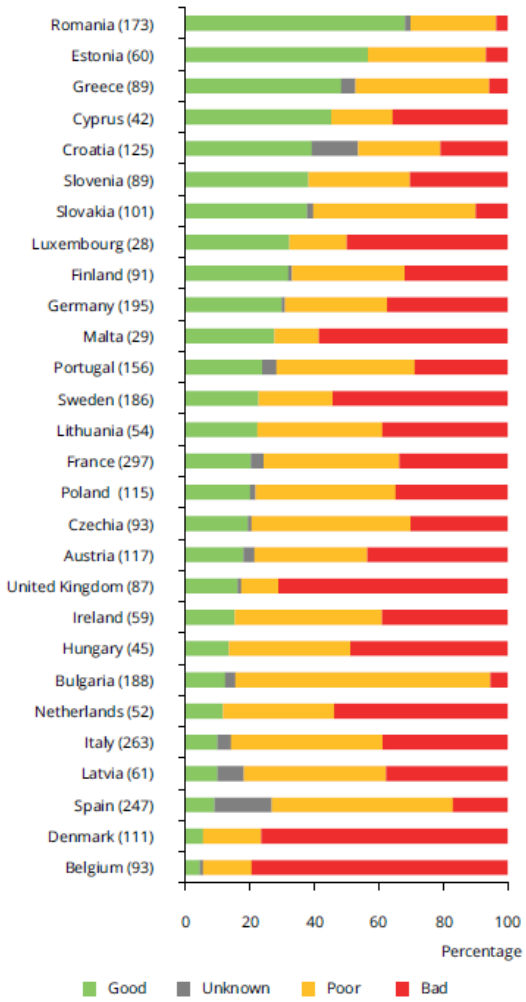


Figure 2: Conservation status of habitats listed in Annex I of the Habitats Directive at Member State level (State of Nature report, EEA).

[46] EUROSTAT: Common farmland bird populations continue to
https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-

[47] Recent surge in EU forest harvesting, according to JRC study:
eu-forest-harvesting-according-jrc-study

[48] Jonathan Smith, Horizon: The EU Research & Innovation Mag
build framework for climate-smart sustainable agricultural soil

[49] Hallmann CA, Sorg M, Jongejans E,Siepel H, Hofland N, Schw
decline over 27 years in total flying insect biomass in protected

[50] Mission Board Soil health and food, *'Caring for Soil is Caring for Life'*, European Commission, Directorate-General for Research and Innovation, 2020.

[51] The report is based on an analysis by the European Environn
the Birds and Habitats Directives.

[52] The State of Nature report shows the number of reports for
shares of habitat area or species population in each Member State.

[53] https://www.cbd.int/convention/articles/?a=cbd-02.

contribute significantly to climate change mitigation. For example, restoring drained peatlands in the EU by rewetting them could reduce CO_2 emissions by about 50 $MtCO_2$ eq per year[54], as well as provide a healthy habitat for valuable species. Restoration of healthy ecosystems is also crucial for climate adaptation and to mitigate the impacts of natural disasters. For instance, improving the condition of soils leads to better water absorption and retention, soil retention and temperature cooling. Restoration and climate adaptation are not only important because of the ecosystem services to people, but also for nature itself. Restored ecosystem that are more biodiverse, larger and better connected will be less vulnerability to climate change. In other words, we need more space for nature and natural processes in order to make nature more resilient and to minimise predicted ecosystem degradation and biodiversity loss due to climate change. The biodiversity and climate crisis are closely connected and so are their solutions.

Annex VIII provides information on the distribution, condition, pressures and trends for the EU ecosystems which Member States report on under the Habitats Directive. Annex VI provides further data and analysis on these ecosystems and beyond, covering for instance also soils, pollinators and urban ecosystems. A comprehensive overview is also available in the EU Ecosystem Assessment.

In summary, the problem is clear: biodiversity loss and the degradation of ecosystems continue at an alarming rate in the EU (albeit not at equal rate). This degradation is evident across the main EU ecosystem types: wetlands, forests, agro-ecosystems (including grassland and cropland), marine ecosystems, heathland, scrub, sparse vegetation, lakes, rivers and alluvial ecosystems, urban ecosystems and soils. Their restoration is central to ensure human health, wellbeing and for tackling and adapting to climate change.

Figure 4 shows the relative area covered by the main ecosystem types in the EU and the sum of their area[55]. Their geographical distribution is presented in Figure 5 (more detailed maps are in Annex VIII). It should be noted that soils are considered as a cross-cutting ecosystem in its own right, that underpin most terrestrial ecosystems. Note that the figures and tables in this chapter result from reports and data compiled before 2021 (based on data until 2018), and thus they cover the EU and the UK (EU-28).

Information on ecosystem-specific data availability is provided in the ecosystem-specific assessments in Annex VI.

[54] McDonald, H., Frelih-Larsen, A., Lóránt, A., Duin, L., Pyndt Andersen, S., Costa, G., and Bradley, H. 2021, Carbon farming – Making agriculture fit for 2030, Study for the committee on Environment, Public Health and Food Safety (ENVI), Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg.

[55] In Figure 4, 'urban' relates to 'Artificial surfaces' (Corine land cover type 1), which represents a smaller area than the 'Local Administrative Units'used for the impact assessment.

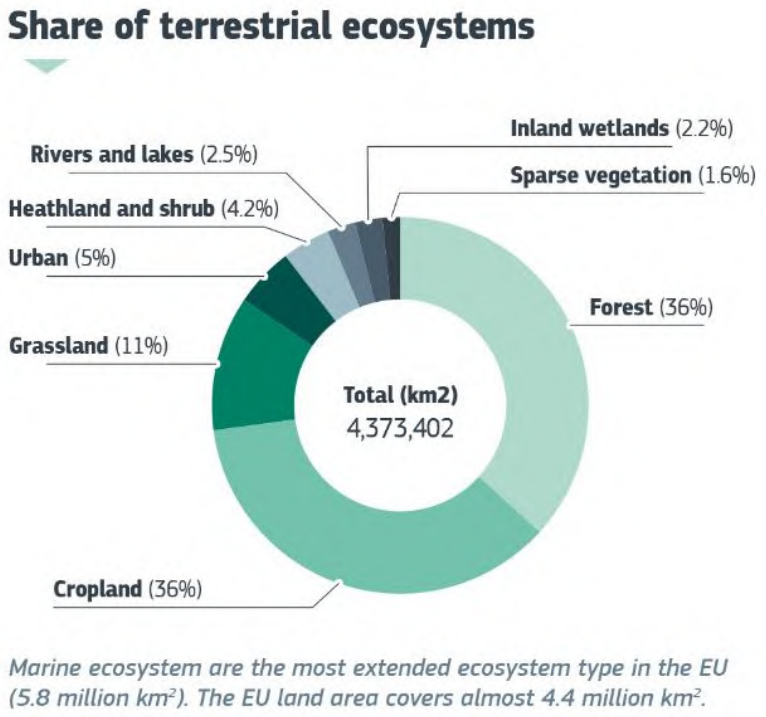
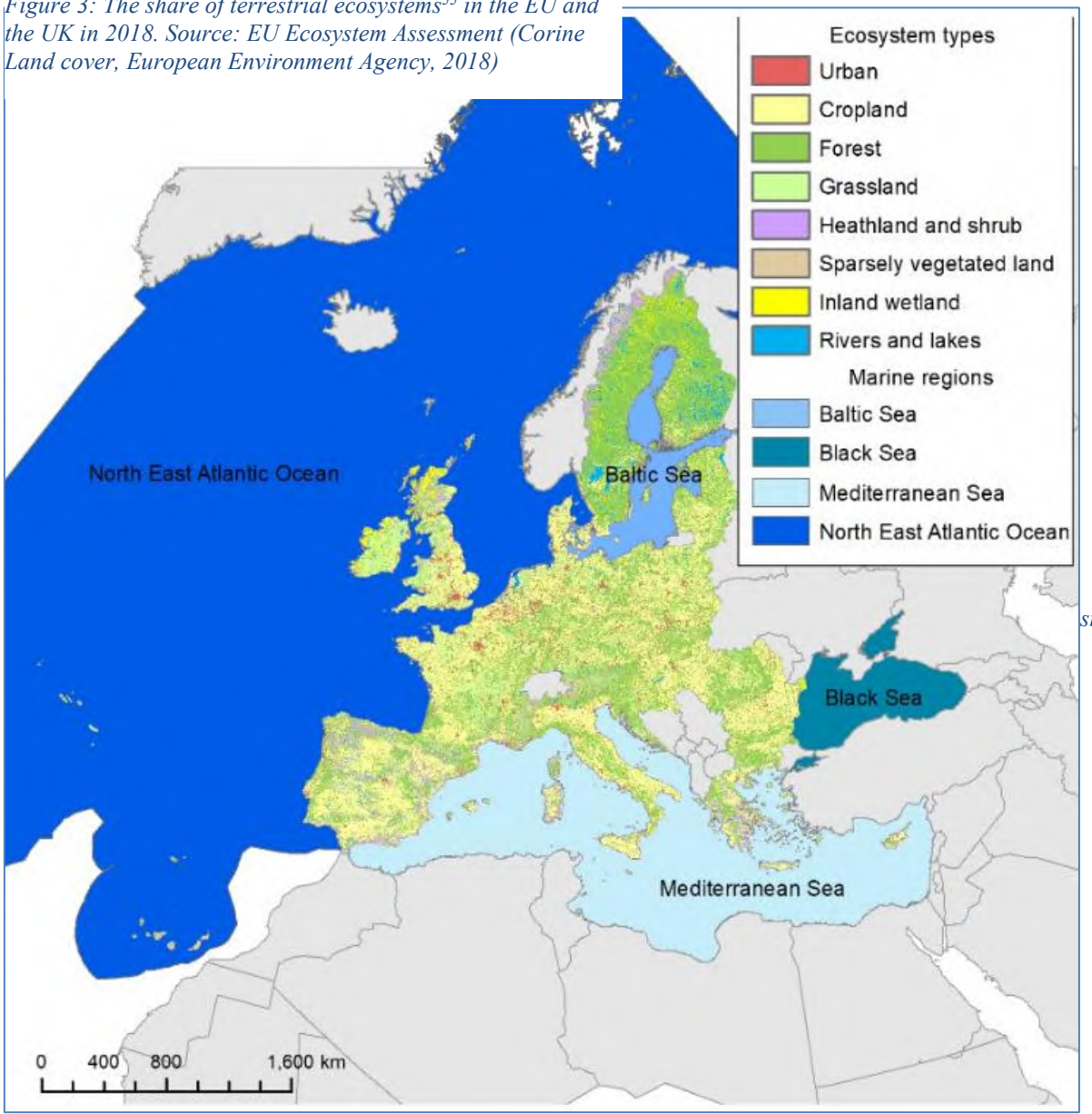


Figure 3: The share of terrestrial ecosystems[55] in the EU and the UK in 2018. Source: EU Ecosystem Assessment (Corine Land cover, European Environment Agency, 2018)

2.1.2. Specific problem: ecosystem restoration efforts have been insufficient so far

As stated in the EU Biodiversity Strategy for 2030: "*Protecting the nature we have will not be enough to bring nature back into our lives. To reverse biodiversity loss, we need to be*



sment)

more ambitious ***on nature restoration****."* Protecting an ecosystem does not guarantee that it will evolve spontaneously to good condition – and degraded ecosystems that are not protected also need to be restored. The state of ecosystems covered under EU environmental legislation has not improved over the past decade and their condition is to a large part deteriorating.

The EU Ecosystem Assessment highlights the need to avoid further degradation and to restore degraded ecosystems. In some cases, passive restoration, by removing pressures, can be sufficient, so that ecosystems can recover by themselves. In other cases, degraded ecosystems need active restoration intervention to recover and become more resilient. In some cases, ecosystem re-creation is needed when land has been transformed into entirely other types of use, so that the ecosystem cannot simply evolve back (see glossary on different types of restoration).

Enhanced ecosystem restoration, both passive and active, would significantly contribute to addressing all of the key drivers of biodiversity loss and ecosystem degradation. For instance, passive restoration can involve the easing of pressures (e.g. overexploitation in marine areas or forests, or air or water pollution). These can help ecosystems recover by themselves to an extent. Active restoration entails actions to help ecosystems that have been damaged beyond their capacity to recover alone, for example re-establishing former land use or remodelling land or seascapes. Other active restoration actions require removing alien species or removing pollutants directly from the ecosystem (e.g. soil remediation, cleaning up litter). Beyond removing local pressures, restoration will also help reducing key drivers of biodiversity loss on a wider scale, for example, wetland restoration contributes to capturing carbon and mitigating climate change effects such as flooding.

Findings of **the evaluation of the EU Biodiversity Strategy to 2020**[56] indicate that the voluntary target to maintain and restore ecosystems has not been achieved. Further results from the evaluation are available in Annex IX. The EEA's **State of Nature in the EU** report[57] also points towards the gap in restoration, while deterioration continues and climate impacts and risks increase. Furthermore, the underlying drivers of soil degradation are not projected to change favourably by 2030.

[56] See footnotes 12 and 13 .

[57] https://www.eea.europa.eu/publications/state-of-nature-in-the-eu-2020.

Based on Member States' reporting, the EEA has made estimates of restoration needs to bring habitats listed in Annex I of the Habitats Directive (representing 24% of the EU land area and 4.8% sea area) to favourable conservation status (see detailed data in Annex VIII). The estimates show that significant areas of the EU need to be restored (Table I per habitat type and further broken down in Table II, III and IV). As explained in 2.1.1, the condition of terrestrial ecosystems outside of Annex I habitats, (the remaining 76% of land), because they are not subject to the same protection regime or conservation measures, is likely to be worse and thus their restoration needs are likely to be higher.

The specific problem is that ecosystem restoration across the EU has been insufficient so far, while ecosystems continue to degrade.

Table I: Restoration needs of habitats listed in Annex I of the Habitats Directive based on reporting by Member States (2013-2018). Romania is excluded because its reported Annex I areas exceed the terrestrial area of the country. Source: EEA.

Ecosystem based on Annex I types *(N° of Annex I habitat types)*	**Surface[1] Annex I habitats in km²**	**Condition in km² & %**			**Overall restoration needs in km²**	
		Good	Not good	Unknown	Area re-establishment (min/max)	Improvement in condition (min/max)
Wetlands[2] (inland & coastal) *(28)*	174 400	62 950 36%	27 100 16%	84 300 48%	3 131 6 910	27 100 111 400
Forests[3] *(69)*	357 952	162 300 45%	79 210 22%	116 444 33%	3 487 8332	79 210 195 000
Agro-habitats and grasslands[4] *(35)*	177 442	84 150 47%	31 180 18%	62 100 35%	2 431 8 798	31 180 93 000
River, lakes, alluvial and riparian habitats[5] *(32)*	96 480	52 970 55%	21 560 22%	21 950 23%	894 2 743	21 560 38 000
Heath & scrub[6] *(21)*	78 582	43 420 55%	6 590 8%	28 600 36%	405 928	6 586 35 000
Rocky and (Coastal) & dunes *(41)*	65 135	30 048 46%	6 619 10%	28 500 44%	355 1 458	6 619 35 100
Total Terrestrial	**949 990**	**435 838 46%**	**172 259 18%**	**341 894 36%**	**10 703 29 169[8]**	**172 255 505 500[9]**
				Total restoration terrestrial:	**182 985 – 536 669 km² [10]**	
Marine[7] *(4)*	**240 030**	36 810 15%	34 830 15%	168 390 70%	1 622 3 424	34 828 203 200
				Total restoration marine:	**36 450 – 206 624 km² [11]**	

[1] Areas of Annex I terrestrial habitats reported by Romania exceed the terrestrial area of the Member State; therefore, they were excluded from all numbers in the table.

[2] All wetland Annex I habitats (definition of wetlands by the Ramsar Convention) except rivers, lakes, alluvial and riparian habitats, which form a distinct group.

[3] All Annex I habitats in the group 'Forests', except wet, alluvial and riparian forests and wooded meadows, which were included in other groups (wetlands, rivers & lakes, agro-habitats).

[4] Includes Annex I habitat types, mostly semi-natural, that depend on some degree of agricultural activity (e.g. mowing, grazing) and grasslands.

[5] Includes all Annex I river and lake habitats and several riparian and alluvial habitats (meadows and forests).

[6] Includes all Annex I heath, scrub and steppe habitats, except wet heaths (included in the wetlands group) and some heath and scrub that depend on agricultural activities.

[7] Only includes near- and offshore Annex I marine habitats.

[8] This means 0,3-0,75% of EU land

[9] This means 4,4-13% of EU land

[10] This means a total restoration need of 4,7-13,8% of EU land

[11] This means 0,65 – 3,7% of EU seas

Table II: Overall restoration needs, by Member State, of habitats listed in Annex I of the Habitats Directive, based on reporting by Member States (period 2013-2018) under Art.17 of the HD – EU27 (excluding Romania for data quality reasons). Source: EEA.

Member State	Member State surface in km²	Overall restoration needs (all ecosystems) in km² **TERRESTRIAL**				Overall restoration needs in km² **MARINE**
		Area re-establishment (min/max)	Area improvement (min/max)	**Total restoration area (min/max)**	**% of MS territory (min/max)**	**(min/max)**
Austria	83 944	229 / 846	1 215 / 4 778	1 444 / 5 624	1.7 / 6.7	n.a.
Belgium	30 683	106 / 515	571 / 2 410	677 / 2 925	2.2 / 9.5	477 / 1867
Bulgaria	110 995	0 / 0	223 / 5 030	223 / 5 030	0.2 / 4.5	0 / 117
Cyprus	9 249	0 / 0	265 / 269	265 / 269	2.9 / 2.9	0 / 0
Czechia	78 874	0 / 1	881 / 2435	881 / 2 435	1.1 / 3.1	n.a.
Germany	362 177	531 / 1 752	4 813 / 7 058	5 344 / 8 811	1.5 / 2.4	3 354 / 11 944
Denmark	44 162	22 / 102	3 179 / 8 224	3 508 / 8 942	7.9 / 20.2	12 391 / 17 702
Estonia	45 382	0 / 0	907 / 1 962	907 / 1 962	2.0 / 4.3	91 / 852
Spain	506 222	1 466 / 3 026	25 017 / 110 384	26 483 / 113 410	5.2 / 22.4	82 / 12 814
Finland	338 004	3 166 / 6 334	19 348 / 80 619	22 514 / 86 953	6.7 / 25.7	573 / 3 024
France[58]	551 881	866 / 2 650	72 826 / 91 385	73 693 / 94 035	13.4 / 17.0	2 720 / 26 832
Greece	132 014	48 / 96	602 / 7 156	650 / 7 253	0.5 / 5.5	3 564 / 7 176

[58] *The French reports have a lot of duplicated data between 'good', 'not-good' and 'unknown' condition; in addition, they reported often a max value obtained from modelling/potential vegetation, which may have also increased the areas.*

Croatia	55 590	32 / 66	319 / 6 842	351 / 6 908	0.6 / 12.4	0 / 798
Hungary	93 012	127 / 335	3 417 / 4 693	3 544 / 5 029	3.8 / 5.4	n.a.
Ireland	70 699	313 / 640	5 180 / 5 657	5 493 / 6 297	7.8 / 8.9	3 014 / 24 542
Italy	301 321	3 035 / 10 175	2 216 / 57 158	5 251 / 67 333	1.7 / 22.3	0 / 3 981
Lithuania	65 289	70 / 140	308 / 4 436	378 / 4 576	0.6 / 7.0	0 / 285
Luxembourg	2 595	9 / 18	125 / 146	134 / 164	5.2 / 6.3	n.a.
Latvia	64 590	1 / 3	1 091 / 3 138	1 092 / 3 141	1.7 / 4.9	985 / 1 038
Malta	316	0 / 0	17 / 17	17 / 17	5.5 / 5.5	4 / 69
Netherlands	39 898	97 / 353	1 026 / 2 952	1 123 / 3 305	2.8 / 8.3	8 916 / 10 236
Poland	312 683	22 / 44	14 044 / 14 439	14 066 / 14 483	4.5 / 4.6	220 / 220
Portugal	92 378	126 / 253	1 612 / 6 117	1 737 / 6 369	1.9 / 6.9	0 / 65 290
Romania	*238 404*	*979 / 1 959*	*11 704 / 55 023*	*12 683 / 56 982*	*5.3 / 23.9*	*1 889 / 1945*
Sweden	450 110	298 / 1 474	10 925 / 74 646	11 223 / 76 120	2.5 / 16.9	61 / 17 891
Slovenia	20 274	87 / 244	2 015 / 2 599	2 103 / 2 843	10.4 / 14.0	<1 / <1
Slovakia	49 026	51 / 102	137 / 9 548	188 / 9 649	0.4 / 19.7	n.a.

Table III: MINIMUM restoration needs, by Member State and by Annex I habitat, based on reporting by Member States (period 2013-2018) under Art.17 of the HD – EU27. Source: EEA.

		MINIMUM ecosystem areas (km^2) for restoration (improvement + re-establishment)						
	MS area (km^2)	Wetlands	Rivers & lakes	Grasslands & agri	Forests	Heath & scrub	Rocky & dunes	Terrestrial
AT	83.944	36	164	127	603	12	502	**1.444**
BE	30.683	26	259	118	238	0	36	**677**
BG	110.995	0	222	0	1	0	0	**223**
CY	9.249	3	17	4	216	26	0	**265**
CZ	78.874	17	170	227	461	0	5	**881**
DE	362.177	1.814	1.374	899	1.179	16	62	**5.344**
DK	44.162	1.387	550	352	642	0	271	**3.201**
EE	45.382	464	53	93	290	0	7	**907**
ES	506.222	482	639	6.602	14.602	3.762	396	**26.483**
FI	338.004	10.794	3.661	24	5.676	1.980	379	**22.514**
FR	551.881	1.030	6.873	14.701	46.949	77	4.069	**73.699**
GR	132.014	303	37	52	204	39	15	**650**
HR	55.590	1	205	116	29	0	0	**351**
HU	93.012	603	663	670	1.525	2	81	**3.544**
IE	70.699	3.753	928	692	19	54	47	**5.493**
IT	301.321	279	504	1.653	2.313	255	247	**5.251**
LT	65.289	84	84	143	56	0	11	**378**
LU	2.595	0	3	129	1	0	0	**134**
LV	64.590	367	200	122	355	0	48	**1.092**
MT	316	0	0	5	0	7	5	**17**
NL	39.898	614	103	139	88	0	179	**1.123**

		MINIMUM ecosystem areas (km^2) for restoration (improvement + re-establishment)						
	MS area (km^2)	**Wetlands**	**Rivers & lakes**	**Grasslands & agri**	**Forests**	**Heath & scrub**	**Rocky & dunes**	**Terrestrial**
PL	312.683	1.706	3.831	4.224	4.133	15	157	**14.066**
PT	92.378	350	37	230	261	739	120	**1.737**
RO	238.404	2.355	3.273	2.815	3.702	12	526	**12.683**
SE	450.110	6.132	1.655	1.867	1.250[59]	0	320	**11.223**
SI	20.274	4	202	366	1.509	7	15	**2.103**
SK	49.026	5	25	57	96	3	1	**188**
Total EU27	**4.149.772**	32.609	25.730	36.429	86.400	7.003	7.501	**195.671**
Total without RO[60]	**3.911.368**	**30.254**	**22.457**	**33.614**	**82.698**	**6.991**	**6.974**	**182.988**

[59] Sweden forests: reported Favorable Reference Area values leading to a re-establishment of over 24 500 km^2; not included in the table due to methodological issues.
[60] For data quality reasons.

Table IV: MINIMUM restoration needs, by improvement/re-establishment, by Member State and by Annex I habitats, based on reporting by Member States (period 2013-2018) under Art.17 of the HD – EU27. Source: EEA.

Condition: area reported in 'not-good' condition: in need of improvement. Zeros often reflect that most areas have been reported as 'unknown condition'

Additional: for re-establishment: based on minimum Favorable Reference Areas.

	MINIMUM ecosystem areas (km^2) for restoration (improvement and re-establishment)												
	Wetlands		Rivers & lakes		Grasslands		Forests		Heath & scrub		Rocky & dunes		
	condition	Additional	condition	Additional	condition	additional	condition	additional	condition	additional	condition	additional	Terre-strial
AT	27	9	107	57	22	104	590	13	12	0	456	46	**1.444**
BE	17	9	231	28	99	19	192	45	0	0	31	5	**677**
BG	0	0	222	0	0	0	1	0	0	0	0	0	**223**
CY	3	0	17	0	4	0	216	0	26	0	0	0	**265**
CZ	17	0	170	0	227	0	461	0	0	0	5	0	**881**
DE	1.773	41	1.177	197	665	234	1.129	50	16	0	54	7	**5.344**
DK	1.382	4	550	0	334	17	642	0		0	271	0	**3.201**
EE	464	0	53	0	93	0	290	0		0	7	0	**907**
ES	482	1	553	85	6.536	65	13.608	994	3.476	286	360	35	**26.483**
FI	8.413	2.381	3.660	1	18	7	4.901	775	1.980	0	377	1	**22.514**
FR	788	243	6.678	195	14.428	273	46.922	28	77	0	3.941	127	**73.699**
GR	261	42	36	1	52	0	204	0	39	0	11	5	**650**
HR	0	0	202	2	102	14	14	15	0	0	0	0	**351**
HU	603	0	608	55	607	63	1.520	5	2	1	79	3	**3.544**
IE	3.527	226	928	0	611	82	19	0	54	0	42	4	**5.493**
IT	191	88	291	213	590	1.064	845	1.468	136	119	163	84	**5.251**

	MINIMUM ecosystem areas (km²) for restoration (improvement and re-establishment)												
	Wetlands		**Rivers & lakes**		**Grasslands**		**Forests**		**Heath & scrub**		**Rocky & dunes**		
	condition	**Additional**	**condition**	**Additional**	**condition**	**additional**	**condition**	**additional**	**condition**	**additional**	**condition**	**additional**	**Terre-strial**
LT	77	7	83	1	140	3	0	56		0	9	3	**378**
LU	0	0	2	1	122	7	1	0	0	0	0	0	**134**
LV	367	0	200	0	122	0	355	0		0	47	1	**1.092**
MT	0	0	0	0	5	0	0	0	7	0	5	0	**17**
NL	560	54	96	7	126	14	81	8		0	164	15	**1.123**
PL	1.702	3	3.820	12	4.218	7	4.133	0	15	0	157	0	**14.066**
PT	338	12	37	0	130	100	261	0	739	0	107	14	**1.737**
RO	2.251	104	3.027	247	2.500	315	3.401	301	0	12	526	0	**12.683**
SE	6.125	7	1.650	5	1.585	282	1.250	0[61]	0	0	315	4	**11.223**
SI	3	0	177	25	306	60	1.508	2	7	0	15	0	**2.103**
SK	3	2	17	8	43	14	69	27	3	0	1	0	**188**
Total EU27	29.374	3.235	24.589	1.140	33.683	2.746	82.612	3.788	6.586	417	7.145	355	**195.671**
without RO	27.124	3.131	21.563	894	31.183	2.431	79.211	3.487	6.586	405	6.619	355	**182.988**

[61] Sweden forests: reported FRA values leading to a re-establishment of over 24 500 km²; not included in the table due to methodological issues.

2.1.3. Consequences/why is it an issue

Biodiversity loss and ecosystem collapse are one of **the biggest threats facing humanity in the next decade because our lives are directly dependent on healthy ecosystems.**[62] They also threaten the foundations of our economy and **the costs of inaction are high and are anticipated to increase**[63]. Insufficient restoration and the further undermining of ecosystem resilience pose significant risks to the security of supply of critical supporting **ecosystem services**, such as nutrient and water cycles, soil formation, carbon sequestration and pollination. These in turn put at risk the delivery of key provisioning ecosystem services, such as **food**[64], freshwater, bio-materials, cultural services (recreation, education, tourism, aesthetics) and rural livelihoods as well as regulating services, such as disease regulation, air and water quality and security, as well as climate change and disaster risk mitigation and adaptation.

Furthermore, forests, grasslands, wetlands, peatlands, marine and soil ecosystems can take up and store large amounts of carbon from the atmosphere. Degradation or loss of these ecosystems not only reduces the capacity of the valuable natural carbon sinks but can also have the effect of releasing greenhouse gasses and thus, contribute to climate change. Securing healthy **ecosystem and tackling climate change** are intrinsically linked. The IPCC Special Report on the impacts of global warming of 1.5°C points out that climate-related risks depend on the rate, peak and duration of warming, and some impacts may be long-lasting or irreversible, such as the loss of some ecosystems. More biodiverse and better connected ecosystems are more resilient to climate change. Many land and ocean ecosystems and some of the services they provide have already changed due to global warming. Approximately 4% of the global terrestrial land area is projected to undergo a transformation of ecosystems from one type to another at 1°C of global warming, compared with 13% at 2°C. In addition, healthy ecosystem significantly contribute to carbon sequestration and storage. Although wetlands occupy only between 5% and 8% of the earth's total land surface, they hold 35% or more of organic carbon that is stored in soils. Yet when such ecosystems are degraded, their role is reversed, and drained or damaged wetlands are a major source of greenhouse gas emissions, with current rates of release of damaged wetlands estimated at nearly 6% of global human CO_2 emissions[65].

Healthy ecosystems are also important for **disaster risk reduction & control** and to reduce the negative impacts, including economic losses. For example, in case of heavy rainfall, functioning floodplains along rivers and wetlands can buffer large amounts of water and thus

[62] World Economic Forum: The Global Risks Report 2022.
[63] OECD: Biodiversity Finance and the Economic and Business Case for Action.
[64] State of Biodiversity for Food Agriculture (FAO).
[65] Wetland Restoration for Climate Change Resilience, Ramsar Briefing Note 10 (2018).

protect downstream villages and cities from floods[66]. Such ecosystems that act like sponges, can also mitigate the impacts of extreme draught. Coral reefs, seagrass and mangroves protect coastlines from waves and storms. Forested slopes and vegetation help stabilise soil, protecting people and their assets from erosion and landslides. When these ecosystems disappear or degrade, so does their risk-reducing capacity.

The overall poor and degrading condition of ecosystems represents a significant economic risk to society, a problem that is also reported at global level. The recent IPCC 2022 report[6] points out that biodiversity loss, and degradation, damages to and transformation of ecosystems are already key risks for every region due to past global warming and will continue to escalate with every increment of global warming. At the same time, climate conservation, protection and restoration of ecosystems reduces the vulnerability of biodiversity to climate change. Thus, safeguarding biodiversity and ecosystems is fundamental to climate resilient development. Climate change will increasingly put pressure on food production and access, especially in vulnerable regions, undermining food security and nutrition. At the same time **agroecological principles and practices**, ecosystem-based management in fisheries and aquaculture, and other approaches that work with natural processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services. Thus restoring ecosystems will **be fundamental in helping to combat climate change and also reduce risks to food security.** Over half of **global GDP depends**[67] on nature and the services it provides and more than 75 % of **global food crop types**[68] rely on animal pollination. The in-depth global **Dasgupta Review**[69], on the economics of biodiversity, made an urgent call to ensure that our demands on nature do not exceed its supply, and that we must tackle the nature crisis in conjunction with the climate emergency for the sake of our economies, livelihoods and well-being - and those of future generations.

As documented in the EU 2021 Strategic Foresight Report[70], the cost of these environmental challenges is estimated at EUR 3.5-18.5 trillion per year in ecosystem services from 1997 to 2011, which were lost globally owing to land-cover change, and an estimated loss of EUR 5.5-10.5 trillion per year due to land degradation. There is also a link between between climate change, biodiversity loss, environmental degradation and public health: loss of biodiversity, pressure on animal habitats combined with other factors can make future pandemics or diseases more likely.[71]

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[66] The European Commission's INCA project estimated the value of flood control by ecosystems in the EU-28 at 18 billion euro (avoided damage cost).

[67] WEF: New Nature Economy Report (2020).

[68] IPBES: Global Assessment.

[69] Professor Sir Partha Dasgupta, final report of the independent review on The Economics of Biodiversity, 2 February 2021.

[70] COM(2021) 750

[71] COM(2021) 750

The failure to restore ecosystems will also have repercussions for the EU to meet its **international commitments**, as under the Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (UNCCD), the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement (see 1.1. Political context), and to lead by example. Also the EU's domestic commitments in the EU Green Deal as the new economic strategy, including the climate package with strengthened focus on natural sinks, cannot be delivered on without restoring nature.

Finally, it needs to be recognised that nature is more than an economic good or service[72]: and most EU citizens highly value its very existence and recognise its intrinsic worth, a natural heritage that should be respected and protected on a par with cultural heritage so that it can continue to benefit future generations. Healthy ecosystems present a range of aesthetic, spiritual and restorative values to people, as it became particularly evident during the COVID-19 pandemic, which cannot always be expressed in quantitative or monetary terms[73]. Economic estimates can give some monetary estimates of the value of specific ecosystem services, however as underlined in the Dasgupta review[74] absolute values of nature are likely to be meaningless, since without nature life would cease to exist, and as the review summarises: "economics, when used with care, is meant to serve our ethical values".

2.2. What are the problem drivers?

According to the **State of Nature Report**, the EU Ecosystem Assessment and the **IPBES report**[75], the **main drivers of biodiversity loss and ecosystem degradation** are changes in land and sea use, over-exploitation of natural resources, climate change, pollution and invasive alien species.

The drivers are, to an extent, being addressed by EU legislation such as the Birds and Habitats Directives, the Marine Strategy Framework Directive, the Water Framework Directive and the Regulation on Invasive Alien Species. **However, despite significant effort and some progress, the existing EU legislation has so far not led to a significant recovery of the targeted ecosystems.** The reasons for these failures have been examined[76] and are covered in detail later in this section. Furthermore, not all ecosystems that suffer degradation, such as forests and agricultural ecosystsems, are comprehensively covered by the above-mentioned legislation.

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[72] Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. Abridged Version. (London: HM Treasury)

[73] https://www.newscientist.com/article/mg24933270-800-green-spaces-arent-just-for-nature-they-boost-our-mental-health-too/

[74] Professor Sir Partha Dasgupta, final report of the independent review on The Economics of Biodiversity, 2 February 2021, abridged version p. 23

[75] The Regional Assessment Report on Biodiversity and Ecosystem Services for Europe and Central Asia.

[76] See EU Water legislation – Fitness check, Fitness Check of the Birds and Habitats Directives.

A number of the drivers and pressures on biodiversity are being addressed to a degree by the **actions under the Biodiversity Strategy for 2030** together with other initiatives under the **European Green Deal** (e.g. Zero Pollution, Circular Economy, Farm to Fork, Soil Strategy, Forest Strategy, Adaptation Strategy, climate neutrality), but it is too early for these to show results. They will have positive contributions to restoration but on their own, will not be sufficient to meet tangible verifiable restoration objectives (see sections 2.4 and 5.1).

The evaluation of the Biodiversity Strategy to 2020 has also revealed insufficient progress towards restoration. Therefore, there is a significant and specific problem to be addressed, ***the insufficient restoration of degraded ecosystems due to policy and legislative failures,*** which is therefore the focus of this impact assessment.

Specific policy drivers: policy and legislative failures

The main policy failures can be broken down in 1) ineffectiveness of voluntary targets, 2) shortcomings in existing legislation, and 3) lack of a comprehensive and coherent approach.

1) Voluntary targets have been ineffective

In 2011, a key voluntary target of the EU Biodiversity Strategy to 2020 was to restore at least 15 % of degraded ecosystems by 2020. This voluntary target has not been met. The **evaluation study of the Biodiversity Strategy to 2020** identified, among the reasons for the failure in ecosystem restoration, the voluntary rather than legally binding nature of the targets. The subsequent **lack of commitment and political priority for restoration activities** is regarded as a key barrier leading to a lack of financing and resources being allocated to restoration. On the other hand, another target of the Biodiversity Strategy to 2020 on invasive alien species that was made legally binding, with the adoption of a new regulation, did result in this target being implemented to a large extent and in benefits that would not have been delivered if they would have been voluntary[77].

Reasons why the voluntary restoration target has not been met, include:

- Lack of obligation for Member States to act: Despite the guidance[78] developed and the explicit request by the Commission, only a few Member States developed the strategic frameworks to set priorities for ecosystem restoration, and restoration progress has been slow and uneven. The absence of these strategic frameworks has been a barrier to the strategic planning, financing, implementation and monitoring of restoration activities. The fact that the

[77] Report on the review of the application of the Regulation on Invasive Alien Species: COM(2021) 628: *"The IAS Regulation has created a coherent framework for addressing IAS at EU level. It has led most of the Member States to set up a surveillance system and carry out official controls for such species. Despite the very short period of actual full implementation, there are indications that restrictions (e.g. removal of species from trade), early detection/rapid eradication and management of widely spread species deliver benefits."*

[78] Commission Guidance to the Member States in relation to the development and application of a strategic Restoration Prioritisation Framework, 2014, which was based on the study: Priorities for the restoration of ecosystems and their services in the EU, 2014

guidance was followed by some Member States suggests that developing such frameworks was feasible. However, in the absence of an obligation and of a linked dedicated EU-level governance framework to steer the process and regularly review progress, most Member States did not follow on the commitment, to deliver such strategic frameworks and to effectively prioritise restoration, leading to insufficient funding and insufficient restoration effort. This indicates that a stronger and more binding framework is needed with clear targets, resource planning, monitoring and enforcement mechanisms to support strategic planning and implementation and to ensure delivery.

- The formulation of the target as an overall percentage of degraded ecosystems: In the absence of an agreed methodology to comprehensively map, assess, monitor and report on the condition of ecosystems , progress towards reaching the target was not measurable. The **Mapping and Assessment of Ecosystems and their Services**[79] initiative (under Action 5 of the Biodiversity Strategy to 2020) has made progress in developing an EU methodology and enhancing knowledge on the condition of EU ecosystems and their services. However, there are still significant data gaps for certain ecosystems, such as marine, soils, forests, and agro-ecosystems. This has made it impossible for Member States to assess their performance against the voluntary target.
- Biodiversity targets of a voluntary nature were not systematically prioritised for funding in the design and implementation of EU instruments in other policy areas, and measures of low or no positive biodiversity impact were often favoured in national programming.

2) Shortcomings in existing legislation

The evaluation of the Biodiversity Strategy to 2020 and of the main pieces of relevant legislation have revealed implementation problems, reflecting the complexity of the issues at hand. Beyond that, a number of shortcomings remain, since aspects of legislation are **not sufficiently specific, time-bound or measurable to achieve restoration objectives**. For instance:

The **Habitats Directive (HD)** sets an objective to maintain or restore, to favourable conservation status, natural habitats and species of Community interest, **but without deadlines or timeframes, i.e. there are no time-bound targets to reach favourable conservation status**. The **Birds Directive** sets a similar objective for all species of naturally occurring birds in the wild state in the EU, also without a deadline to reach secure status. **Both directives also lack effective requirements to restore habitats outside the Natura 2000 network.** The **Fitness Check of the Birds and Habitats Directives**[80] (2016) found that

[79] https://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm
[80] SWD/2016/472 final.

the directives are fit for purpose, but fully achieving their objectives and realising their full potential will depend on substantial improvement in their implementation. In particular, it found that the lack of precise timelines/targets makes it difficult to fully judge whether progress is in line with expectations, and it is not possible to determine when the general objectives of the directives will be achieved. The pace of implementation of measures towards favourable conservation status has been very slow; action has been concentrated in setting up Natura 2000 sites and to date it has been mainly linked to protection of the habitats and species in the sites, rather than to their restoration. The most frequently reported factors affecting implementation are funding availability, stakeholder awareness and cooperation and availability of knowledge, as well as ineffective integration with other policies.

All in all, this underlines that explicit, well-defined time-bound targets are needed, accompanied by effective enabling measures, including planning, monitoring, reporting and funding.

The **Marine Strategy Framework Directive (MSFD)** sets out a broad goal to achieve good environmental status in EU marine territories by 2020. The 2020 **report from the Commission on the first implementation cycle of the directive**[81] concludes that progress in reaching good environmental status has not been fast enough. **In particular, the broad goal of the Marine Strategy Framework Directive has proven very difficult to achieve;** the reasons for that include the lack of specific measures, **lack of sufficiently fine-grained monitoring of specific habitats or species**, coupled with **a lack of specific focussed targets**. This does not cater for, and hinders, the needed specific restoration measures for specific habitats or species, that need to be rapidly addressed.

The **Water Framework Directive (WFD)** sets out an obligation to restore all water bodies to good status by 2015, with the latest deadline by 2027. The **Fitness Check of the Water Framework Directive and Floods Directive**[82] (2019) concluded that the Water Framework Directive is broadly fit for purpose. However, the objective of reaching good (ecological and chemical) surface water status has not been reached – only 40 % of water bodies are in good ecological status. This difficulty in implementation is in part due to the fact that the water body condition is affected by diffused pollution (e.g. nitrates and pesticides) coming from surrounding habitats (the catchment). These, if restored and protected, would help accelerate progress. Another factor is that the WFD does not necessarily require the removal of barriers that may disrupt the natural connectivity of a river/lake system (only where this would be required to achieve good status and with possible exemptions where justified). However, many terrestrial ecosystems, such as wetlands and floodplains and several habitats and species protected by the Birds and Habitats Directives, directly depend on the aquatic ecosystems being in near natural conditions (free-flowing state). Thus, the **WFD may not be**

[81] Report from the Commission to the European Parliament and the Council on the implementation of the Marine Strategy Framework Directive (Directive 2008/56/EC) COM/2020/259 final.

[82] Trinomics B.V., *Final evaluation report*, European Commission- DG Environment, Service request under framework contract ENV.F.l/FRA/2014/0063, Rotterdam, October 2019.

sufficiently equipped to guarantee such natural connectivity to the extent necessary to sustain these habitats and species and guarantee thriving floodplains. Furthermore, while the WFD addresses all waters in the EU, the methodologies prescribed to delineate the water bodies, which are the units of measures for compliance checks, are such that smaller rivers or lakes below a certain size threshold may in practice not be fully addressed. These shortcomings can be addressed with supplementary restoration requirements.

3) Lack of a comprehensive approach

Ecosystems underpin much of our livelihoods, yet there is a lack of a policy approach to deal with the broad range of ecosystems in a comprehensive manner. Ecosystems are dealt with separately by different pieces of legislation, which has resulted in some **challenges in coordinated implementation.** Although there are differences in their objectives, the Birds and Habitats Directives (BHDs), the Water Framework Directive (WFD), and the Marine Strategy Framework Directive (MSFD) are generally coherent with each other and mutually reinforcing. The Fitness Check of the BHD has nevertheless revealed some challenges in implementation that need to be addressed. This is particularly relevant where these Directives interact, for example water bodies whose status depends on their surrounding riparian habitats, and should be dealt with in an integrated way to achieve specific restoration objectives, such as for flood plains.

Moreover, there are habitats/species/ecosystems that are not or insufficiently covered by legislation. While the Birds Directive aims to protect all wild bird species and their habitats across the EU, its most specific provision on habitat protection (Article 4) only concerns bird species listed in Annex I of the directive as well as regularly occurring migratory species not listed in Annex I. For those species, Member States must set up Special Protection Areas which form part of the Natura 2000 network. The provision concerning the preservation and restoration of the habitats of all bird species (Article 3) provides a general obligation which is largely not implemented. Hence, many **bird habitats** are, in practise, not subject to protection and restoration measures.

The Habitats Directive (HD) covers 1 200 threatened or endemic species of wild animals and plants, collectively referred to as species of Community interest (listed in its Annexes II, IV and V), as well as 231 rare habitat types, listed in its Annex I. Its provisions that are most relevant for restoration mainly relate to Annex I habitats as well as habitats of the species listed in Annex II within Special Areas of Conservation (part of the Natura 2000 network). For those Annex I habitats and habitats of Annex II species that are located outside Natura 2000, **there is no specific provision on restoration**, albeit the achievement of the directive's objective would require this to happen. The same goes for species listed in Annex IV and V of the directive, for which no specific habitat restoration provisions are set, in spite of the objective to maintain or restore them, at favourable conservation status. Moreover, for habitats of the protected species which do not overlap with Annex I habitats, the restoration requirements only concern the necessary action to address the ecological requirements of the

protected species, including birds, while there is no requirement to implement restoration for any other purposes.

The Natura 2000 network on land currently covers 18% of the EU surface (764 000 km^2)[83], ranging from 8,3% in Denmark to 36,7% in Croatia, which reflects differences in biodiversity richness but also different designation strategies by the Member States. The network covers approximately 34% of the surface of all Annex I habitat types, which means that about two thirds lies outside.

Therefore, it can be concluded that – as regards the Habitats and Birds Directives - the areas for which there is no effective provision on restoration cover all land and sea that do not fall within Natura 2000 sites, i.e. the majority of the EU territory, large parts of which are undergoing continuous degradation (EU Ecosystem Assessment 2020).

Although protection and restoration of habitats (e.g. peatlands) under the Birds and the Habitats Directive will benefit soil health and soil biodiversity, this is not an explicit objective of the Directives. **Soil health and soil biodiversity** are not yet covered by EU legislation in an explicit comprehensive and coherent manner. As stated in the State and Outlook of the Environment Report 2020 (EEA): "*The lack of a comprehensive and coherent policy framework for protecting Europe's land and soil resources is a key gap that reduces the effectiveness of the existing incentives and measures and may limit Europe's ability to achieve future objectives related to development of green infrastructure and the bioeconomy".* The legislative proposal ('Soil Health Law') announced in the recently adopted EU Soil Strategy for 2030[84] is expected to address this. For these reasons, soil-related legal obligations will be taken up in that proposal. Furthermore, although some **pollinators** are protected under the Habitats Directive (e.g. rare butterfly species) and they also benefit from habitat conservation measures (e.g. for grasslands) they are not a particular focus of the Nature Directives. Finally, there is no EU legislation requiring the restoration of **urban ecosystems**.

The key policy and legislative failures can be summarised as follows:

1) **Voluntary targets have not been effective** and have not led to the achievement of the agreed EU voluntary restoration targets in the EU Biodiversity Strategy to 2020.
2) There are **significant shortcomings and gaps in existing legislation to address restoration effectively** (for example there are no terrestrial time-bound targets, there is a lack of specific provisions on restoration, etc).
3) **Many ecosystems are not covered** by legislation, and are degraded, **representing significant areas** of the EU territory. This includes soils and some forests, grasslands and urban ecosystems. Furthermore, **key species groups such as pollinators are not covered** by legislation.

[83] https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000-barometer
[84] COM(2021) 323

4) **The lack of a common methodology** for assessing ecosystem condition for these ecosystems not covered by existing legislation blocks progress since condition cannot be measured consistently.

Whilst better implementation of existing legislation would improve the situation, it would not be sufficient to address the problem of reversing the trend of biodiversity loss and restoring ecosystems. To address the policy gaps and shortcomings mentioned above, new legislation is needed. This should supplement the existing legal instruments to protect nature, with additional means to restore nature in order to reverse these downward trends. In other words, to halt and reverse biodiversity loss, protection of nature needs to be supplemented by more efforts to restore degraded ecosystems. The new legislation should build on and work in synergy with existing legislation, but go further to ensure that restoration can be addressed explicitly and extensively across the EU.

2.3. Who is affected by the problem?

The poor condition of ecosystems and the decline of biodiversity impacts on the whole of society, through the loss of ecosystem services, which support economic activity and human livelihoods. The World Economic Forum has identified biodiversity loss as the third most pressing global risk by severity for the next decade, after climate action failure and extreme weather[85]. Biodiversity loss has critical implications for the whole population, from the collapse of food and health systems to the disruption of entire supply chains. Over half of global GDP depends on nature and the services it provides, with three key economic sectors – construction, agriculture, and food and drink – all highly dependent on it[86]. The Banque the France found that 42% of the market value of securities held by French financial institutions comes from issuers (non-financial corporations) that are highly or very highly dependent on at least one ecosystem service[87].

The degradation of ecosystems particularly affects farmers, foresters, landowners, fishers, the water sector and agri-food sectors, the insurance sector (increased impact of disasters), the financial sector (investments dependent on biodiversity) and the tourism sector. At the same time society as a whole also stands to gain significant benefits once ecosystem health is improved.

[85] Global Risks Report 2022, World Economic Forum, WEF: https://www.weforum.org/reports/global-risks-report-2022

[86] World Economic Forum (2020), Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy: http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

[87] Banque de France (2021), Working Paper Series no. 826: A "Silent Spring" for the Financial System? Exploring Biodiversity-Related Financial Risks in France.

The **OECD estimates**[88] that the world lost EUR 3.5-18.5 trillion per year in ecosystem services from 1997 to 2011 owing to land-cover change, and an estimated EUR 5.5-10.5 trillion per year from land degradation. Although figures for the EU were not specifically calculated, one can deduce corresponding losses for the EU. Soil erosion costs European countries and farmers EUR 1.25 billion per year solely in loss of agricultural productivity[89].

Furthermore, biological diversity of microorganisms, flora and fauna also provides extensive benefits for biological, health, and pharmacological sciences. Loss in biodiversity would limit discovery of potential treatments for many diseases and health problems. Loss of biodiversity including pollinators in agricultural soils is also a threat to food production and food quality affecting farmers and citizens alike.

Moreover, there are costs of at least EUR 169 billion per year due to poor management of oceans such as over-exploitation of fisheries, nutrient pollution and invasive marine species carried in ship ballast water.[90]

Degraded ecosystems also have a reduced capacity to mitigate and adapt to climate change, so that people and nature will face more severe consequences such as heat, drought, wildfires, floods and other disasters, when ecosystems continue to decline.

However, biodiversity conservation and nature restoration can avoid many of these costs. They have potential direct economic benefits for many sectors of the economy. For example, conserving marine stocks could increase annual profits of the seafood industry by more than EUR 49 billion, while protecting coastal wetlands could save the insurance industry around EUR 50 billion annually through reducing flood damage losses.[91]

In addition, the Nature Fitness Check[92] showed that the benefits of Natura 2000 are valued at between EUR 200-300 billion per year. The investment needs of the network are expected to support as many as 500,000 additional jobs.[93] For example in the forestry sector a first estimate suggests that Natura 2000 supports 73,000 jobs.[94]

Box 1: Views of stakeholders and authorities on the problem, its impacts and drivers in the EU:

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[88] *Biodiversity: Finance and the Economic and Business Case for Action,* report prepared by the OECD for the French G7 Presidency and the G7 Environment Ministers' Meeting, 5-6 May 2019.

[89] Panagos et al., *Cost of agricultural productivity loss due to soil erosion in the European Union,* 2018.

[90] UNDP and GEF (2012), Catalysing Ocean Finance Volume I Transforming Markets to Restore and Protect the Global Ocean United Nations Development Programme, http://www.thegef.org (accessed on 29 March 2019).

[91] Barbier et al. (2018), How to pay for saving biodiversity. (see BDS2030 chapter 1)

[92] Fitness Check of the EU Nature Legislation (SWD (2016) 472).

[93] Member States' Prioritised Action Frameworks 2020; Mutafoglu et al. (2017), Natura 2000 and Jobs: Scoping Study

[94] Member States' Prioritised Action Frameworks 2020; Mutafoglu et al. (2017), Natura 2000 and Jobs: Scoping Study

A series of Eurobarometer surveys[95] over the past years indicate that the overwhelming majority of European citizens consider the various effects of biodiversity loss to be serious for humans and for nature, and agree that it is important to halt its loss (eight out of ten in the last survey published in 2019). The biggest perceived threats to biodiversity are pollution of air, soil and water, man-made disasters and climate change. EU citizens overwhelmingly agree that nature protection areas are very important and they are not willing to trade damage or destruction of protected areas for economic development.

An open public consultation on the evaluation of the EU Biodiversity Strategy to 2020, carried out jointly with the public consultation on the nature restoration targets, explored the drivers as well as impacts on stakeholders from the failure to halt biodiversity loss. A key reason for failure noted by stakeholders in open text responses related to the lack of integrated, holistic approaches to halting biodiversity loss. EU citizens and academic/ research institutions noted that conflicts can arise in the management of biodiversity predominantly due to contrasting approaches between Member States' and EU/international decision making and diverging economic interests amongst actors in implementing biodiversity-related measures. Furthermore, a 'lack of enforceability' of the Strategy was regarded as a reason for failure by some stakeholders (EU citizens and an academic), followed by poor definition of the targets. Asked about impacts on themselves or on their field of work, more respondents identified significant impacts since 2011 (48%) compared to those who did not identify impacts (33%).

In the open public consultation and consultation workshops on the definition of nature restoration targets, stakeholders from environmental organisations pointed to the voluntary nature of the restoration target in the past as a reason for the failure to implement it. The majority of respondents in the Open Public Consultation who 'completely disagreed' that the voluntary nature of the target had undermined its delivery were forestry-related. The majority of stakeholders who 'fully agreed' or 'tended to agree' that unresolved conflicting land use interests were a factor belonged (in decreasing order) to the forestry, environment and culture sectors. The lowest number of respondents considered that insufficient knowledge and skills had been a barrier. Insufficient funding and conflicting land use interests were the answers most often selected by forestry sector stakeholders.

How the views of stakeholders and authorities have been taken into account:

The problems and drivers identified by the stakeholders are taken into account in this impact assessement and are addressed by the proposed policy option. Threats such as pollution are largely being addressed by other EU initiatives and legislation, however, nature restoration will in many cases also entail reduction of (the impacts of) pollution, and will, in turn, contribute to cleaner water and air. The EU proposal on restoration targets will provide for a more harmonised approach in the EU, with objectives which are in line with international ambitions and commitments. The synergies with and added value to existing legislation, such

[95] https://www.eea.europa.eu/data-and-maps/indicators/public-awareness-2/assessment

as the Birds and Habitats Directives, the Climate Law and the LULUCF Regulation, will ensure the called-for integrate approach. The lack of enforceability and poor definition of targets, as well asl their voluntary nature, is addressed by this proposal as it sets specific, binding targets with clear deadlines and reporting obligations. The issue of conflicting land use interests will be (at least partially) addressed by enabling measures, for instance by pointing towards financial opportunities at EU-level e.g. for developing alternative incomes based on the provision of ecosystem services.

2.4. How will the problem evolve?

As described in Chapter 2, biodiversity loss and degradation of ecosystems continues in the EU, and the restoration efforts to improve the condition of ecosystems have been largely insufficient.

Halting all greenhouse gas emissions would still not prevent the impacts of climate change that are already occurring. These will continue for decades, even if global and European efforts to cut greenhouse gas emissions prove effective. Studies suggest that up to half of Europe's land area may experience major climate-induced changes during this century[96,97]. Marine ecosystems and the oceans are also projected to change significantly[98].

Estimates of how the problem will evolve are also described in the **evolution of the baseline** for each main ecosystem type in the thematic assessments in Annex VI. Annex VII provides a description of the trends of the baseline in broad terms.

The initiatives under the Biodiversity Strategy for 2030 and under the European Green Deal (see Chapter 1) can help to tackle several of the drivers and pressures of ecosystem degradation, and the set of existing and upcoming policy measures of the Green Deal can be expected to help ecosystems to recover to a small degree, for instance by contributing to passive restoration, for instance by reducing pollution or reducing over-exploitation (see policies and their relevance to restoration in Annex X). However, the analysis of their overall impacts indicates that this does not sufficiently address the problem (Annex VII see baseline) and extensive restoration will not be achieved by these policies. Many degraded ecosystems require focussed and location-specific passive restoration measures, as well as a range of location-specific active restoration measures. All of these are needed for ecosystems to

[96] Samuel Hoffmann, Severin D. H. Irl & Carl Beierkuhnlein, *Predicted climate shifts within terrestrial protected areas worldwide*. Nature Communications vol 10 N° 4787, 2019.

[97] Hickler et al., *Projecting the future distribution of European potential natural vegetation zones with a generalized, tree species-based dynamic vegetation model*, Global Ecology and Biogeography, 2012, pages 21, 50–63.

[98] https://www.ipcc.ch/srocc.

recover. **Thus, without significant intervention, the problem of the lack of restoration will continue and persist across the EU.**

Biodiversity and ecosystems and the need to restore nature is at the core of the Green Deal, and the economic transformation of the Green Deal goes hand in hand with having healthy ecosystems. Failure to address the problem of restoration will pose risks to addressing core objectives of the Green Deal, including reaching climate neutrality. EU climate policy is increasingly relying on natural sinks to capture and store carbon (such as in the LULUCF Regulation). Ecosystems, such as wetlands or forests, need to be in a heathy state in order to be able to effectively capture and store carbon. Likewise, more biodiverse and healthy ecosystems are more resilient to climate change and also provide more effective form of disaster reduction and prevention. Healthy croplands and grasslands, rich in biodiversity and pollinators are needed in order to assure crop provision in terms in quantity and quality, and without these **the likely evolution of the problem would increase the likelihood of not reaching objectives of strategies of the Green Deal** such as the Farm to Fork Strategy.

In summary, because of the various shortcomings and gaps in the existing legislation as described above, this will not by itself be able to drive a restoration agenda. **In the absence of binding restoration targets and proper planning, monitoring, reporting and enforcement mechanisms, the problem of poor ecosystem condition risks to be further aggravated. This would also significantly hamper reaching the objectives of the Green Deal.**

3. WHY SHOULD THE EU ACT?

3.1. Legal basis

The legal basis is Article 192(1) of the Treaty on the Functioning of the European Union. On the basis of this provision, the Union can take action to achieve the objectives of Article 191: Union policy on the environment shall contribute to pursuit of the following objectives:

- preserving, protecting and improving the quality of the environment,
- protecting human health,
- prudent and rational utilisation of natural resources,
- promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.

3.2. Subsidiarity: necessity of EU action

Intervention at EU level is justified in view of the scale and transboundary nature of biodiversity loss and ecosystem degradation, the impacts of environmental degradation on citizens across the Union as well as the risks to its economy. Coordinated measures by all

Member States are necessary to achieve significant levels of biodiversity and ecosystem restoration in the EU. The roll out of the Biodiversity Strategy to 2020 has shown that the voluntary commitments of Member States are not sufficiently conducive to reaching EU objectives for restoring ecosystems.

Moreover, given that several ecosystems are already covered by EU legislation, EU action is needed to complement existing requirements where necessary and to fill policy gaps for ecosystems that are not yet fully covered.

3.3. Subsidiarity: added value of EU action

- Coordinated action is needed at a sufficiently large scale to address biodiversity loss and degradation and to benefit from synergies at that level. The more ecosystems are restored, the greater their capacity to reverse the decline of species and habitats. Working at European scale is essential, for instance for the recovery of birds and pollinators which is a problem across the EU and cannot be solved by only working in some Member States. Likewise, addressing problems at European scale is also essential given the extent of mobility of many terrestrial/aquatic/marine species and for addressing pressures such as aquatic and air pollution. In terms of synergies, restoring one ecosystem has positive effects on other neighbouring or connected ecosystems and their biodiversity, since many species thrive better in connected networks of ecosystems on a large geographical scale.
- EU-level action allows to address the transboundary nature of biodiversity-related and ecosystem degradation issues, including the pressures on ecosystems, which could not be tackled efficiently at Member State level alone. EU-level action brings effectiveness/efficiency gains.
- EU-level action is also needed to ensure a consistent approach to restoring towards good ecosystems condition across the EU. Without this there would be no common targets of what restoration efforts are aiming towards.
- Taking ambitious, coordinated action on biodiversity and ecosystem restoration at EU level, will give the EU the necessary credibility to 'lead by example and by action' at international level.
- Further analysis of subsidiarity for each of the policy options is presented in Chapter 7.

Box 2: Views of stakeholders and authorities on the need for EU action.

*The feedback received on the **Inception Impact Assessment roadmap** (see Annex II for more analytical detail) revealed overall broad support for the EU initiative across NGOs, academia, business, citizens and other organisations. Some environmental NGOs and experts proposed that EU legislation should set binding targets for the individual Member States. However, most respondents (across stakeholder groups) considered that the selection of*

restoration sites and measures should be done at the national and sub-national level, and that the governance, monitoring and reporting framework should provide for this flexibility.

Stakeholder views expressed in the open public consultation diverged significantly as concerns the ***level at which targets should be set****. When all responses were considered, there was close to full support both for an overarching restoration goal (97%) and for specific targets for ecosystems (96%). When the responses submitted via the #RestoreNature campaign were isolated, none of the options for binding EU restoration targets received majority support. Stakeholders active in the forestry sector in Poland, who formed the majority of these respondents (55%), indicated relatively low support for an EU level target across all ecosystems (40%) and even lower support for ecosystem-specific EU restoration targets, while open responses indicated preference for the setting of targets at the national level and called for financial incentives. Open text respondents overwhelmingly supported subsidiarity for the Member States to determine restoration priorities, pointing to local social, historical and cultural knowledge, differences in economy and policy structures and biodiversity and ecosystems. A combined approach of EU restoration targets and Member States' flexibility to plan restoration on the ground according to national features was broadly supported by Member States' authorities and stakeholders at the consultation workshops.*

How views of stakeholders and authorities have been taken into account:

The proposed policy option sets targets for Member States, but the prioritisation of restoration sites and selection of measures is left to Member States, in line with the principle of subsidiarity and allowing for flexibility in planning and to accommodate for local conditions. A combined approach is proposed, setting both an overarching restoration target as well as a range of ecosystem-specific targets.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1. General objective

The general objective is that the EU's biodiversity should be on the path to recovery and that all EU ecosystems should be restored.

This general objective is in line with the Biodiversity Strategy for 2030 and supported by other initiatives under the European Green Deal. This general objective is at a level consistent with Article 192(1) of the Treaty on the Functioning of the European Union (see section 3.1 above). The implementation of the strategy is in progress, with a large number of specific

actions being carried out.[99] The more ecosystems are restored the greater their capacity to revert the decline of species and habitat types, thereby avoiding extinctions and regaining habitats and species in what is their natural range. In addition, the more biodiverse and better connected ecosystems we have, the greater is their capacity to adapt to climate change (by allowing species to migrate northwards and upwards) and the greater the overall resilience of Europe's nature to predicted weather extremes. In addition (and as important), the more we restore ecosystems that capture and store carbon, the more contribution there is to climate policy in terms of climate adaptation and mitigation. Ecosystem restoration is an essential part of climate policy and vice versa: climate adaptation and mitigation is needed to prevent further biodiversity loss and ecoystems degradation. This should apply to all regions of the EU including the outermost regions[100, 101].

4.2. Specific objective

Following from the general objective, the specific objective is:

To restore degraded ecosystems across the EU, in particular those that have the most potential to remove and store carbon and prevent and reduce the impact of natural disasters; and to restore the broad range of ecosystems in the EU, with restoration measures in place by 2050 and ecosystems on the path to recovery by 2030.

For the specific objective, one should note that:

1. The primary objective is an ecological one (i.e to improve the condition of ecosystems). However, improved ecosystem condition also goes hand in hand with the delivery of a range of ecosystem services that result from improved condition. Thus, the **specific objective will naturally entail the improvement of a wide range of ecosystems services, of which climate mitigation and disaster risk reduction are particularly highlighted.** The emphasis given to restoration that in particular contributes to climate mitigation and disaster risk reduction was specified in the Biodiversity Strategy to 2030.

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[99] Details of the implementation plan and progress are publically available through the online EU Biodiversity Strategy Actions Tracker and the EU Biodiversity Strategy Dashboard.

[100] Scattered across the Atlantic Ocean, the Caribbean sea, Latin America and the Indian Ocean, the nine EU outermost regions - Guadeloupe, French Guiana, Martinique, Mayotte, Reunion Island and Saint-Martin (France), the Azores and Madeira (Portugal) and Canary Islands (Spain) - face permanent constraints due to their remoteness, small size, insularity, and have the highest EU unemployment rates and some of the lowest GDP rates. It is in this context that the Treaty on the Functioning of the European Union (Article 349 TFEU) provides for specific measures to support the outermost regions, including derogations on the application of EU law in these regions.

[101] The Biodiversity Strategy for 2030 foresees that "*particular focus will be placed on protecting and restoring the tropical and sub-tropical marine and terrestrial ecosystems in the EU's outermost regions given their exceptionally rich biodiversity value*".

2. To define the **breadth of ambition** and **set dates** for progress for the specific objective, further reference to the biodiversity strategy has been made. The strategy specifies that the EU's biodiversity will be on the path to recovery by 2030, and that by 2050 all ecosystems are restored. **Given that in practice it may not be possible to restore *all* ecosystems, the specific objective needs to address at least "a broad range" of ecosystems[102] in the EU.** Furthermore, given the dates specified in the Biodiversity Strategy, **ecosystems should be restored by 2050 and on the path to recovery by 2030**. This sets the breadth of ambition of the specific objective and provides milestones dates for progress for the specific objective.

3. The **"broad range" of ecosystems** to be addressed is taken to correspond to the main ecosystem types in the EU: **wetlands, forests, agro-ecosystems (including grassland and cropland), marine ecosystems, heathland, scrub, rocky and dune habitats (which encompasses sparse vegetation), lakes, rivers and alluvial ecosystems and urban ecosystems.** Carrying out restoration of these ecosystems would help improve their condition and restore biodiversity. Restoration of these ecosystems would also typically, and to varying degrees depending on the specific restoration carried out, contribute to removing and storing carbon and preventing and reducing the impact of natural disasters. The marine and terrestrial ecosystems in the EU's outermost regions (including tropical and sub-tropical) are also included given their exceptionally high biodiversity value.
4. The **condition** towards or to which most ecosystems need to be restored – "good condition" – means a state where the key characteristics of an ecosystem, namely physical, chemical, compositional, structural and functional state, and landscape and seascape characteristics, reflect the high level of ecological integrity, stability and resilience necessary to ensure the long-term maintenance. For habitat types listed in Annex I and II the condition is assessed via the "structure and functions" parameter, as referred to in Article 1(e) of the Habitats Directive. Under the Nature Directives, Member States have elaborated for Annex I habitats what a good condition is and how it is monitored in their specific biogeographical circumstances. The result of the monitoring is reported , as part of the Conservation Status assessment under Art.17 of the Habitats Directive to the Commission every 6 years.
5. Restoration of ecosystems does not require to achieve a certain historic condition (e.g. cities don't have to be reverted back into wetlands or forests, biodiverse grasslands do not have to be converted into forests, etc.) but it considers current and predicted changes in environmental conditions. In the case of re-establishment of ecosystems, Member States would be expected to identify (where possible) where ecosystems were lost in the last 70 years in order to take this information into account when

[102] It may not be possible to restore all ecosystems, but at least a broad range should be restored. For example, some very heavily modified ecosystems due to human or climate change causes may not be possible to fully restore.

drafting their restoration plans and planning the areas of ecosystems to be re-)established. This does however not mean that they have to re-establish a situation as it was 70 years ago.

6. **For ecosystems currently not covered by the Nature Directives, good condition will be defined by the EU-wide methodology to be set up in the context of the Nature Restoration Law** implementation (as explained in 5.2.2 under 'EU-wide methodology').
7. Restoration not only includes measures to improve the condition of the ecosystems but also their **re-establishment**, in particular but not exclusively in the areas where they were lost.
8. One needs to also ensure that restored ecosystems and all others subject to the specific objective be **maintained** and do **not (further) deteriorate** (for example by ensuring protection or appropriate management). Restoration approaches need to take into account the fact that future restored ecosystems should be **climate-resilient**.

In order to put EU's nature on the path to recovery by 2030, the initiative needs **to act with urgency and lead to measurable results by that date.** However, since data (e.g. on condition) and monitoring mechanisms are not available for all ecosystems, these would need to be developed based on a **step-wise approach**. This is described further in 5.2.1 in more detail; see also Figure 6.

The specific objective would **apply directly to Member States**, taking into account Member States' bio-geographical characteristics, as not all ecosystems are represented in each Member State (see Annex VIII for geographical distribution and condition per Member State). At EU level we would aim to reach the specific objective EU-wide and at Member State level we would aim to ensure that the appropriate efforts are put in place that will jointly help achieve the EU-level objective. Such appropriate efforts are later described in section 5.2.2 which outlines the implementation framework and the requirements placed on Member States for the options considered.

To ensure a good understanding of the objectives and the targets, it is important to note the difference between "**restoration**" and "**recovery**" (as outlined in the Glossary): To restore means that all the necessary measures (e.g blocking of wetlands drainage, re-introduction of needed species, etc.) have been put into place to enable the recovery of an ecosystem to get back to **good condition.** However, some ecosystems can take decades to recover even if all the restoration measures have been put into place. Thus, restoration measures can be put into place relatively quickly, but recovery to good condition can take more time to arrive at, depending also on the type of ecosystem.

Box 3: Views of stakeholders and authorities on the general and specific objectives.

*Restoration for **biodiversity improvement** was considered moderate to high priority for the majority of respondents in the Open Public Consultation, as were the additional objectives of*

***climate mitigation**, **adaptation** and **resilience**, **disaster risk reduction**, **air and water regulation**, **pollination**, and **human health**. Open question responses from academic and research organisations and some sector stakeholder organisations further stressed the importance of an integrated strategy to support ecosystems restoration and socio-economic development.*

*National authorities, restoration experts from the academia and environmental NGOs participating in the **consultation workshops** underlined the importance of **reducing pressures** and **increasing ecological connectivity**. Several environmental NGOs and restoration experts called for ensuring non-deterioration of both ecosystems that are restored, and those that are to be restored. Stakeholders ranging from national authorities in the Member States and NGOs to sector associations underlined the importance of ensuring links and complementarity with the objectives existing EU legislation and policies such as the BHD, WFD, MSFD, CFP, CAP and LULUCF.*

How views of stakeholders and authorities have been taken into account:

The stakeholder feedback on connectivity and on non-deterioration has led to explicit incorporation of both principles (as requirements) in the proposal. Links and complementarity with existing EU legislation is also built in the proposal, for instance to limit the burden on Member States for monitoring and reporting (no duplication) and to ensure added value of the proposal.

Operational objectives:

Following from the specific objective, and the rationale described in section 2.2, the operational objectives are to:

- Restore and maintain ecosystems to good condition by establishing *legally binding nature restoration targets*, in a way that complements existing relevant instruments and fills EU policy and legal gaps. The targets should be 'SMART', i.e. specific, measurable, achievable, realistic and time-bound.
- Ensure that targets are properly implemented by establishing an *effective implementation framework* that includes requirements for monitoring, assessment, planning, reporting, enforcement, financing and capacity building, and when necessary, remedial or corrective action.

Legally binding targets and an associated implementation framework are considered to be the appropriate instruments to fill the **gaps identified in the problem definition** because they would directly address the persisting restoration gaps as well as underlying policy and legislative failures outlined in section 2.2.

Box 4: Views of stakeholders and authorities on the operational objectives:

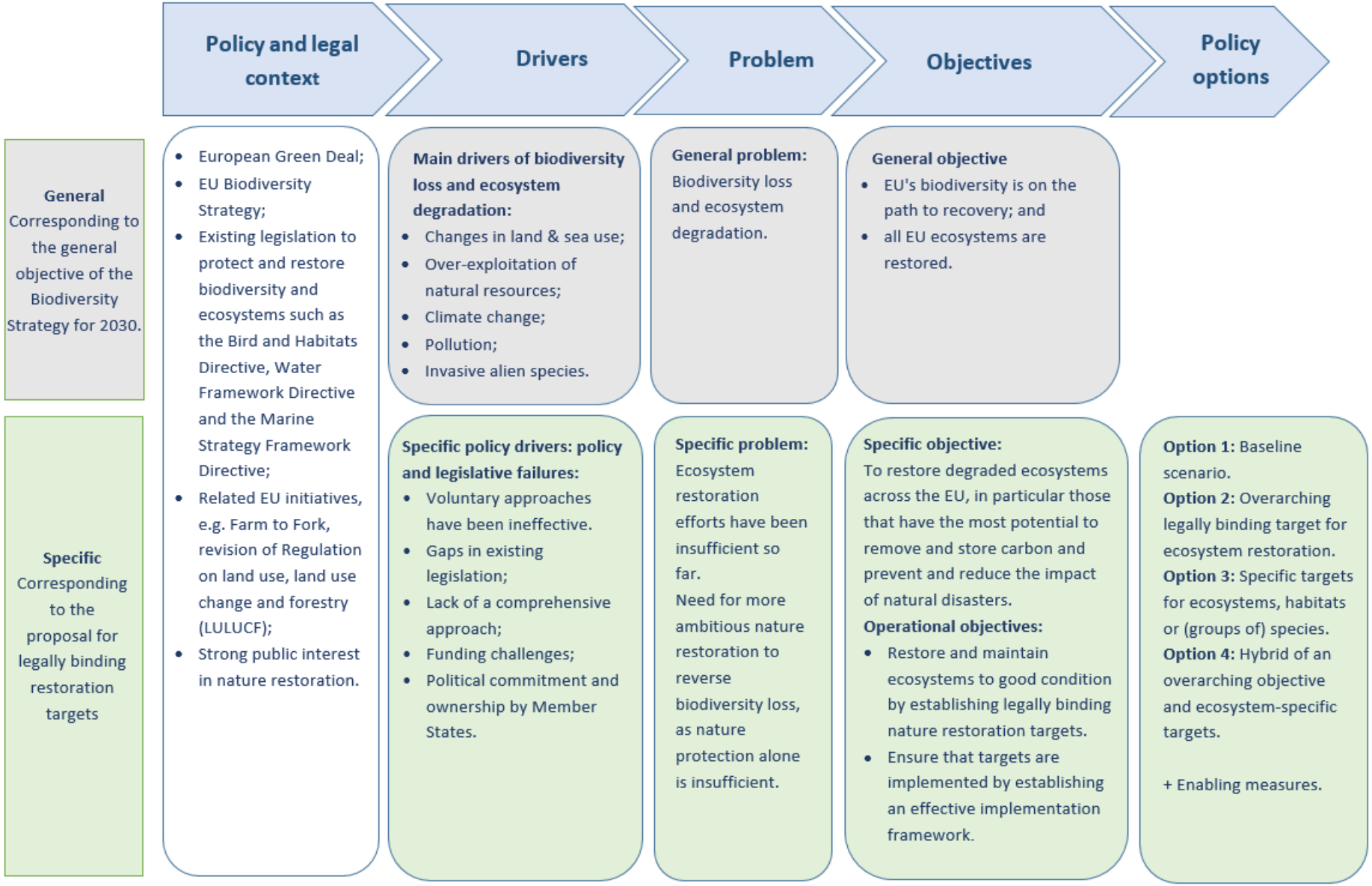
The Open Public Consultation results overwhelmingly supported the establishment of ***legally binding restoration targets*** *(97 % in favour of general EU-level restoration targets across all ecosystems, 96 % for targets per ecosystem or habitat, 97 % for 'other' and 1 % for targets per species or group of species). The majority of this support was mobilised via the #RestoreNature campaign initiated by environmental NGOs, which included more than 95 % of the EU citizens participating in the consultation. Another specific segment of respondents, mostly citizens and stakeholders active in the Polish forestry sector, expressed preference for* ***soft measures****. The majority of all respondents supported EU action to improve knowledge and training, as well as cooperation with EU neighbours to restore cross-border ecosystems.*

At the consultation workshops, calls were made by authorities and stakeholders across the board to ensure support for restoration with enabling measures, with a special emphasis on funding (including compensation), as well as for measures to support community-led ecosystem restoration and management, knowledge, monitoring and research into the impacts of restoration. Passive restoration as well as measures to protect restored ecosystems and to ensure their non-deterioration and sustainable management were considered essential by restoration experts.

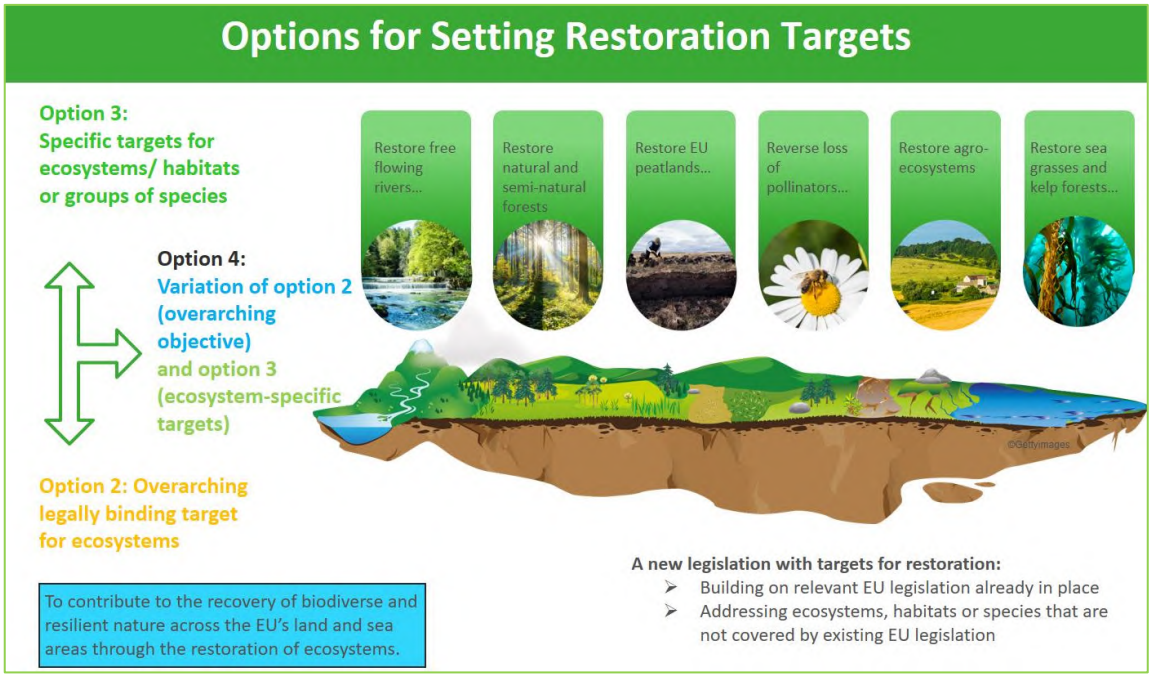
How views of stakeholders and authorities have been taken into account:

The proposal includes legally binding targets, both at an overarching level, as well as ecosystem-specific targets. In response to the need for 'soft measures' and 'enebling measures', such enabling measures have been included in the proposal. The impact assessment has shown, that soft (non-binding) measures alone would be insufficient to achieve the restoration objectives of the Biodiversity Strategy. Passive restoration as well as measures to ensure the non-deterioration of ecosystems have been included in the proposal.

4.3. Intervention logic



5. WHAT ARE THE AVAILABLE POLICY OPTIONS?



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5.1. What is the baseline from which options are assessed?

The baseline scenario assumes the implementation of the Green Deal and Biodiversity Strategy for 2030 *with the exception of the legally binding restoration targets*. Beyond that, the baseline also assumes that other EU and Member State policies relevant to restoration would be implemented. Information on national restoration policies is provided in Annex XI.

The baseline scenario would therefore include:

- Non-binding targets included in the EU Biodiversity Strategy to 2030 related to restoration, such as: no deterioration in conservation trends and status of all protected habitats and species by 2030 and that at least 30% of species and habitats not currently in favourable status are in that category or show a strong positive trend by 2030; 25 000 km of rivers is restored to be free-flowing; by-catch of species threatened with extinction is eliminated or reduced to a level that allows full recovery; and a reverse in the decline of pollinators.
- Broad commitments for financing for biodiversity as well as potential market-based instruments and voluntary approaches to remove harmful subsidies (as outlined in the Biodiversity Strategy for 2030).
- Implementation of relevant EU policies and legislation, particularly the BHD, MSFD, WFD and those under the European Green Deal such as the Zero Pollution Action Plan, the Soil Strategy and Chemicals Strategy, the Fit for 55 Package (mainly LULUCF), the Climate Law, the proposed revision of the

Renewable Energy Directive (RED) and the proposed Regulation on deforestation and forest degradation[103].

- Implementation of national policies relevant to restoration.

For the baseline scenario, we interpret "implementation" of relevant policies, voluntary commitments and legislation as "realistic", based on expected implementation by Member States and based on experience to date (which has shown that implementation has not been perfect and with many insufficiencies). So specifically, it considers the "realistic" implementation of BHD, WFD, MSFD and climate laws (see Annex VII).

Contribution of existing EU legislation and initiatives (see Annex VII for more details)

The 'realistic' implementation of relevant EU environmental and climate legislation will contribute to the recovery of degraded ecosystems by addressing the drivers of biodiversity loss and ecosystem degradation.

The Birds and Habitats Directives (**BHD)** are expected to see enhanced implementation towards 2030 as a result of the efforts resulting from the implementation of the Action Plan for nature, people and the economy that was developed following a thorough Fitness Check of the legislation. Following the completion of the Natura 2000 designation process on land, Member States are in the decisive phase of developing site-specific conservation objectives and measures (including restoration) which are critical to yield results on the ground. The Water Framework Directive (**WFD)** is also expected to see enhanced implementation in light of the deadline to achieve good status of water bodies by 2027, and the Fitness Check that identified some priorities for better implementation. There is, however, little likelihood that Marine Strategy Framework Directive (**MSFD)** implementation will improve towards 2030, as there are several implementation challenges for which it is too early to tell how effectively they will be tackled in the ongoing review. Moreover, the benefits of the review are unlikely to be felt in the short term.

With the **European Green Deal**, biodiversity has become a political priority at the highest political level in the EU. The EGD sets out a strategy for a wide range of initiatives that have the potential to address some of the biggest drivers in ecosystems degradation. The **Climate Law** legally commits all Member States to achieve climate neutrality by 2050. To get on track towards this goal, the **Fit for 55** package sets the EU on course to cut greenhouse gas emissions by **55** % by 2030 by introducing new and revised legislation on energy and climate. This would mainly help mitigate climate change. The revision of **LULUCF**, through reduced emission and increased carbon removal requirements for the land use sector, would in particular yield biodiversity co-benefits such as reduced tillage to enhance soil carbon, or increasing standing biomass in forests. The revision of the **Renewable Energy Directive** and related guidance has the potential of reducing negative impacts on forest ecosystems as a result of stricter

[103] Proposal for a Regulation on deforestation-free products, COM(2021) 706.

requirements for using forest biomass for energy production. Other elements in this package are expected to have less notable effects on biodiversity.

The **Biodiversity Strategy for 2030** also contains other proposed objectives and initiatives that can contribute to the recovery of ecosystems. **BDS2030 pillar 1 on protection** outlines voluntary protection targets. The protection of at least 30% of EU land and sea will help promote passive and active restoration in these protected areas. The commitment *'to ensure no deterioration in conservation trends and status of all protected habitats and species by 2030'* and *'to ensure that at least 30% of species and habitats not currently in favourable status are in that category or show a strong positive trend'* will only be achieved if it goes hand in hand with a significant restoration of the ecosystems in which these habitats and species occur.

BDS2030 pillar 2 on restoration provides some aspirational targets for restoration of **agro-habitats** for which the biodiversity strategy would work in tandem with the **Farm to Fork Strategy.** This sets voluntary commitments to increase organic farming, reduce pesticide and fertiliser use, introduce landscape features, and improve soil health. The **EU Pollinators Initiative** is furthermore currently being reviewed to put in place enabling measures with the aim of reversing the decline of pollinators by 2030.

The latest **Common Agricultural Policy** agreement gives the opportunity to Member States to use funds for environmental purposes. However, all Member States face competing priorities, and the 2014-20 experience of greening measures is that they have made a limited contribution to improving the environmental performance of farming[104]. This combined with past experience with voluntary commitments (as outlined in Section 2.2) makes that significant additional restoration cannot be expected unless Member States are mandated to achieve a certain level of restoration of degraded agro- or forest ecosystems.

For restoring **marine habitats**, the biodiversity strategy sets out the commitment to reduce bycatch and damage to seabeds. To achieve this, the strategy not only relies on the MSFD but also on the Common Fisheries Policy and the Marine Spatial Planning Directive (MSPD). The evaluation of the Biodiversity Strategy to 2020 noted high negative biodiversity impacts and continuing overfishing in certain EU sea basins. In the Mediterranean, for instance, most stocks are still massively overfished while a large number of north-east Atlantic stocks are fished sustainably. As regards the MSPD, several Member States have not adopted their maritime spatial plans by the implementation deadline of the MSPD. While ongoing policy developments, such as strengthening national marine spatial plans, providing guidance on priority areas and improving knowledge, will surely focus minds on ecological objectives in the marine environment, it remains to be seen in how far they will result in actual restoration outcomes.

[104] European Court of Auditors Special Report 22/2017, Special Report 13/2020 and COM(2018)790 final.

For **freshwater ecosystems**, the strategy sets the voluntary target to restore 25 000 km of rivers to free-flowing state through barrier removal. To help Member States achieve this, the Commission will provide technical guidance to identify sites and mobilise funding. However, broad uptake cannot be guaranteed because of the target's voluntary nature. For **urban ecosystems** the strategy commits to stop the loss of green urban ecosystems, and calls on European cities of at least 20 000 inhabitants to develop ambitious Urban Greening Plans by the end of 2021. Again, the level of uptake and effectiveness cannot be guaranteed.

The strategy aims to halve the number of Red listed species threatened by invasive alien species, which is to be made possible by implementing the **Invasive Alien Species Regulation**. The **Forest Strategy** furthermore announced that definitions, indicators, guidelines, cooperation and a certification scheme will follow, most of which are voluntary. Without a legally binding basis, including provisions for achieving a certain level of forest ecosystem condition, it is questionable that it will lead to significantly more restoration. The **Zero Pollution Action Plan**, **Circular Economy Action Plan, Adaptation Strategy, Soil Strategy** and the proposed **Regulation on deforestation and forest degradation** will furthermore address pollution, over-exploitation of natural resources, climate change, soil health and deforestation.

BDS2030 pillar 3 on enabling transformative change announces several initiatives such as a new governance framework and further commitments to dedicated funding. However, without legally binding obligations it remains to be seen how much uptake this will generate and how much would be focussed on restoration as such. **BDS2020 pillar 4 on the global biodiversity agenda** underlines a commitment to the ambition that 'by 2050, all of the world's ecosystems are restored, resilient, and adequately protected'. If adopted at the next CBD COP 15, which is to adopt a new Global Biodiversity Framework, it will put additional pressure on the EU to fulfill its commitments and lead by example.

The above EU policies will all have positive contributions to restoration but on their own will not be sufficient to lead to tangible verifiable restoration objectives outlined in Chapter 4 and thus leaving significant gaps that the legally binding targets can address.

Estimates of the evolution of the baseline for each main ecosystem type are given in the thematic assessments in Annex VI. Annex VII provides a description of the likely trends of the baseline in broad terms.

5.2. Description of the policy options

This section describes the policy options. These describe four main policy options: the baseline and three options for legally binding restoration targets that aim to address the shortcomings in EU policy. In essence, these consider different ways of setting targets, either aiming at broad overarching restoration targets, or much more specifically defined

restoration targets at the level of specific ecosystems, or a form of hybrid target. These are: 2) an overarching legally binding target for ecosystem restoration, 3) legally binding ecosystem-specific targets, and finally 4) legally binding ecosystem-specific targets with an overarching objective. The options are described further described below in 5.2.1, and then 5.2.2. describes how implementation would be ensured for these options.

5.2.1 Options for setting targets

Policy Option 1 – Baseline

The baseline is described in section 5.1. and assumes the implementation of policies in the Green Deal and Biodiversity Strategy for 2030 and other relevant existing polices *with the exception of the legally binding restoration targets*. A more detailed description of the baseline is given in Annex VII.

Policy Option 2 – An overarching legally binding EU target for ecosystem restoration

Considering that the voluntary target set out in the Biodiversity Strategy to 2020 was not achieved, this option considers putting in a place a clearly defined legally binding version of this overarching target to restore ecosystems with deadline dates. Such an overarching target could be defined as: **By 2050, ecosystems in the EU are restored to and maintained in good condition**, complemented by legally binding milestones, that "by 2030, 20%, and by 2040, 60% of ecosystems in the EU are restored to and maintained in good condition"[105]. This EU target would be defined to cover the broad range of ecosystems in the EU, as described and listed in 4.2.

Such an overarching legally binding EU target would be established in legislation, and Member States would be required to reach the target on their own territories. They would be required to set up **national restoration plans** to reach the overarching target. This would give each Member State the freedom to decide how to best achieve their target based on their geographical characteristics and national preferences. The Commission could also provide guidance on which ecosystems to prioritise according the different milestone dates.

Overarching targets for restoration across the EU have also been proposed by the European Parliament and some stakeholders. For example, the Parliament resolution proposes a target to restore at least 30 % of the EU's land and seas, which should be fully implemented by each Member State throughout their territory[106]. The assessment in

[105] The proposed targets of 20% and 40% aim for a realistic distribution over time of the effort needed, taking into account that the period between entry into force and 2030 will be short, and that by 2040 a high enough perscentage (60% and not e.g. 40 or 50%) will provide a better overall benefit/cost ratio, as shown in the impact assessment of the specific targets.

[106] European Parliament resolution of 9 June 2021 on the EU Biodiversity Strategy for 2030: Bringing nature back into our lives (2020/2273(INI).

section 6.2 also applies to a large extent to that proposed target, given that this target is very similar to the one analysed, other than the percentages that are slightly different.

The option would also include the requirement of **no deterioration** of ecosystems, to avoid that restored ecosystems are subsequently destroyed or damaged. See Annex X for a more detailed description of how this could be accomplished.

Monitoring and reporting of ecosystems covered by the BHD, WFD or MSFD, could be addressed by the monitoring and reporting mechanisms of that legislation. This would enable Member States and the Commission to measure progress towards a subset of the target. This, however, would only allow for partial coverage of ecosystems that would contribute to the target being reached. For other ecosystems, for which information about condition is not available through existing monitoring and reporting mechanisms (e.g. agro-ecosystems or forest habitats not listed in Annex I of the Habitats Directive), additional methodologies and monitoring mechanisms would have to be developed (so that Member States can determine which of those ecosystems need to be restored. The requirement to develop such an EU wide methodology could also be set in legislation. This could be an EU wide methodology across ecosystems in the EU or be based on the approach as described in option 3.

Policy Option 3 – Legally binding ecosystem-specific targets

The legislation would set legally binding ecosystem-specific targets for a range of ecosystems, habitats, or (groups) of species that should be restored by 2050. Targets would be established for each of the EU's main ecosystem types (i.e. wetlands; forests; agro-ecosystems and grasslands; heathland and scrub; rivers, lakes and alluvial habitats; marine; urban ecosystems; and pollinators as a specific species group) **that would be directly applicable at Member State level**. For soils, a target (rewetting of drained peatland) and an indicator (on soil organic carbon) have been included under agro-ecosystems. The targets and sub-options for the specific targets for each of the main ecosystem types are provided in Annex V. A summary table of the targets selected is provided below.

Member States would set up **national restoration plans** to reach these targets at national level. This would give each Member State the obligation to restore based on their national biographical situation (for example land-locked Member States would obviously not have any marine ecosystems to restore) and they would have ownership of exactly how to plan to reach the targets.

The **evidence base** and methodology for arriving at a set of specific targets is described in Annex IV. This evidence base stems from stakeholder workshops, in-house expertise in the Commission, as well as the EEA. Data and information about Annex I habitats and the related targets comes primarily from reporting by Member States under the Habitats Directive, providing evidence of how much area needs to be restored, that was analysed in detail with the help of the EEA. Other targets such as for farmland birds are underpinned by the farmland bird index or follow from studies, including the EU

Ecosystem Assessment, and related work by the JRC, the EEA and the European Topic Centre on Biodiversity.

The option would also include the requirement of **no deterioration** of ecosystems (the approach of how to address this is given in Annex X).

This option would use a **stepwise approach** (Figure 6). In step 1 (the initial adoption of the legislation), targets would be set for ecosystems, habitats or groups of species for which data, baselines and monitoring mechanisms are available. This would result in targets being set for each of the main ecosystem types in step 1 (see table below and Annex V). For terrestrial ecosystems, targets to restore Annex I habitats of the Habitats Directive would cover 24%[107] (949 990 km^2) of the EU's land area, corresponding to areas both within Natura 2000 and outside of Natura 2000. Of the terrestrial Annex I area, 182 985 to 536 669 km^2 would need to be restored (see table 1, section 2.1.2). Other species targets such as on protected species, farmland birds or pollinators would indirectly address a bigger part of the EU land area. Using a stepwise approach was proposed and supported at the stakeholder workshops.

For ecosystems, habitats or species for which data and monitoring mechanisms are not yet present or not yet sufficiently developed-, such as agro-ecosystems and forest habitats not listed in Annex I of the Habitats Directive, Member States would be required to achieve a positive trend of certain key biodiversity indicators. Meanwhile a process would be established in the legislation to develop an **EU-wide methodology** for assessing their condition. The methodology is described further below as an enabling measure, and would be developed by the Member States and the Commission. This would lay the basis for setting baselines and thresholds of good condition for further restoration targets to be established in step 2. Based on this, **impact assessments** of these targets would be carried out. The targets then established in step 2 would then gradually increase coverage and in principle cover all of the EU's area. Step 2 targets would be established by revising the legislation adopted in step 1 (see Figure 6). Developing an EU-wide methodology was proposed and supported at the stakeholder workshops.

[107] Romania is not included due to data issues.

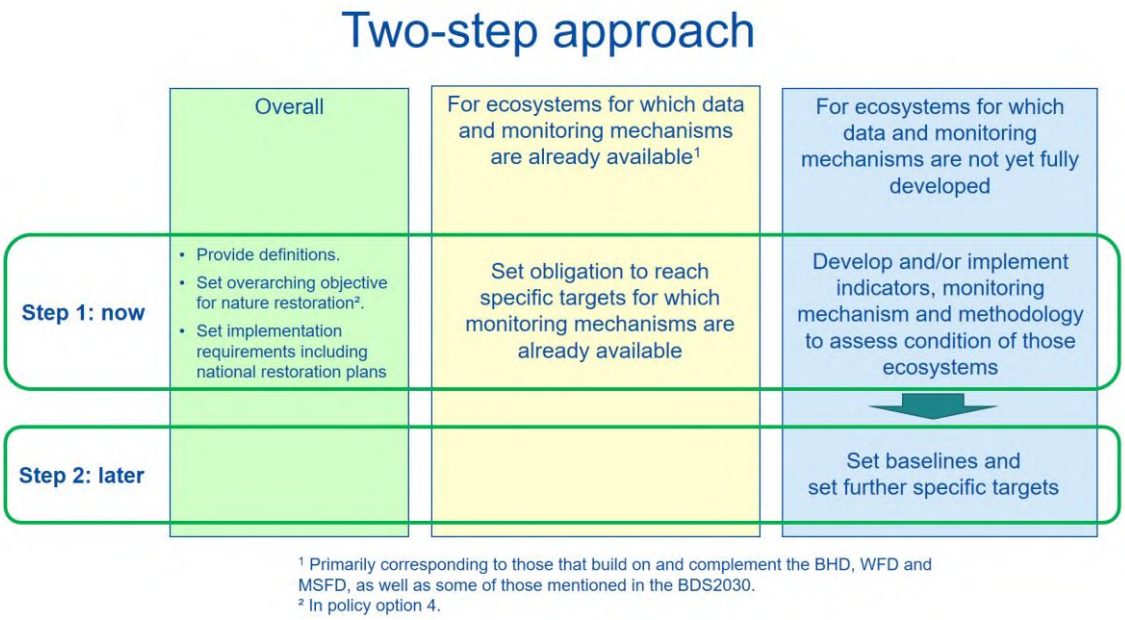

Figure 7: Two-step approach for ecosystem-specific targets (policy option 3), in combination with an overarching objective (policy option 4).

SELECTED TARGETS AND OBLIGATIONS FOR STEP 1
WETLANDS (incl. Peatlands, marshlands & coastal wetlands)
- Restore all HD Annex I wetland habitat area to good condition, with all necessary restoration measures completed on 30 % (or 15 %)[108] of degraded areas by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050. - Recreate 30 % (or 15 %) of additional habitat area required to achieve favorable conservation status of HD Annex I wetland habitats by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050. - Restore and re-create the area as necessary to enhance the conservation status of species listed in Annex II, IV and V of the Habitats Directive as well as wild birds associated with wetlands in view of achieving their favourable conservation status by 2050, with at least 30 % achieved by 2030 and at least 60 % by 2040.
FORESTS
- Restore all HD Annex I forest habitat area to good condition, with all necessary restoration measures completed on 30 % (or 15 %) of degraded areas by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050. - Recreate 30 % (or 15 %) of additional habitat area required to achieve favorable conservation status of HD Annex I forest habitats by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050. - Restore and re-create the area as necessary to enhance the conservation status of species listed in Annex II, IV and V of the Habitats Directive as well as wild birds associated with forests in view of achieving their favourable conservation status by 2050, with at least 30 % achieved by 2030 and at least 60 % by 2040. - Achieve a continuously improving trend of each of the following indicators, until satisfactory levels are achieved or until new targets are in place: deadwood, age structure, forest connectivity, tree cover density, abundance of common forest birds, soil organic carbon in forest land.
AGRO-ECOSYSTEMS AND GRASSLANDS

[108] The percentages between brackets represent an alternative (slower) rate of restoration. See explanation in section 6.3.

- Restore all HD Annex I agricultural habitat area to good condition, with all necessary restoration measures completed on 30 % (or 15 %) of degraded areas by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- Recreate 30 % (or 15 %) of additional habitat area required to achieve favorable conservation status of HD Annex I agricultural habitats by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- To increase the populations of farmland birds as measured by the common farmland bird index re-set at 100 at year X [one year after the entry into force of this Regulation] to:
  i. 110 by 2030, 120 by 2040 and 130 by 2050, for Member States with historically depleted populations of farmland birds;
  ii. 105 by 2030, 110 by 2040 and 115 by 2050, for Member States that do not have historically depleted populations of farmland birds.
- Restore and re-create the area as necessary to enhance the conservation status of species listed in Annex II, IV and V of the Habitats Directive as well as wild birds associated with agro-habitats and grassland in view of achieving their favourable conservation status by 2050, with at least 15 %/30 % of all necessary actions carried out by 2030 and 40 %/60 % by 2040 and 100 % 2050.
- For drained peatlands under agricultural use, to put in place restoration measures, including rewetting, on at least:
  i. 30% of such areas by 2030 of which at least a quarter is rewetted;
  ii. 50% of such areas by 2040 of which at least half is rewetted, and
  iii. 70% of such areas by 2050 of which at least half is rewetted.
- Achieve a continuously improving trend of each of the following indicators:
  i. grassland butterfly index;
  ii. organic carbon content in cropland mineral soils;
  until satisfactory levels are achieved or until the new targets are in place; and
  iii. share of agricultural land with high-diversity landscape features until 2030, with the view to achieving the EU commitment to bring back at least 10% of agricultural area under high-diversity landscape features by 2030;
  iv. percentage of species and habitats of Union interest related to agriculture with stable or increasing trends until 100% is reached at the latest by 2050.

HEATHLANDS & SCRUB, ROCKY & DUNE HABITATS (SPARSE VEGETATION)

- Restore all HD Annex I steppe, heath and scrub, rocky & dune habitat area to good condition, with all necessary restoration measures completed on 30 % (or 15 %) of degraded areas by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- Recreate 30 % (or 15 %) of additional habitat area required to achieve favorable conservation status of HD Annex I steppe, heath and scrub, rocky & dune habitats by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- Restore and re-create the area as necessary to enhance the conservation status of species listed in Annex II, IV and V of the Habitats Directive as well as wild birds and associated with steppe, heath and scrub, rocky & dune habitats in view of achieving their favourable conservation status by 2050, with at least 30 % (or 15 %) of all necessary actions carried out by 2030 and 60 % (or 40 %) by 2040 and 100 % by 2050.

FRESHWATER: RIVERS, LAKES AND ALLUVIAL HABITATS

- Restore all HD Annex I rivers, lakes and alluvial habitat area to good condition, with all necessary restoration measures completed on 30 % (or 15 %) of degraded areas by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- Recreate 30 % (or 15 %) of additional habitat area required to achieve favourable conservation status of HD Annex I rivers, lakes and alluvial habitats by 2030, 60 % (or 40 %) by 2040 and 100 % by 2050.
- Restore and re-create the area as necessary to enhance the conservation status of species listed in Annex II, IV and V of the Habitats Directive as well as wild birds associated with rivers, lakes and alluvial habitats in view of achieving their favourable conservation status by 2050, with at least 15 % achieved by 2030 and at least 40 % by 2040.

- Develop an inventory of barriers to longitudinal and lateral connectivity of rivers and a detailed plan of which barriers will be removed, with a view to achieving free-flowing status where possible and necessary to restore the habitats depending on such connectivity. - Mapping out of small water units, with a view to identify their restoration and recreation potential and assess their contribution to improve connectivity between habitats as part of high diversity landscape features, contributing to the restoration of habitats and species.
MARINE ECOSYSTEMS
- To put in place the necessary restoration measures to improve all areas that are not in good condition to good condition in specified marine habitat types, with measures put in place on at least 30 % of such areas by 2030, on at least 60 % of such areas by 2040, and on at least 90 % of such areas by 2050[109]: a. HD Annex I marine habitats (sub-types of Annex I habitat types, such as seagrass beds, macro-algal forests, sponge, coral and coralligenous beds, maerl beds, shellfish beds, vents and seeps); b. Marine habitats outside HD Annex I (such as marine shelf sediments). - To put in place the restoration measures necessary to re-establish those habitat types in areas not covered by those habitat types, on at least 30 % of the additional area needed to reach the favourable reference area of each group of habitat types by 2030, at least 60 % of such areas by 2040, and 100 % of such areas by 2050; - To put in place restoration measures for the habitats of marine species listed in Annexes II, IV and V of the HD and Annex I to Regulation 2019/1241 and of wild birds covered under Birds Directive, that are needed to improve the quality of those habitats, re-establish those habitats and create sufficient connectivity among those habitats corresponding to the ecological requirements of those species.
URBAN ECOSYSTEMS
• To ensure that there is no net loss of urban green space, and urban tree canopy cover by 2030, compared to 2021, within all cities and towns and suburbs; • To ensure that there is an increase in the total national area of urban green space in cities and towns and suburbs of at least 3 % of the total area of cities and towns and suburbs in 2021, by 2040, and at least 5 % by 2050. In addition Member States shall ensure: i. a minimum of 10 % urban tree canopy cover in all cities and towns and suburbs by 2050; and ii. a net gain of urban green space that is integrated into existing and new buildings and infrastructure developments, including through renovations and renewals, in all cities and towns and suburbs.
POLLINATORS
- Reverse the decline of pollinators[110]: This target relates in particular to the following ecosystems: agro-habitats and grasslands, wetlands, forests and heathlands & scrub.
An EU wide methodology for assessing the condition of ecosystems would be established in Step1.

To illustrate the **areas of ecosystems that would be covered by the targets in the EU**, the **example of forests** is provided. For Step 1 the first forest target to restore Annex I forest area would cover 28% of EU terrestrial forest area, which is the percentage of the

[109] It is important to bear in mind the long time periods to restore certain marine ecosystems, thus this proposed target is based on putting necessary measures into place by 2030 and with the aim of arriving at good condition beyond 2030.

[110] For pollinators, it is likely that finalising the measurement methodology and establishing a baseline would be ready by 2023. Given that negotiations with Parliament and Council on the proposal would last until at least mid-2023, this target could already be included in the legislative proposal.

overall EU forest area covered by Annex I habitats (based on best available data). The second target on recreation could pertain to potentially any terrestrial area, since recreation could be carried out in principle anywhere inside or outside Annex I habitats. Likewise, the third target on ensuring the conservation status of species could pertain to potentially any terrestrial area, since the species could occur in any area inside or outside of Annex I habitats. For step 2, a more specific target on restoring non-Annex I habitats forest area would have to be defined. However, in principle it could apply to up to 72% of the EU terrestrial forest area (i.e. any non-Annex I area).

As regards **potential targets for step 2,** a table of initial potential targets is provided below. They have been identified as potential future targets in the ecosystem specific impact assessments (see Annex VI). For these, further methodological development and analysis would be needed.

POTENTIAL TARGETS FOR STEP 2 THIS INCLUDES AN INITIAL LIST AND FURTHER TARGETS MAY BE DEVELOPED
WETLANDS (incl. Peatlands, marshlands & coastal wetlands)
FORESTS
• Restore degraded non-HD Annex I forest habitat areas.
AGRO-ECOSYSTEMS AND GRASSLANDS
• Restore and recreate semi-modified and semi-natural grasslands. • Restore and recreate unploughed / untilled grasslands.
HEATHLANDS & SCRUB
FRESHWATER: RIVERS, LAKES AND ALLUVIAL HABITATS
• Numerical target on the restoration of free flowing rivers[111] • Restoration of small water units**.**
MARINE ECOSYSTEMS
• Target on specific marine animal species
URBAN ECOSYSTEMS
SOILS
• Target on contaminated soils.
POLLINATORS

[111]This is related to the target in step 1 which requires Member States to develop inventories of barriers to longitudinal and lateral connectivity of rivers and a detailed plan of which barriers will be removed, with a view to achieving free-flowing status where possible and necessary to restore the habitats depending on such connectivity. This will contribute to achieving the voluntary target of the BDS2030 of 25 000 km of free flowing rivers. As part of step 2, a more exact approach to setting a numerical target on free-flowing rivers, including lateral and longitudinal aspects, would be developed.

Box 5: Views of stakeholders and authorities on ecosystem-specific targets to prioritise.

In terms of ecosystems to be restored, the responses submitted in the Open Public Consultation via the #RestoreNature campaign strongly prioritised wetlands, freshwater and marine ecosystems, forests, heathlands and shrublands. Respondents who were not part of this campaign tended to consider most ecosystems to be of moderate to high priority for restoration, with a stronger emphasis on freshwater and wetland ecosystems. They also showed significantly stronger support for the restoration of modified ecosystems such as agroecosystems, urban and soil ecosystems. Open-text comments added as priority the urban-rural interface and issues facing agricultural ecosystems such as intensification, urban sprawl and climate change (academic organisations' contributions), as well as ecosystems with high carbon storage and sequestration potential, such as peatlands, coastal and inland wetlands, floodplains, old-growth forests, high-biodiversity grasslands and marine ecosystems (NGOs). Some organisations drew attention to specific species in need of restoration.

In the course of the consultation workshops, conservation, academic and protected area management organisations as well as national authorities repeatedly emphasized the importance of ecological connectivity, the needs of migratory species and targets for vulnerable species that are more difficult to restore. National authorities expressed diverging opinions, from prioritising ecosystems with the most unfavourable status to those with the most human health benefits. Some also referred to cost-effectiveness, given limited resources, and to the need for a common prioritisation framework. Views of nature NGOs included the need to prioritise benefits to biodiversity over benefits to climate, and the importance of ecosystem services that are not easily quantified or monetised. Research institutes also referred to the importance of prioritising and communicating about restoration benefits to people.

Environmental NGOs expressed broad support for targets on agro-ecosystems, considering that they comprise 39% of EU land and are of importance for biodiversity. Different organisations supported targets on wetlands, urban ecosystems (especially on abandoned land), rivers (particularly on free-flowing rivers, keystone species such as eel) and pollinators, as well as the importance of passive restoration for marine ecosystems. An organic farming association underlined that ecosystem restoration and food production are no contradiction, considering the reliance on biodiversity and welcomed targets and indicators on pollinators, farmland birds and soil health. A small-scale farming association warned that intensive farmers would be paid to restore degraded agro-habitats due to intensive farming. A forestry association underlined the importance of reaching favourable status of forests also in light of climate benefits. Some research stakeholders welcomed urban restoration as a means to bring benefits close to the people. Some conservation organisations considered the target to complete all necessary marine restoration measures by 2050 unrealistic considering maritime activities and climate change. A potential risk was identified by experts in environmental organisations and authorities in relation to a target to increase Soil

Organic Carbon, which could be detrimental if applied to vulnerable habitats with naturally poor soils (such as dunes).
As concerns the proposed 2-step approach, national authorities expressed broad support to ensure positive results in step 1 for a number of ecosystem types. Environmental NGOs underlined the need for quick action but also inquired about mechanisms for the second stage. Research institutes emphasized that scientific knowledge is available to support the restoration of priority ecosystems. Several Member States authorities envisaged difficulties in implementing restoration beyond Natura 2000. At the same time, several Member States asked for more ambition to ensure ecological connectivity and for extending the focus beyond natural habitats (Annex I), to cover green infrastructure and to diversify agricultural landscapes. One Member State suggested a separate target on high-diversity landscape features. It was suggested that targets should be considered for intermediary steps towards more naturalness, e.g. to move away from monocultural forests and towards more natural rivers, and that restoration provisions do not lower the ambition of existing requirements.
How views of stakeholders and authorities have been taken into account:
The proposal includes targets for practically all ecosystems highlighted by stakeholders, including, for instance, pollinators, rivers, urban green areas and agro-ecosystems, in line with the objective of the Biodiversity Strategy for 2030 to restore all EU ecosystems. Also the aspect of connectivity has been taken on board as an essential aspect of ecosystem restoration, as it is an integral part of the definition of 'restoration measure' and explicitly mentioned in some of the targets. On the marine targets and on soil organic carbon, discussions are stepped up with relevant experts to ensure that targets defined in the law are implementable, do not duplicate what exists and cause no adverse effects.
The proposal also responds to the stakeholder views that action is urgently needed, and that ecosystem restoration should go beyond the Annex I habitats. Therefore, the proposal includes the two-step approach suggested by stakeholders, i.e. setting targets now where the knowledge and monitoring systems are available, going already beyond Annex I habitats, and setting up a method and process for setting additional targets later.

Policy Option 4: Legally binding ecosystem-specific targets with an overarching objective

This is a hybrid of the specific targets of option 3 and a variant of option 2, namely an overarching objective '**to contribute to the continuous, long term and sustained recovery of biodiverse and resilient nature across EU land and sea areas through the restoration of ecosystems and to contribute to the EU's overarching objectives concerning climate change mitigation and adaptation, and to contribute to meeting the EU's international commitments; and that the restoration measures together shall cover, by 2030, at least 20 % of the Union's land and sea areas and, by 2050,**

all ecosystems in need of restoration'. This overarching objective provides a clear political aspiration that the EU should strive towards, as well as an area objective that the EU shall stive towards (a variation of option 2). The objective is underpinned by a set of ecosystem-specific legally binding and enforceable targets and obligations for Member States (option 3). It should be underlined that the overarching objective would be applicable at EU level, but not directly enforceable as such. What will be enforceable are the set of specific targets taken from option 3, and for which enforceability is described in section 5.5.2 below.

While the overarching objective drives the long-term direction and supports communication, political and mainstreaming purposes, the set of binding ecosystem-specific targets define in more concrete and measurable terms what needs to be achieved by when by the Member States. Having an overarching objective in addition to the specific targets can aid the achievement of the objectives. This was seconded by **stakeholders** during consultations.

The **overarching objective functions in a similar way as the climate-neutrality objective in the European Climate Law**[112], expressing the common ambition across Member States and stakeholders, bringing the different target options under one umbrella and driving overall direction to 2050. It also provides a clear link to the EU's commitment to achieve both the headline ambition of the Biodiversity Strategy for 2030, which extends to 2050, as well as the global vision under the Convention on Biological Diversity. The overarching objective provides a unified framework for action beyond 2030 and makes it clear that the legislation intends to go beyond only restoring those ecosystems for which targets are set in step 1. The fact that it includes maintenance of ecosystems, further highlights that restoration needs to go hand in hand with protection.

It can be estimated that the **overarching objective** would correspond to Member States putting into place restoration measures which together would **cover at least 20% of the Union's land and sea areas by 2030.** The section below provides an estimate of the total EU areas that restoration measures will cover by 2030. In the longer term, **all ecosystems in need of restoration should have restoration measures put in place by 2050.**

In order to estimate the areas that would be covered with restoration measures by 2030 to reach the targets and obligations of the proposal, one can break down the calculations as follows: the Annex I terrestrial habitat targets, other terrestrial targets and obligations, and the marine targets. It should be understood that these are only approximate, order of magnitude, estimations.

A summary of the estimates is as follows:

The **terrestrial estimate** is based on targets related to the habitats of Annex I of the Habitats Directive, as well as other targets and obligations such as on forests,

[112] COM/2020/80 final.

agroecosystems and urban. The estimates of restoration measures as given as percentages of EU land area:

Annex I terrestrial habitats:	1.3%-3.8%
Agro ecosystems :	6%
Forest Ecosystems:	4.3%-9.0%
Urban:	0.07%

We can assume that the other obligations (e.g. on pollinators, farmland birds, habitats of protected species forest and agricultural ecosystem indicators) will require action on more areas than the ones mentioned above thus increasing the above and compensating the possible overlaps with Annex I habitats, although it is difficult to make exact estimates of these. We can therefore safely underpin the number of **at least 20% of EU land area** with restoration measures by 2030.

For the **Marine area,** the estimates are based on areas of the marine habitats proposed for restoration. This includes soft sediment and other habitats, such as sub-types of marine habitats listed in Annex I HD. An additional estimate is based on the marine areas to be restored for the habitats of marine species. The estimates of area to be covered by restoration measures are given as percentages of EU-27 European marine waters (with Macaronesia).

EU seabed area to be restored:	≈10%
Areas to be restored for species :	≈10%

We estimate that around **20% of EU marine area** will have restoration measures by 2030 in order to achieve the target. This also corresponds and build on with the target of the EU Biodiversity Strategy for 2030 to strictly protect at least 10% of the marine area (strict protection is a passive restoration measure) and to protect at least 30% of marine land (part of the 20% protected areas not strictly protected will also require restoration by 2030).

Therefore, we can reasonably say that **by 2030, at least 20% of EU land and sea area** will have restoration measures.

As for option 3, a **two-step approach** is proposed for the **ecosystem-specific targets** in option 4.

It is important to point out that the three options above give consideration of how **restoration should work hand in hand with effective protection and maintenance**. This is because it is also important to ensure that the condition of ecosystems is not allowed to deteriorate before or after restoration, to avoid perverse effects. This is why the requirement of **non-deterioration** is included in the options. This can apply to areas that need to be restored as well as those that are already in good condition and need to be maintained. Restored areas need to receive a degree of protection that will ensure their full recovery and the long-term viability of the restored ecosystem. These could for example be designated as protected areas and be taken into account for the 30 %

protected area and 10 % strictly protected area targets of the EU Biodiversity Strategy for 2030. A further analysis of this approach to non-deterioration is provided in Annex X, part 3, for the three main EU territory regimes.

Box 6: Views of stakeholders and authorities on the choice of overarching and ecosystem-specific targets

*When all responses to the **open public consultation** were considered, there was close to full support both for an overarching restoration goal (97%) and for specific targets for ecosystems (96%). When the responses submitted via the #RestoreNature campaign were isolated, stakeholders active in the forestry sector in Poland formed the majority of the remaining respondents. These stakeholders indicated relatively low support for an EU-level target across all ecosystems (40%) and even lower support for ecosystem-specific EU restoration targets, while open responses indicated preference for the setting of targets at the national level.*

*In the **consultation workshops** held by the Commission with Member State experts and EU-level stakeholders, there was **broad support for specific targets in addition to an overarching objective**, with enabling measures and complementarity to existing legislation. Environmental NGOs and research institutes expressed particularly broad support for EU legally binding ecosystem-specific targets, high restoration ambition and a combination of process- and outcome-oriented targets that focus on Habitats Directive Annex I habitats but also go further to cover all EU ecosystems. An overarching restoration target of 15% of degraded ecosystems for 2030 was seen as too low, with NGOs suggesting a target to restore 15% of the EU land and EU sea area. Most national authorities supported an overarching aspirational goal set at EU level coupled with ecosystem-specific targets set at the national level, so that they can decide what ecosystems to restore. Some national authorities considered that enhanced restoration requirements could be set within existing legislation. Associations of stakeholders (agriculture, forestry and forest owners) indicated preference for soft measures over legally binding instruments, underlined the need to respect ownership rights and promoted a voluntary bottom-up approach. Forest stakeholders expressed preference for process targets over outcome targets.*

*States authorities and stakeholders alike pointed to the need to ensure that the targets work in synergy among themselves and with existing EU legislation and policies. Forestry sector representatives questioned whether targets could be set without knowing the location and the concrete measures, which would allow an assessment of their feasibility. Environmental organisations called for an emphasis on the 2030-2040 period in terms of contributing to the biodiversity and climate targets rather than to 'back-load' the ambition. They also emphasized that all targets should consider the **impact of climate change** and with this the evolution of ecosystems and invasive alien species. Most stakeholders and national authorities welcomed a 2-step approach and clear milestones. Some research institutions, environmental NGOs and national*

authorities expressed support for targets going beyond HD Annex I habitats, already in step 1.

How the views of stakeholders and authorities were taken into account:

See previous boxes on the views on overarching and specific targets, binding versus voluntary/aspirational measures, synergies with existing legislation, going beyond Annex I habitats and a 2-step approach. Regarding the ambition level, the preferred option includes the scenario to restore 30% by 2030 and 60% by 2040 for a number of targets, which can be considered ambitious considering that currently, the condition of many ecosystems is still degrading. The impact of climate change is considered, for instance by building in the requirement for increased connectivity, which facilitates migration of species.

5.2.2. Implementation framework and enabling measures

Several enabling measures are essential to ensure delivery and to contribute to an **effective framework of implementation**. All the aspects of the implementation framework will be instrumental in ensuring ownership, engagement, implementation and enforcement. The main components are described below. Components A, B, C and D are included in options 2, 3 and 4. Component E is only included in options 3 and 4.

A. National Restoration Plans (NRPs)

Member States would have to determine how to achieve the targets and would be required to prepare and adopt plans for restoration and other enabling measures, in National Restoration Plans (NRPs). The NRPs will be instrumental in planning and prioritising activities, as well as in channelling and optimising financial and other resources from EU and Member States' sources. Relevant Member States would also have to pay specific attention to the restoration of their outermost regions' ecosystems within their plans. The development of the NRPs will be instrumental in ensuring the engagement and ownership of Member States in carrying out restoration activities necessary for reaching the targets. For ecosystems spanning across borders, Member States could foster synergies with the national restoration plans of other Member States.

These NRPs would include the following components:

- A **quantification of the areas** to be restored to reach the restoration targets based on preparatory monitoring and research that takes into account the latest scientific evidence, in particular on: 1) for each of the habitat types: a) the total habitat area; b) a clear identification of the areas that are not in good condition; c) the area needed to reach favourable conservation status (favourable reference area) and d) the areas most suitable for re-establishment, taking into account projected changes to environmental condition due to climate change;

2) for habitats of protected species covered by the Birds and Habitats Directives: a) a quantification of the areas needed for the achievement of favourable conservation status of these species, as well as b) the quality needed for these habitats that corresponds to the ecological characteristics of these species. The plans will also include measures based on preparatory work on: 1) for agricultural ecosystems: a) the identification of the agricultural areas in need of restoration, in particular the areas that, due to intensification or other management factors, are in need of enhanced connectivity, landscape diversity; b) the satisfactory levels for key biodiversity indicators such as the grassland butterflies index, the stock of organic carbon in soils, the share of agricultural land with high-diversity landscape features; c) the areas of drained peatland under agricultural use to be restored and rewetted; 2) for forest ecosystems: the satisfactory levels for key biodiversity indicators such as deadwood, age structure, forest connectivity, tree cover density, abundance of common forest birds and stock of organic carbon in soils. Finally, the plans will include the inventory of barriers to longitudinal and lateral connectivity of surface waters.

- Plans for **specific restoration measures**, also clarifying where to prioritise restoration (e.g. making links with protected areas, identifying areas with strongest benefits for carbon capture and storage, taking into account the predicted effects of climate change on ecosystems, etc.).
- A concrete **financing plan**, that includes EU funding sources, national sources, and public/private financing . The plan should also describe where and how to best deploy this financing. Financing would mainly be used to support restoration activities but would also include providing assistance, or developing alternative incomes based on the provision of ecosystem services, to those potentially affected by the restoration. The financing possibilities at EU level that the NRPs would channel are illustrated in Annex XII.
- How to effectively **monitor on progress** towards the targets, i.e. the monitoring that would be put in place on the areas subject to restoration measures to assess their effectiveness.In order to seek synergies for biodiversity and climate change adaptation/mitigation, and to carfully consider potential trade-offs, Member States should include a dedicated section setting out how the national restoration plan considers (i) the relevance of climate change scenarios for the planning of the type and location of restoration measures; (ii) the potential of restoration measures to minimise climate change impacts on nature and to support adaptation; (iii) synergies with national adaptation strategies and/or plans.
- **Public participation**: How stakeholders would be given opportunities to participate in the preparation of NRPs and various restoration activities. For example, how to address the potential needs of stakeholders that may require support (e.g. farmers, foresters, fishers and landowners) andtransitioning to new practices, in networking and sharing of best practices, in developing new business models that build on the benefits of improved ecosystem services.

Member States will need to periodically report on their progress in terms of **(i) restoration measures undertaken and (ii) description of ecosystem condition.** For targets to be proposed under step 1 based on habitat types listed under the Habitats Directive, monitoring and reporting requirements already exist (they would need to be slightly adjusted). This is because the "condition" of these habitats is described by the "structure and functions" parameter of the conservation status assessment corresponds. The same for protected species under the Habitats and Birds Directives (information on quality and quantity of their habitats is already reported under the nature directives and only slight adjustments would be needed). Further monitoring and reporting requirements for targets to be established in step 2, would be determined as part of the development of the EU-wide methodology (see below), and these further requirements would aim to not introduce unnecessary additional burdens. Reporting by Member States would be required by separate provisions in the proposed restoration law, linking, for instance, with the reporting obligations in the Nature Directives or with the EU-wide methodology, as appropriate.

B. Periodic Review

National restoration plans would need to be submitted to the European Commission and the proposed Nature Restoration Law would establish a process for the **Commission to assess the plans and to address observations to the Member States,** and for the Member States to provide to the Commission all necessary additional information and, where appropriate, revise their proposed plan before adopting it. **The Member States would be required to review the plans after 10 years or sooner and, when necessary, revise the plans.**

A similar approach has been used in other pieces of EU legislation. For example under the *Regulation on the governance of the energy union and the climate action (EU/2018/1999)*, Member States have to establish **National Energy and Climate Plans** (NECPs). As a first step, Member States have to send their draft plans to the Commission, then revise them following the Commission's assessment and then send their final plans back to the Commission'.[113]

The Commission would also review implementation on a periodic basis. Reporting by Member States would be required. The responsibility of the Commission would be to review progress, as reported by the Member States on **(i) restoration measures put into place and (ii) achieving the targets and, where relevant, being on the path to good ecosystem condition.**

The development of the NRPs, feedback given on them and all aspects of the review of implementation will be instrumental in ensuring ownership, engagement, enforcement, and implementation by the Member States. Given the time to prepare plans, carrying out

[113] See: https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en.

restoration activities and reporting on progress, it is expected that submission of the NRPs, their adoption and the periodic review of implementation would take place in cycles of several years. Ultimately, success would be achieved when all the ecosystem targets are achieved, and for some ecosystems this would require a long time. However, progress would be measured in terms of effective NRPs being developed by Member States, restoration measures being implemented and results achieved in terms of reaching the targets and/or recovery of ecosystems, such as evidence of positive trends in condition or the achievement of good condition.

C. Guidelines and further specifications

Effective implementation may also require mandating in the restoration law the future development of **implementing acts, delegated acts and/or guidelines** for further **specifications** on what **restoration or ecosystem management practices and measures** are needed or what practices could be detrimental towards achieving the targets.

D. EU-wide methodology

The Commission will develop an EU-wide methodology to be used to assess the condition of ecosystems for which information is not currently sufficiently available, and/or no agreed definition of 'good condition' exists, such as agro-ecosystems and forests not covered by Annex I of the Habitats Directive. It would determine the methods for setting indicators, baselines and thresholds for further restoration targets that would be established in step 2. The methodology would build on the data and methods for ecosystems covered by the BHD, WFD and MSFD, the **work of MAES**, that has categorised potential indicators[114] for different ecosystem types, the upcoming proposal for a revision of the Regulation on Environmental and Economic Accounts[115] and standards such as the UN System of Environmental Economic Accounting (UNSEEA)[116] and the Society for Ecological Restoration (SER)[117]. Further guidance would be provided by the Commission, developed with the support of a Committee and/or Expert Group. The preparatory work is already ongoing for a number of potential targets and applicable methods are expected to be available within the first few years after the final adoption of the legislative act at the latest.

Establishing this methodology will be essential to provide the necessary **legal clarity** to establish legally binding targets in step 2 and to monitor progress towards them, as it will provide clear definitions and thresholds of what constitutes good condition for relevant ecosystems. It will thus enable Member States to monitor and report on those ecosystems

[114] See the 5th MAES report. For each ecosystem type a table of potential indicators is developed, see for example forests pages 36-37.

[115] Have your say: Environmental economic accounts - new modules: Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 691/2011 on European environmental economic accounts.

[116] https://seea.un.org/ecosystem-accounting

[117] https://www.ser.org/

and to assess their condition – information which is needed to set and implement future restoration targets.

E. Cross linkages with LULUCF

During the development of this impact assessment on ecosystem restoration targets, synergies with the proposed revision of the Regulation on land use, land-use change and forestry (LULUCF) have been ensured. This is an important link because restoring ecosystems, in particular coastal wetlands, peatlands, soils and forests will make significant contributions to the proposed fit for 55 package initiatives, in particular with regard to reaching the LULUCF objectives. The main cross-linkage that was developed was on monitoring and reporting, in particular a more integrated system to ensure that **measures on climate mitigation and nature restoration would now be mutually reinforcing and would not undermine each other**. As a consequence, the proposed revised LULUCF Regulation includes provisions for amending the monitoring systems to capture land-use changes according to different land categorisations: (a) high-carbon stock land; (b) land-use units subject to protection; (c) land-use units subject to restoration; (d) land-use units with high climate risk. The proposed amendments to Annex V to Regulation (EU) 2018(1999) concerning methodologies for monitoring and reporting in the LULUCF sector include a formulation that should allow adapting to new EU nature restoration provisions, in particular a reference to areas identified as in need of restoration according to a nature restoration plan applicable in a Member State. The proposed LULUCF revision should thus, amongst other things, enable future patterns of land-use change driven by climate change or climate action to be tracked in terms of the effects on land subject to nature restoration. This is expected to contribute to better and more effective implementation of both the proposed climate regulation and the legally binding restoration targets being assessed herein. The proposed revision to Annex V to Regulation (EU) 2018/1999 can be found in Annex III of the LULUCF proposal[118].

Box 7: Views of stakeholders and authorities on the enabling measures for implementation.

*As regards the **choice of instruments** to encourage restoration, the overwhelming majority of responses to the **Open Public Consultation** came from the #RestoreNature campaign, giving the highest importance to **national nature restoration plans** and a **progress monitoring and reporting mechanism**, and some importance to awareness raising and ecosystem mapping and assessment. The remaining respondents (from a range of backgrounds including citizens, business, academia and local government, with a significant majority indicating association with the forestry sector) gave the highest importance to awareness raising and the break-down of restoration targets to national contributions.*

*Campaign responses prioritised all suggested **measures to ensure the maintenance of***

[118] revision-regulation-ghg-land-use-forestry_with-annex_en.pdf

restored ecosystems *(long-term monitoring and reporting, protection designation and, to a lesser extent, anticipation of climate change effects in the planning of restoration actions), while the majority of other respondents prioritised climate change anticipation. Open text responses further referred to sustainable management practices and economic considerations.*

At the ***consultation workshops,*** *considerable support across all stakeholder groups was voiced for the creation of national restoration plans (NRPs), and the importance of financing was stressed. Environmental NGOs underlined the need for clear content requirements in the NRPs, and for a robust review process. National authorities also expressed some support for NRPs, while underlining their importance for ensuring finance, e.g. at EU level. There were numerous calls for clarity on the* ***financing****. One Member State warned not to count on private finance too much considering experience from the past.*

Monitoring: *there was broad support among stakeholder for improved coverage, coherence and comparability in terms of* ***monitoring methods and data****. National authorities underlined the need to streamline monitoring with existing systems in the scope of existing EU legislation and policies. Suggestions were made to streamline monitoring with the Prioritised Action Frameworks, and to build on the Mapping and Assessment of Ecosystems and their Services (MAES). One Member State expressed concern about the feasibility of mapping the area to be restored in the National Restoration Plan, before having carried out extensive discussions with stakeholders, as this would provoke a lot of reaction. A nature NGO pointed out the need for a common approach (indicators, methodology) if the legislation goes beyond Annex I of the Habitats Directive. A forestry association underlined the need for improved monitoring of ecosystem condition (data and methods) and reporting under existing systems. Research stakeholders offered support and underlined need to zoom into regional rather than national level.*

The need to ***involve stakeholders*** *such as farmers and private land owners, as well as the challenges in this regard were stressed by most Member States during the consultations as well as by NGOs and stakeholder representatives themselves. Private forest owners called for an open approach when planning restoration measures in order to build trust and support.*

Conflicting policy priorities and pressure from other sectors were also highlighted. This raised also the question of ***funding*** *for compensation, restoration, management and other related measures. Several stakeholders pointed to the need to be clear on* ***who would be responsible to implement*** *the targets and obligations. Two NGOs commented that the burden of implementation should be placed not only on the nature authorities, but also on other relevant administrations (e.g. water).*

Several workshop participants from the non-governmental sector pointed to the need to diversify the economic sector to engage with the restoration agenda. For example, the national restoration plans could include new economic activities that would

provide alternative livelihoods.

How views of stakeholders and authorities have been taken into account:

The proposal includes National Restoration Plans as part of the enabling measures, including a review by the Commission.. Content requirements are already proposed to some extent and will further detailed through the development of a template/format. The concern expressed about the feasibility of mapping the area to be restored in the National Restoration Plan has led to a more carefull formulation of the requirements. Furthermore, the proposal acknowledges the need to involve stakeholders in setting up the National Restoration Plans.

Progress monitoring and reporting have also been included among the obligations for Member States to enable the Commission to follow-up implementation. It is foreseen to create maximal synergies with existing monitoring and reporting obligations, for instance for the BHD and LULUCF.

To ensure the maintenance of restored ecosystem, the non-deterioration obligation has been included in the proposal. Climate change anticipation is included in several ways, for instance by including the ecosystems that have the greatest capacity to contribute to climate change mitigatin and adaption, and by including connectivity in the concept of restoration.

The aspect of financing is also addressed in the enabling measures.

Overview of the components of each policy option

	Binding overarching target	Overarching objective	Binding ecosystem-specific targets	National Restoration Plans	Periodic review	Guidelines and further specifications	An EU-wide methodology	Crosslinkages with LULUCF
Policy option 1								
Policy option 2	x			x	x	x	x	x
Policy option 3			x	x	x	x	x	x
Policy option 4		x	x	x	x	x	x	x

5.3. Options discarded at an early stage

Options such as **market-based instruments and financing alone**, were discarded because they are already proposed in section 3 of the Biodiversity Strategy for 2030 and thus form part of the baseline, and a range of financing sources at EU level exist and can already be used for ecosystem restoration. Furthermore, the evaluation of the Biodiversity Strategy to 2020 concluded that a reliance on voluntary instruments alone was a significant cause of the Strategy's failure and that the Strategy could have

benefited from a different combination of regulatory instruments (such as legally binding targets) and market-based instruments.

The option of **revising existing legislation** was also discarded early on because revising several pieces of specific legislation does not provide sufficient coherence and timeliness to deliver the objectives outlined in previous sections, for which a unified and timely approach is necessary. The overarching framework for Member States to develop comprehensive National Restoration Plans would be missing. Such a framework would be necessary to bring together restoration action that is now scattered across different legal bases. At national level, it would furthermore help to break silos pushing all sectors engaged in restoration to come together to deliver a common plan. In addition, the national restoration plans would benefit from a Commission review and adoption to ensure their quality and consistency. None of this could be achieved by amendments to individual pieces of legislation.

Moreover, revising existing legislation would entail significant complexity, including for the co-legislators and for the Member States. If the Commission put forward several amendment proposals for different pieces of legislation, the ordinary legislative procedure would follow its separate course for each of them and it would be very difficult to ensure consistency across the board. This would also open the possibility for co-legislators to propose amendments to other provisions of existing legislation other than those strictly related to restoration. This could complicate the legislative process and alter the nature of the Commission proposals. Furthermore, for the BHD and WFD the respective Fitness Checks concluded that the legislation is fit for purpose but more efforts in implementation are needed to achieve results on the ground. A new binding instrument can indeed better define these implementation efforts, with no need to change the basis provided by existing legislation, in particular BHD and WFD.

In addition, revising several pieces of legislation would take much more time than establishing the proposed new one. Since the existing legislation is mainly composed of directives, each amendment, after adoption in the various ordinary legislative procedures, would need to be transposed in the national legal order of the Member States. The time required to make the new Commission proposals for amending the various Directives, the adoption by the co-legislations and the transposition of the revised Directives into national law would take several years. This would make it hardly possible to see substantial progress in restoration by 2030.

Finally, revising existing legislation would not easily allow for the establishment of an EU wide methodology for assessing ecosystem condition, and a coherent way of establishing further legally binding targets across a broad range of ecosystem types. Several such future targets could correspond to different legislative bases that would have to be revised separately, for example terrestrial targets with the BHD and marine targets with the MSFD. This would lead to difficulties in the coordination of such a methodology dispersed across several existing pieces of legislation. It would further

complicate a stepwise approach to set future targets for further ecosystems, for which we currently do not have sufficient data, monitoring mechanisms, baselines and thresholds in place.

Other discarded options for targets are listed and described in Annexes V and VI respectively.

6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

Approach to impact assessment

The following sections analyse the policy options along the facets of effectiveness, policy coherence and efficiency.

Effectiveness

Effectiveness is the extent to which the option would achieve the specific objectives. Each policy option is assessed along dimensions that build on the definitions of SMART:

- **Specific**: Are the targets specific and will the option deliver specific results or only broad outcomes?
- **Measurable**: Are the targets and outcomes measurable?
- **Achievable and Realistic**: Is it feasible to attain the objective/targets of the policy options, or are they impossible to achieve? Are they within reach and deliver quality outcomes within the time frame?
- **Time-bound**: Do targets set a clearly defined timeline, including a target date?
- **Coordinated approach**: To what extent will this option deliver results across the EU in a harmonised manner, as opposed to only in some Member States. To what extent are common approaches used?
- **Comprehensive**: Does the option address a broad range of ecosystem types or only some?
- **Enabling measures**: Does the option include measures such as developing NRPs and financing sources that are channelled through NRPs?

Policy coherence

Policy coherence is assessed with respect to the EU policies linked to the biodiversity strategy and the Green Deal. This includes the four key pieces of EU biodiversity legislation, namely the BHD, WFD and MSFD, as well as Climate Law, Farm-to-Fork strategy and LULUCF regulation, and the CAP and CFP regulations.

Efficiency

The efficiency of options relates to their respective key economic, social and environmental impacts and benefit/cost ratio (cost-effectiveness). The efficiency of the options is assessed along the following impact types and measures:

- **Environmental impacts**: Impacts on biodiversity and ecosystems.
- **Socio-economic impacts:** Impacts, both positive or negative, economy and society wide or on business sectors such as agriculture, forestry and fisheries (including SMEs) water industries, tourism, and in terms of opportunity costs, transitional costs, compliance costs and reputational impacts.
- **Administrative impacts**: Monitoring and other administrative/enforcement costs in the EU and Member States for public authorities. In particular, it considers costs for the surveying of ecosystems, development of national restoration plans, administration and monitoring of ecosystems to be chosen for restoration, as well as for reporting. Administrative costs include the costs for enabling measures, as outlined in Annex VII section 5. They also include costs incurred by businesses and citizens.

Scoring

Policy options are analysed and scored along the above criteria as follows: (0) neutral, (1) slightly positive, (2) moderately positive, (3) positive, and (4) very positive. Scores are compared to the baseline, and so Option 1 by default scores 0 as it provides the reference level against which other options are assessed. It should be noted that because administrative impacts are mostly made up of costs, higher administrative costs will result in a lower score.

A more detailed overview of who is affected is provided in Annex III. Analytical methods to conduct the impact assessment are explained in Annex IV. Ecosystem-specific data availability issues are also explained in the ecosystem-specific impact assessments in Annex VI.

6.1. Impacts of policy Option 1 (Baseline)

The baseline describes the likely evolution of nature restoration and the condition of ecosystems in the EU towards 2030, and to the extent possible 2040 and 2050, *in the absence of legally binding EU nature restoration targets*. This is based on monitoring evidence on the state of ecosystems, previous experience in restoration governance and expert judgement. Annex VII provides a more detailed description of the baseline and potential impacts.

Effectiveness (score: 0)

Overall, effectiveness is expected to be neutral and will therefore not be sufficient to achieve the specific goals. The main reason for this is that voluntary targets have led to very little action in the past and the existing legal obligations for restoration have been poorly implemented.

The Biodiversity Strategy for 2030, without considering the commitment to put forward a proposal for legally binding EU restoration targets, sets out several restoration-related targets of which some are **specific and time-bound**. In theory the targets for 2030 are **achievable**, however, their voluntary nature makes their achievement unlikely. Furthermore, for several of the voluntary targets suggested in the Biodiversity Strategy, neither indicators nor baselines for measuring them are defined. **Coordinated action** across the EU is expected to be very low, based on the experience with the Biodiversity Strategy for 2020 that led only to three Member States producing restoration plans voluntarily. Specific targets suggested in the Biodiversity Strategy for 2030 address some ecosystems but not all; for example, there are no explicit targets for wetlands. Therefore, there is only limited **comprehensiveness**.

Furthermore, even though some targets specify percentages to be achieved, elements of the targets are not further defined nor explained, which means that Member States would be left with several questions on how to go about working towards these targets. As such it is unlikely that these targets without further guidance and additional **enabling measures** lead to **specific**, let alone measurable, **outcomes**. Due to these limitations of this option, the baseline as described in previous sections is considered unable to attain to the specified objectives.

Policy coherence (score: 0)

Option 1 is based on the BDS2030 but without legally binding targets, so is broadly speaking coherent. However, synergies would mostly be expected with policies and initiatives set out in the strategy to 2030 itself, but synergies with other policies are expected to be weak since there is no obligation to streamline legal processes, e.g. in terms of reporting. See section 5.1 for a more detailed description.

Efficiency (score: 0)

The baseline includes estimates of the effects of the continued implementation of existing forthcoming voluntary and mandatory commitments. It includes therefore the influence of continued implementation of the EU Birds and Habitats Directives, the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD), as well as other voluntary activities under the BDS 2030, and policies of the Green Deal, in particular the climate law and LULUCF, Farm to Fork, as well as the CAP and CFP regulations.

The baseline also describes some of the likely effects of climate change on ecosystems and likely ensuing trends, as well as the likely socio-economic trends.

In broad terms, the baseline is not expected to lead to major changes in ecosystem extent in comparison to the current situation, across the main ecosystem types. However, the **analysis indicates that despite the hopeful developments since the adoption of the EU Green Deal and the EU Biodiversity Strategy for 2030, and continued**

implementation of the nature directives, the expectation is that ecosystem condition will only slightly improve in the period to 2030 under the baseline scenario.

In order to make some quantitative estimates, building on a previous study that made a quantitative assessment of the amount of restoration undertaken in the EU[119], it was possible to extrapolate how much could be expected to be restored in the future. This study had provided estimates of average **annual EU area** on which restoration action had been taken based on both binding and voluntary commitments and for all the main ecosystem types. **The extrapolation shows that restoration measures would only cover a fraction of the total EU area , or 0,71% by 2030, 1,50% by 2040 and 2,30% by 2050** (see Annex VII, section 1.1).

In summary, the baseline restoration effort is likely to remain at an insufficient scale to meet restoration needs. Furthermore, restoration is likely to happen too slowly to reverse the present, steep biodiversity decline and to underpin ecosystem resilience in the face of climate change.

While the changes in the extent and distribution of broad types of ecosystems in Europe between now and 2050 are less certain, there is greater certainty that the condition and ability to provide services of many ecosystems will not improve significantly and/or will worsen. Society and businesses (incl. SMEs), especially those that are directly dependent on nature, will experience negative impacts in the longer term. On the other hand, those businesses that benefit most from the status quo will, at least in the short term, benefit from the baseline model. Existing legislation and initiatives will not match the extent of measures required to achieve the objectives for any of the ecosystems.

Administrative impacts

The administrative costs are taken as 0, the reference level as this is the baseline. Costs of the baseline scenario and the assumptions of implementation it includes could be met through existing EU, Member States or private funds.

6.2. Impacts of policy Option 2 (Legally binding overarching target)

This policy option sets an overarching target that is legally binding (see Chapter 5).

Effectiveness (average score: 1.7)

This option would give impetus to restoration activity across Member States on a continued basis up to 2050. The goal is clearly **time-bound**. The milestone dates of the targets are useful but likely not to ensure **achievability.**

[119] Eftec, ECNC, UAntwerp & CEEWEB (2017), Promotion of ecosystem restoration in the context of the EU biodiversity strategy to 2020. Report to European Commission, DG Environment. https://ec.europa.eu/environment/nature/pdf/promotion_of_ecosystem_restoration_in_the_context_of_the_EU_biodiversity_strategy_report%20.zip

Under this option, and as described in section 5.2.1, Member States would be required to reach the target on their own territories, and would be required to set up national restoration plans to reach the overarching target. Each Member State would decide how to best achieve their target based on their geographical characteristics and national preferences, and the Commission could also provide guidance on which ecosystems to prioritise. In terms of implementation, Member States would have to monitor and then sum each of their specific restoration efforts and monitor how this would contribute to the overall target in terms of overall areas restored. These restoration efforts and the overall sum contribution to the target would be reported and checked against the target. Enforcement would entail checking for each Member State progress towards this overall target.

The main problem with this option is that of **enforceability**. As of today, only for some specific habitat types for which specific targets are outlined under option 3, is there an agreed common methodology for defining good ecosystem condition, and hence for determining what a degraded ecosystem is. This concerns in particular habitats covered by the Habitats Directive and water bodies and marine ecosystems under the Water Framework Directive and Marine Strategy Framework Directive. It is therefore currently not possible to assess how much of other ecosystems are being degraded in the EU or in a specific Member State and hence to what level progress will be made towards achieving the target. For example, we do not know how much of non-BHD annex I forest- or agro-ecosystems are currently degraded as there is no common methodology with specific thresholds for determining the level of degradation. That is, unless such a common methodology has been established and agreed in the EU with the Member States, it is not possible to assess the current baseline and condition of ecosystems in the EU and the Member States. This target is therefore **only partially measurable** , until the methodology would be fully developed. Without such a methodology, there would be a lack of common approaches for measurement and reviewing implementation progress.

Furthermore, this option could very easily lead to Member States prioritising the restoration of some ecosystems over others, resulting in uneven **coverage** across the main ecosystem types. Member States could also prioritise the cheaper options for restoration while giving insufficient attention to biodiversity benefits and while leaving out others that may be more costly to restore but would generate more biodiversity and societal benefits and have a better cost/benefit ratio. This too would result in sub-optimal outcomes and uneven coverage. Furthermore, the broadness of the target lends itself to a lack of **specificity**. This has been seen in the implementation of other directives with broad goals, such as the MSFD. It could therefore lead to Member States not taking sufficient action because of lack of specificity. Likewise, for compliance it may be difficult to prove that a Member State has not taken sufficient restoration efforts until the deadline for attaining the target has passed, whereas a more measurable target would enable a closer follow-up of the progress towards the target and intermediate milestones. Due to the limitations of this option the overarching target is considered difficult to attain.

Policy option 2: effectiveness	Score
Timing	3
Specificity	0
Measurability	1
Achievability	1
Coordinated action	3
Comprehensiveness	2
Enabling measures	2
Total	*12*
Average	*1.7*
Assessment	*Moderately effective*

Policy coherence (score: 1)

Option 2 is reasonably coherent with the **BHD**, **MSFD** and **WFD** as it can work together with these directives and would require Member States to draw up National Restoration Plans. However, it does not address the policy and legislative failures related to these directives, as outlined in section 2.2. First, while this option provides a restoration target that is both legally binding and time-bound, it only partially addresses the 'time-bound gap' of the **BHD**, since there are no deadlines for specific ecosystems. This would increase the risk of Member States deciding to postpone restoration of some ecosystems to later dates even though more rapid action could be needed. Overall, this would contribute to a lack of coherence and some ecosystems being addressed more quickly than others across the EU. Second, the overarching target does not provide specific targets, measures and monitoring for specific habitats or species, thereby not addressing the 'specificity gap' of the **MSFD**. Third, this lack of specific restoration targets for both freshwater and the surrounding habitats, including barrier removal, would not address the needed interlinkages between the **WFD and the BHD,** in particular for riverine and alluvial habitats. Fourth, this option does not sufficiently address the directives' broader gap of not explicitly addressing those ecosystem types that are currently not covered by legislation; thus, for example the particular emphasis needed for the restoration of soils or non-annex I forests, or others would not be dealt with explicitly, and could lead to the insufficient restoration of these ecosystems.

The target is in line with the ambition level of the **Green Deal**. However, because Member States could define and design their own monitoring systems for any targets beyond those Annex I habitats and protected species under the nature directives, there would be less opportunity to link these with existing EU methods and standards, leading to potential inefficiencies and incoherence.

The overarching target is directly aligned with the **Biodiversity Strategy for 2030**'s headline ambition "to ensure that by 2050 all of the world's ecosystems are restored, resilient, and adequately protected". The binding nature of the target would give considerable impetus for Member States to fulfil the strategy's voluntary commitments that support restoration under the baseline, for example stopping deterioration of

protected habitats, increasing organic farming, reducing pesticide and fertiliser use, and improving soil health, reversing the decline of pollinators, introducing landscape features, planting trees, restoring free flowing rivers, reducing the number of invasive alien species, reducing bycatch and damage to seabeds, and stopping the loss of green urban ecosystems. It may, for example, encourage Member States to make optimal use of the **CAP** funds and ecoschemes to finance restoration.

However, again, Member States would not be required to prioritise specific key species or habitats with high biodiversity value. Instead, they would be free to "cherry pick" what ecosystems to restore first, what voluntary targets to contribute to, what measures to use, and how to define attributes and monitor progress. This large degree of flexibility would lead to uneven and incoherent implementation.

In sum, due to the broadness of the target and lack of specific links to other legislation and initiatives, this option is assessed as *slightly coherent*.

Efficiency (average score: 1.7)

A more detailed analysis is provided in Annex VII, option 2.

Environmental impacts (score: 2)

A clearly positive aspect of this option is that a single, easy to communicate legally binding target would facilitate building broad awareness of EU ambition on nature restoration. It could help ensure buy-in across stakeholder groups and could help put biodiversity on par with 'headline' climate targets such as achieving climate neutrality.

Member States would have quite a degree of freedom and flexibility in choosing which ecosystems to prioritise for restoration. There would be a high degree of freedom also in the sequencing of ecosystem restoration (which to start with and which to leave for later) since the overarching target would require restoration of most ecosystems by 2050 and their maintenance. An evaluation was made to map the decision-making factors that would guide the direction of ecosystem restoration by Member States. A summary table is provided in Annex VII, option 2.

The main disadvantage of a broad overarching target (rather than ecosystem-specific targets) is that it would probably result in uncertain and uneven rates of restoration of ecosystems in the Member States, at least in the short-medium term. Moreover, the goal may not even be reached on time, as it has been evidenced in other pieces of legislation with very broad goals such as the MSFD. Member States are likely to prioritise which ecosystems to restore first, as described above. However, the goal would provide the impetus and would thus increase the scope and magnitude of implementation. Thus, compared to the baseline there is an even greater risk that this could result in the "picking of low hanging fruit", i.e. prioritisation of restoration of ecosystems that are easiest and least expensive to restore, or with the most immediate service benefit. This in turn could lead to an implementation effort that would be unbalanced. For those ecosystems for

which indicators have to be developed, the lack of a common, EU wide approach would lead to uncoordinated approaches across Member States. This would all lead to not very positive consequences for biodiversity.

Consequently, this option would result in only moderately positive outcomes for the ecosystems and biodiversity. Ecosystem condition would likely improve across the EU albeit in an uneven manner. It would fail to restore biodiversity to the level required to meet EU-wide and international biodiversity objectives. See Annex VI for the more detailed thematic impact assessment.

Socio-economic impacts (score: 2)

In overall terms, the overarching target would spur increased restoration action which would likely benefit biodiversity and ecosystem services. However, as over time biodiversity would continue to degrade further in various ecosystems not prioritised for restoration, this would in the medium to long term still undermine the provision of their services as well as increase future restoration costs. Therefore, with this option one would probably see moderate overall net ecosystem service benefits in the short-term, but probably lower net benefits towards 2040-2050. This would lead to only moderately positive results for society at large and businesses since ecosystems services will not be delivered to their full potential. There would be costs for farmers, for example in terms of potentially lower yields, even if quality would be likely to increase in the medium to longer term. Fishers would also have initial costs, that in the longer term would be compensated by improved fish stocks in the future.

Administrative impacts (score: 1)

Several administrative impacts can be expected, including costs for the surveying of ecosystems, development of national restoration plans, administration and monitoring of ecosystems to be chosen for restoration, as well as for reporting. These costs for 27 Member States together are estimated to amount to nearly EUR 14 billion until 2050. See Annex VII section 4 and Annex III for more details on administrative costs.

Administrative costs for option 2		
	One-off costs	***Annual costs***
Surveys of ecosystems	1 099 000 000	
Development of national restoration plans;	12 800 000	
Administration of restoration measures (2022-2030; 15 % target)		438 321 000
Monitoring of restored ecosystems		20 643 103
Reporting progress against restoration targets		107 000
Sub-total	***1 111 800 000***	***459 071 103***
Costs from 2022 to 2050	***1 111 800 000***	***12 853 990 884***
Total costs from 2022 to 2050		***13 965 790 884***

6.3. Impacts of policy Option 3 (Ecosystem-specific targets)

In this option, the EU sets a number of ecosystem-specific targets. An analysis of policy coherence and effectiveness is provided, as well as an analysis, ecosystem by ecosystem, of efficiency **based on the targets selected for step 1 as listed in section 5.2.1 (as well as in Annex V). Specific details are provided in Annex VI, based on thematic impact assessments for each ecosystem, and for which specific targets are selected.** In each ecosystem-specific analysis for efficiency, if monetary costing was possible, this included restoration, re-creation and maintenance costs and to some extent opportunity costs. See Annex IV for an overview of the analytical methods used.

Effectiveness (average score: 3.4)

The targets proposed have been analysed in each of the thematic assessments. Options were considered for the targets, of which certain targets were discarded. The table in Annex V shows the selected (and discarded) targets following each thematic impact assessment. Each target is ecosystem-specific or in some cases addresses **specific** species that are representative of the health of underlying ecosystems. All are clearly defined and with **deadlines** and many with defined milestone dates.

For any target that builds on the monitoring mechanisms of the BHD, **measurability** is assured, since the targets build on existing definitions of favourable conservation status and description of Annex I habitats. The targets are specified by the area (in km^2) for which restoration measures have to be completed, and this further enhances monitoring and measurement. For any targets specified for which monitoring mechanisms are not yet defined, the process of establishing the EU wide methodology and monitoring framework would assure measurability of those targets once established in step 2.

The targets are **achievable**. They are based on clear definitions, such as 'good ecosystem condition', and 'ecosystem recovery'; see glossary. They take account of the fact that ecosystems can take long times to recover, by specifying that the necessary restoration measures be put into place, with subsequent recovery of the ecosystem as a result. Another aspect of the target also specifies that restoration does lead to good condition, i.e. based on the ecological indicators (for example following from structure and function parameters of the HD). A similar approach is also used in the definition of the marine target, since for marine the actual recovery of marine ecosystems can take long periods of time, in some cases beyond 2050. Based on the above, the targets are both achievable (allowing for recovery) and measurable (mainly based on areas that can be monitored). The inclusion of milestones also contributes to achievability and the thematic assessments considered the most efficient options for the rate of restoration in the period up to 2050.

The two-step approach assures that for those ecosystems for which data and monitoring mechanisms do not exist, further targets can be established in step 2. This EU-wide

methodology ensures that Member States take actions in a more **coordinated manner** than in option 2. Targets are defined and foreseen for each main ecosystem type, ensuring a **comprehensive** approach.

For those targets based on monitoring mechanisms linked to the Nature Directives, it is important to point out that these targets will contribute to *much more than restoring inside protected areas*, since they address Annex I habitats both inside *and* outside the Natura 2000 network of protected areas. Also, it should be noted that "re-creation" would include the conversion of non-Annex I habitats back to Annex I habitats; for example the conversion of a grassland that was created on the basis of a drained wetland, back into a wetland. These correspond to significant areas. On the basis of EEA calculations based on data officially reported by Member States under Article 17 of the Habitats Directive, it is estimated that restoration of Annex I habitats would cover between 182 985 and 536 669 km^2 on land (5-14 % of the terrestrial EU area, at least the area of Greece & Belgium together); re-creation would cover a minimum of 10 703 km^2 on land. This ensures further **comprehensiveness**. Similarly the targets concerning protected species cover areas going well beyond protected areas. The foreseen **enabling measures,** described in the implementation framework such as NRPs, periodic review, an EU wide methodology and further guidance, would further contribute to Member States to achieving the ecosystem-specific targets. In sum, the various aspects of this option makes it feasible to attain the policy objectives, and is therefore considered effective.

Policy option 3: effectiveness	**Score**
Timing	3
Specificity	4
Measurability	3
Achievability	3
Coordinated action	4
Comprehensiveness	4
Enabling measures	3
Total	*24*
Average	*3.4*
Assessment	*Effective*

Policy coherence (score: 3)

Option 3 establishes much increased coherence. This option is closely knitted with the BHD, WFD and MSFD. The set of ecosystem-specific targets proposed make use of the ecosystem measurement and monitoring methodologies of the **BHD**. The targets also address the major gap of the BHD by introducing time-bound targets, and apart from setting a number of ecosystem-specific restoration objectives these would also help accelerate the implementation of the Directives. It acts as a complement to the **WFD** since what is addressed is the attribute of free-flowing rivers, an aspect that is not addressed in the Directive. The specific target on river, lakes and alluvial habitats, works in synergy with the WFD and BHD by focussing on the interactions between water

bodies, such as rivers, and the surrounding terrestrial riverine habitats. The specific marine target will work in synergy with the **MSFD** in that it specifies habitats based on BHD Annex I descriptions and that are at a scale that is needed for restoration; acting as a complement to the broad MSFD goal and the eleven broad descriptors that contribute to Good Environmental Status. The option with ecosystem-specific targets thus dovetail well with the four respective Directives, provide synergies, and would also help accelerate their respective implementation. See also Annex X referring to added value and synergies.

Targets on wetlands, forests, heath and scrub, soil organic carbon, grassland and on marine habitats such as sea grasses, will contribute significantly to climate policies that promote carbon removals, such as **LULUCF**, while the target(s) on urban, coastal wetlands and riverine habitats will contribute to disaster risk reduction and **climate adaptation**. Furthermore, the proposed additions to the monitoring requirements under LULUCF, based on land categories that contribute to carbon removals defined on the basis of environmental legislation, establish important cross correspondence. In the longer term, this would enable more exact estimates of the carbon removals based on the areas of specific ecosystems restored.

Targets on improving soil organic carbon would support initiatives under the **Soil Strategy**. The ecosystem-specific targets on agroecosystems and grasslands would provide benefits to the **CAP** and vice versa funding opportunities of the CAP could also be made use of for the purpose of restoration in the National Restoration Plans. These would work in synergy with the targets under the **Farm to Fork Strategy** (F2F), such as on the reduction of use and risk of chemical pesticide, and on nutrient loss and on promoting carbon and organic farming. The target on restoring a number of marine habitats would contribute to the **CFP** by ensuring better conditions for fish spawning and overall condition of fish stocks. The forest targets would provide support for implementation of the **Forest Strategy**. More information on the relation between the proposal for legally binding restoration targets and other EU legislation and policy initiatives can be found in Annex X.

Efficiency (average score: 3)

Overall impacts of ecosystem-specific targets

Member States would be obliged to achieve the restoration targets corresponding to each of their national territories, as applicable to their national biographical situation (for example land-locked Member States would obviously not have the obligation for any marine restoration). Typically, many of the targets require degraded areas of ecosystem to be restored, so countries with larger areas of degraded ecosystems would require relatively more to be restored. Overall, this means that the obligation of each Member State will be not only proportionate to the extent of its territory and sea, but also on the level of degradation of the ecosystems on its territory and its sea, i.e. reflecting the past and present pressures affecting them.

There are also some general observations that can be made in terms of the distribution of specific ecosystem types across Member States. For marine ecosystems, Member States with the large Exclusive Economic Zones (EEZs) and (where applicable) continental shelves would have large areas for potential restoration. For terrestrial ecosystems, northern Member States have the largest areas of peatlands and forests to restore, southern Member States have a larger areas of coastal wetlands; steppe, heath & scrub, and agro-ecosystems. Central and eastern European Member States have the largest areas of forests, rivers and lakes, and grasslands. So, while ecosystems do not occur equally in all regions of the EU, based on the data estimates, the *overall* contribution to restoration are expected to be rather well distributed across all Member States.

Furthermore, as shown earlier in this section, the analysis shows the benefits of restoration outweigh the costs of restoration, across each of the main ecosystem types, and in some cases significantly. Thus, **countries with larger areas to restore also stand to make greater overall benefits in the longer term.** Annex III provides a detailed analysis of impacts on Member States for a selection of ecosystems, with a numerical analysis of costs and benefits for Member States. Based on the analysis of impacts, **these results show the significant benefits that Members States and the EU as a whole stand to gain.**

The positive impacts of restoration are likely to be distributed across society as a whole; for example, the benefits of reduced risks of disasters, better air quality, better water quality, the benefits of carbon mitigation, etc.

However, **some impacts both positive and negative are more likely to focus on specific stakeholder groups**. For the set of targets considered, the main stakeholders **groups** identified that could be affected by the targets are economic operators in the primary sectors most directly dependent on ecosystems, such as farmers, foresters, fishers and landowners.

On the negative side, these groups could stand to lose income in the short term due to more stringent restoration requirements. For example, farmers may lose income if due to wetland restoration they cannot use their land due to more frequent flooding of restored floodplains or raised water tables from re-conversion of neighboring lands to wetlands (e.g. as part of peatland restoration). Fishermen may see restrictions in fishing areas and -techniques e.g. in protected areas. Foresters will be expected to leave larger areas of their forests in an undisturbed state and lower logging intensity as part of closer to nature forestry approaches. However, it should be borne in mind that most if not all of such foregone incomes can already be compensated for totally or partially under EU funds such as the CAP, the EMFF, the Just Transition Fund and others, as well as under various national funds in most EU Member States.

On the other hand, many of **these stakeholder groups are likely to directly stand to gain, due to improved ecosystem condition**: for example, future crops yields are likely to be more stable e.g. due to greater resilience to pests and extreme weather events. Fish abundance would increase as spawning areas such as shellfish reefs and vegetation can

recover and marine ecosystem health improves. Restored forests will be less vulnerable to forest fires due to a more diverse distribution of tree species. These will all have direct positive effects for farmers, fishers, foresters and landowners. Furthermore, new forms of incomes will become available for these groups, based on new business models that incorporate income diversification based on a range of ecosystem services. For example, diversification of incomes based on various ecosystem services will enable increase incomes stemming from tourists and recreational activities since many ecosystems that are in good health are primary locations for quality tourism. A specific example, is the development of rural and agro-tourism in areas that become more interesting to visit because of their improved natural qualities.

Annex III provides a further analysis of impacts on stakeholders and specific stakeholder groups based on a qualitative assessment.

Impact analysis, ecosystem by ecosystem, based on the targets selected for step 1 as listed in section 5.2.1 (policy option 3) and in Annex V.

Annex VI provides a more detailed of cost and benefits and here overview is provided for each ecosystem type. This is then summarised in the benefit to cost tables provided below and in Annex III. It should be underlined here that **for each ecosystem type the benefits are estimated to outweigh the costs, and in some cases significantly**. Typically costs arise from various estimates of how much it costs to restore specific ecosystems per hectare. **Benefit estimates** draw on the socio-economic benefits of improved ecosystem services, such has contributions to food provision, water purification, raw materials, genetic resources, medicinal resources, air quality regulation, climate regulation, moderation of extreme events, regulation of water flows, erosion prevention, maintenance of soil fertility, pollination, opportunities for recreation and tourism and others. The estimates and calculations are based on an extensive review of literature of the value of benefits of restoration, and were calculated for carbon storage and sequestration and total ecosystem service values (so including carbon benefits). A broad scope was taken to the estimation of total benefits, while avoiding overlaps, to obtain as full a picture of total benefits as possible. The types of benefits accounted for are similar between ecosystems, with some differences mostly caused by differences in services provided between different ecosystems and the scope of available studies on which median estimates were based. **Error! Reference source not found.**below provides a (non-exhaustive- overview of benefits identified beyond biodiversity and carbon benefits which were assessed for all ecosystem types, as well as the number of studies consulted to obtain a benefits estimate. A more detailed description of the analytical method is provided in Annex IV.

Ecosystem type/species	**Types of benefits identified**
Inland wetlands	Flood alleviation; water quality improvements; recreation- and other cultural services.
Coastal and other saline wetlands	Storm surge mitigation; protection against coastal erosion; water filtration; fish stock restoration; recreation and other cultural services.

Forests	Timber products and non-timber forest products, water- and soil quality, flood prevention, increased resilience against natural disturbances (droughts, fires, pests, and diseases); recreation- and other cultural services.
Agro-ecosystems	Food and fibre; water quality; flood management; pollination; soil quality; erosion control; climate regulation; cultural services (recreation, landscape, aesthetic values).
Steppe, heath and scrubland	Erosion control; water quality; flood management; fire prevention; food and fibre; cultural services (recreation, landscape and existence values).
Rivers, lakes and alluvial habitats	Fresh water; fisheries; genetic resources; waste treatment; water quality; flood management; soil quality; cultural services (landscape, aesthetic, inspirational and recreational).
Marine ecosystems	Flood mitigation, erosion control, water quality, food and fibre (including indirectly through fish stock regeneration), recreational services.
Urban ecosystems	Health and wellbeing; cooling and insulation (e.g. against urban heat island effect); recreation; food- and fibre; flood risk reduction; water quality; air quality, noise reduction, property value.
Soil ecosystems	Water quality; flood risk mitigation; drought risk mitigation; pest control; reduced input costs; soil subsistence and -degradation prevention (and herewith resilience of food- and fibre).
Pollinators	Sustainable provision of animal-pollinated crops and associated benefits; healthy ecosystems dependent on the diversity of wild animal-pollinated plants (and wide-range of regulating ecosystems based on them); cultural, aesthetic, wellbeing.

Coastal wetlands *(see also Annex VI for a more detailed analysis)*

The restoration of coastal wetlands, based on the targets selected, would offer unique habitat conditions for threatened species, especially bird species protected under the EU Birds Directive, and restoration will enhance and further support the return of biodiversity.

Despite representing a comparatively small area among all wetland habitats, coastal wetlands provide significant disaster risk prevention services, increased resilience to climate change impacts, and carbon sequestration services, thus contributing to the EU climate objectives. As communities become increasingly urban and coastal, with some projections estimating that by 2060, 55.7 million people in Europe will live in coastal zones, the more we will need coastal wetlands to serve as protective barriers from coastal storms that become increasingly unpredictable and violent.

Coastal ecosystems provide vital services for agriculture and fisheries. Those working directly and indirectly in the aquaculture and fisheries industry may be impacted by restoration/protection measures, e.g. on where to locate aquaculture facilities, but in the longer term would benefit from higher and more resilient catches as habitats for commercially important species, such as shellfish, recover. Farmers may be impacted, for example, by measures needed to limit the amount of nutrient run-off and pollution that can enter a coastal wetland. Opportunity costs could stem from reduced possibilities for using these coastal areas for other economic activities such as construction. On the other

hand, the tourism industry would benefit as these ecosystems are primary locations for touristic activities.

The total cost of coastal wetland activities to reach the targets falls within the range of EUR 5.1 to 5.8 billion. While these costs may be high given the relatively small area of coastal wetlands, they are comparatively low to the benefits that these ecosystems provide in terms of their ecosystem services. Benefits such as from storm mitigation, water filtration, and fish stock restoration, amongst others, are valued between EUR 182 to 223 billion. The analysis estimates that the monetised benefits for carbon storage alone areare less than the estimated costs of full ecosystem recovery (i.e. to good condition), with a**benefita-cost ratio ofof 0.2.** However, ifi other above-mentioned ecosystem service benefits are included, the estimated net benefits increase markedly, with a **benefit-cost ratio of between 35 and 38**.

Evidence suggests that coastal wetlands respond quickly to restoration efforts, with many of the benefits of ecosystem restoration observed within five years, but that some habitats such as saltmarsh may take more than 100 years to recover their full biodiversity[120] (Maskell et al, 2014).

Inland wetlands *(see also Annex VI for a more detailed analysis)*

The effects of the targets selected would be very positive for biodiversity and ecosystem services, most notably in terms of carbon sequestration and storage, water quality, flood risk management, erosion control and cultural services. Marshes are particularly important for birds listed in Annex I of the Birds Directive, as well as other migratory species. The restored peatlands would be particularly effective in maintaining carbon stores, and with time recovery of vegetation, carbon sequestration and several other ecosystem services would increase.

Peatlands have a large carbon mitigation potential, however, currently peatlands, because they are degraded, are estimated to emit around 220 MtCO2e/yr in the EU[121]. Restoring peatlands, such as by rewetting, can protect carbon stocks in organic soils, and sequester carbon as the degraded land recovers. It can also help improve water quality, protect against flooding, provide habitats for biodiversity, and can still be used for agriculture production through paludiculture. Rewetting just 3 % of agricultural land in the EU will save up to 25 % of agricultural greenhouse gas emissions[122].

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[120] Maskell L, Jarvis S, Jones L, Garbutt A and Dickie I (2014) Restoration of natural capital: review of evidence. Report to the Natural Capital Committee, UK. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/517024/ncc-research-restoration-natural-capital-review.pdf

[121] Tanneberger, F., Appulo, L., Ewert, S., Lakner, S., Ó Brolcháin, N., Peters, J., & Wichtmann, W., *The Power of Nature- Based Solutions: How Peatlands Can Help Us to Achieve Key EU Sustainability*, 2021.

[122] Position Paper: *Preserve peatlands in post-2020 CAP*.

Uncompensated opportunity costs as a consequence of establishing the targets can be expected to be minor in relation to the restoration of HD Annex I peatlands and marshlands. Firstly, under the CAP, Member States will have to define the protection that will be applied to peatlands and, if deemed appropriate, will define more ambitious management requirements on wetlands and peatlands, which will be set under Pillar I eco-schemes or Pillar II management commitments. Secondly, because of the increasing recognition of the potential carbon losses from degraded peatlands, damaging activities are now largely prohibited within areas of HD Annex I peatlands. Consequently, lost peat extraction opportunity costs are expected to be small.

The main stakeholders affected by the targets are farmers, landowners and land managers who would undertake the required restoration actions. Farmers' additional costs and income foregone could be covered totally or partially under the CAP, if the Member States make such a choice in their Strategic Plans. In turn, the restoration work will create employment and income for farmers, land managers and contractors in the medium to longer term, and restored areas can provide new sources of income such as eco-tourism. Beneficiaries would include the entire population and economy (through carbon and biodiversity benefits), as well as water companies and consumers, and the tourism sector.

The monetised benefits for carbon storage and sequestration from peatland restoration are estimated at EUR 10.6 to 13.0 billion. They outweigh the estimated costs of full ecosystem recovery (i.e. to good status), estimated at EUR 4.8 to 5.1 billion, and have a **benefit cost ratio ranging from 2.2 to 2.5**. If overall ecosystem service benefits for restored peatland and marshland are applied, the estimated net benefits increase markedly (EUR 45.1 to 55.3 billion), with a **benefit cost ratio of between 7.1 and 8.3** for peatland and between 1.8 and 2.1 for marshland.

Evidence suggests that restoration of wetlands can deliver benefits for biodiversity and ecosystem services quickly but that full recovery of biodiversity may take decades. For example, restoration of blanket bog may achieve improvements in hydrology in 1-2 years, carbon emissions in 3 years and vegetation re-colonisation in 2 years; however full vegetation communities may take 20-50 years to return (Maskell et al, 2014).

Marine *(see also Annex VI for a more detailed analysis)*

Restoration of marine habitats can be a particularly effective way to achieve the recovery of whole marine ecosystems, including species. Science shows that restoring marine habitats (where species live, reproduce and forage) both sets the enabling conditions for species and ecosystems to thrive and allows delivering enhanced ecosystem and societal services. The groups of habitats that are proposed for restoration (seagrass beds; macroalgal forests; shellfish beds; maerl beds; sponge, coral and coralligenous beds; seeps and vents; and soft sediments) have the capacity to contribute substantially to the restoration objectives under the Biodiversity Strategy, in particular towards mitigating climate change, reducing the impact of natural disasters and bringing health, social and economic benefits.

Estimates of the costs of marine restoration vary considerably depending on the habitat, its location, condition, scale, and method used. Benefit calculations are difficult to evaluate with precision, but rather give order of magnitude estimates. Opportunity costs may include foregone income for fishers, or reductions in exploitation of natural resources, such as sand or mineral resources. In the short-term, impacts would be mainly on the fisheries sector in terms of potential lost income and revenues. However, benefits from increased catch would be seen in the medium to long term, and EU funds (e.g. the European Maritime Fisheries and Aquaculture Fund, EMFAF) are available to partially mitigate the initial impacts. Other economic sectors that would be impacted include mining, agriculture, aquaculture and leisure. However, many local stakeholders would benefit in the medium to long term from improved water quality, improved seascapes and richer biodiversity.

Details on the costs and benefits of the selected habitats are provided in Annex VI. As a specific example, seagrass provides benefits for climate mitigation, flooding and erosion approximated at EUR 95 per ha/year as well as benefits for food, water and raw materials valued at EUR 866 per ha/year. No financial valuation is available for ecosystem services for cultural (e.g. recreation, wellbeing, aesthetic value, etc.) or other socio-economic purposes (e.g. coastal tourism), however, these are expected to be significant. The costs of sea grass restoration have a wide range of estimates for both active and passive restoration.

However, given the high variability in the economic cost and benefits of restoring marine habitats, the taxonomic and geographic biases in the availability of information and the lack of a baseline to determine the area of degraded habitat that needs to be restored, it is not possible to estimate – with a degree of certainty – the exact costs of the proposed policy option nor the economic benefits obtained. However, **benefits very likely to outweigh the costs, in particular in the long term.**

In summary, the analysis suggests that of the selected marine habitats, these could be fully recovered in a timescale only *beyond* 2050, with partial recovery reached in 2030, 2040 and 2050. This is due to long recovery times of marine ecosystems and coupled with additional risk factors due to climate change. It is only in this longer-term timescale that the full biodiversity, fisheries and climate benefits may be felt. Benefits of restoration to biodiversity and fisheries have the potential to be realised within a decade (varying by habitat) whilst the benefit of restoration to climate change mitigation, adaptation and pollution effects, may take multiple decades. As such, restoration should start as soon as possible, even if the benefits are not immediate.

Freshwater *(see also Annex VI for a more detailed analysis)*

It is important to underline that this thematic impact assessment considers targets relevant to the entire river ecosystem including riverbanks, floodplains and areas next to rivers that may be covered by water during floods. The outcomes of applying the selected targets would contribute to improving the good ecological status of the waters and improving the condition of the surrounding habitats. This in turn will improve the

delivery of a wide range of ecosystem services such as drinking water, fish supply, flood protection, water purification as well as recreational and cultural values. In addition, there will be important contributions to climate change mitigation, as well as to reducing seasonal and annual flood patterns.

Restoration actions are likely to benefit a range of stakeholders, including (1) local populations through increased safety and house prices due to decreased flood risk potential; (2) water suppliers and consumers through overall reduced water pollution and increased availability; (3) recreational users of freshwater ecosystems through greater access to previously restricted areas (due to barrier removal) and enhanced aesthetic values; and (4) society at large through enhanced ecosystem services. The benefits are estimated at EUR 862 to 1 053 billion.

Cost would arise from restoring the Annex I habitats and by recreation, and this could incur opportunity costs of similar nature to agro-ecosystems and wetlands. The removal of obsolete barriers may also involve opportunity costs, as compensation to stakeholders whose economic activities or assets are impacted by the removal of such barriers. Costs can also be expected for farmers whose management practices might need to change to restore degraded habitats, and whose land and crops would be impacted by, for example, likely frequent flooding following barrier removal. Total costs are estimated at EUR 35 to 40 billion.

Based on the estimates provided, and considering the variations in costs and benefits estimates, it is likely that **the benefit cost ratio deriving from all selected targets would range from 24 to 26.**

Evidence suggests that the full benefits for biodiversity and ecosystem services of restoration of rivers and lakes are likely to be seen within a period of 15-25 years, but that some species may recover within a few years of restoration (Maskell et al, 2014).

Steppe, heathh and scrub, rocky & dune habitats *(see also Annex VI for a more detailed analysis)*

The outcome of implementing the selected targets on heath and scrub habitats would deliver substantial benefits for biodiversity, society and the economy (especially farming and tourism). These include carbon storage and sequestration, whose benefits are valued from EUR 232 to EUR 1 337 per ha/year, as well as other regulating services (wildfire prevention and erosion control), provisioning services (maintenance of sustainable grazing) and cultural services (landscape, recreation and tourism and existence values), whose benefits are valued from EUR 558 to EUR 9 580 per ha/year. Total benefits are estimated at EUR 24 to 29 billion. For rocky and dune habitats benefits are mainly for biodiversity and recreational services, but can only be estimated in qualitative terms. There is evidence that restoration of heathland can result in recovery of vegetation and enhancements of some ecosystem services within 5 years, but that the full recovery of biodiversity will take longer (Maskell et al, 2014).

The costs of restoration will be incurred by farmers, who could in turn be compensated, for example through incentive payments possible under eco-schemes of the CAP. At the same time, restoration work are likely to create employment and enhance the possibility of diversified incomes for farmers and landowners. Total costs for the restoration of heath and scrub habitats over the entire period are estimated at EUR 3.051 to 3.111 billion.

The benefits of restoring Annex I heath and scrub habitats alone are estimated to exceed the restoration costs, even in a scenario where only carbon benefits are considered. **Benefit-cost ratios of are estimated from 1.3 to 1.5 based on carbon benefits alone**, and **from 7.9 to 9.2 if the total value of ecosystem services is considered.**

Pollinators *(see also Annex VI for a more detailed analysis)*

The pollinator target addresses insects, such as bees, hoverflies, butterflies and moths. The establishment of the target would address a decline in these species that has been particularly dramatic in the last thirty years; for example, the population trends of 17 butterfly species in 17 Member States showed a decline of 42-46 % between 1990 and 2017.

Restoring pollinators would result in benefits to various stakeholders, including land managers (e.g. farmers and beekeepers) and their supply chains, due to the biological control of pests, as well as decreased frequency of cutting/mowing and weed control activities, as a result of land management changes. The wider public would also benefit, as well as owners of gardens, and users of green and flower-rich spaces, providing enhanced cultural and wellbeing benefits.

Opportunity costs were estimated the same as for restoring Annex I grasslands, heath and scrub habitats. However, these are not additional costs as already covered under the respective targets. The recreation of Annex I grassland on arable land will have opportunity costs of lost agricultural production potential; however, this type of restoration is likely to be carried out on low productivity arable land and/or land that has a low-price value.

There are few estimates of the benefits of crop pollination in numerical terms. A European study estimated that pollinators are directly responsible for 7 % of crop yield in the EU, and that the crops dependent on animal pollination generate around 31 % of the income from EU crop production. The value of crop pollination was estimated at almost EUR 5 billion per year (value in 2019) for insect pollinators in the EU[123]. Beyond that a range of service benefits can be described and analysed in qualitative terms as described in Annex VI. These qualitative values are likely to be significant.

[123] Vysna, V., Maes, J., Petersen, J.E., La Notte, A., Vallecillo, S., Aizpurua, N., Ivits, E., Teller, A., Accounting for ecosystems and their services in the European Union (INCA). Final report from phase II of the INCA project aiming to develop a pilot for an integrated system of ecosystem accounts for the EU. Statistical report. Publications office of the European Union, Luxembourg, 2021.

The costs of restoration, which would be borne by both public and private landowners, which were included in the estimats of restoring Annex I grassland, heath and scrub habitats to good condition. However, these are not additional costs as already covered by other targets. The costs of actions for pollinators on intensively managed farmland overlap to some degree with actions for farmland birds but may not be identical. Further costs would include the costs of establishing a dedicating monitoring scheme estimated at €154 million. Overall, the analysis indicates, **based on a combination of qualitative assessment and limited numerical data, that the benefits would outweigh the costs**.

Forest ecosystems *(see also Annex VI for a more detailed analysis)*

The selected targets on forests would have several benefits, most notably for biodiversity and ecosystem services such as (1) including more diversified timber and non-timber products with indirect economic benefits for the broader forest-based sector in terms of market value and employment; (2) regulating services including water and soil quality, flood prevention, carbon sequestration and storage, and increased resilience against the projected increase in natural disturbances under climate change (droughts, fires, pests, and diseases); and (3) social and cultural services in terms of aesthetic, recreational and existence values.

Enhanced services will have positive impacts more broadly on the economy, providing employment opportunities and income for the tourism/recreation sectors, conservation organisations, especially in rural economies.

Principal actors involved in the restoration of forest habitats will be forest owners and forest managers. Forest ownership varies from very small and fragmented private-owned to large scale state-owned forests, and from small family-owned holdings to large estates owned by private companies. Around 40 % of the forest area in the EU is publicly owned. Around 60 % of the EU's forests are in private ownership, with about 16 million private forest owners. Across the EU there are major variations in ownership of forests.

Opportunity costs could stem from decreased biomass harvests. These would involve economic costs for forest owners and the forest-based sector, in terms of market value and employment. Afforestation and reforestation activities may include additional costs and foregone income (such as costs for preparation of the soil, for the planting trees and related maintenance) for landowners and changing land use. At the same time foresters will be able to gain in the medium to longer term, since restored forests can provide new sources of income such as eco-tourism, or based on public and private payment schemes for ecosystem services.

A cost-benefit analysis for forest restoration in the EU is complicated by several factors, including the variety of forests across the EU and a lack of comprehensive and reliable data at EU level. An estimation of restoration costs ranges from EUR 50 to 54 billion, whereas an estimation of benefits ranges from EUR 204 to 250 billion (of which EUR 3.8-4.7 billion consists of carbon benefits). This suggests that even without carbon benefits included, the benefits from restoration would exceed the costs. The estimated

carbon benefits represent less than 10% of estimated costs, but are likely to be a significant underestimate.

Evidence suggests that forest ecosystems take a long time to restore, and that the full benefits of restoration may take many decades to be realised (Maskell et al, 2014).

Agro-ecosystems *(see also Annex VI for a more detailed analysis)*

The targets on agro-ecosystems will deliver substantial benefits for biodiversity, benefiting a wide range of species. Many semi-natural ecosystems and associated landscapes once restored, become highly species-rich. These will provide direct benefits to farmers and the agricultural sector, such as benefits from improved soils quality, reduced soil erosion and soil compaction and greater abundance of pollinators.

More widely, the targets will benefit sectors of the economy by enhancing the delivery of a variety of ecosystem services, including provisioning services (sustainably produced or organic food products based on sustainable agricultural practices), regulating services (climate, water quality, soil, quality water provision and improved flood management). They will also benefit the population at large, and tourism, through improved landscape quality and public enjoyment of the countryside. Overall, benefits are estimated at EUR 230 to 250 billion.

At the same time, expected costs are estimated at EUR 26.559 to 27.732 billion. They include costs for farmers in relation to the restoration and re-creation of agro-ecosystems; for example, the costs of switching to new more ecologically favourable management methods to maintain ecosystems in good condition. However, these are likely to be reduced since these can be funded under the CAP. Furthermore, any restrictions to practices brought about by implementation of the targets (such as restriction on the conversion or on the ploughing permanent grassland, or tillage management reducing the risk of soil erosion) would be covered by the new CAP regulations. At the same time restoration actions are likely to create employment and enhance incomes for farmers in the long run.

The benefit to cost analysis estimates that the total ecosystem service **benefits of restoration outweigh the costs by a ratio of 9:1**. The carbon sequestration benefits alone are estimated at 60-70 % of the overall costs.

An additional target on rewetting drained organic soils (drained peatlands) under agricultural use, would also generate considerable climate change mitigation and adaptation benefits, as well as significant benefits for biodiversity, water quality, flood risk mitigation, drought risk mitigation and socio-economic benefits from paludiculture and tourism. For example, rewetting drained agricultural soils can lead to decreases in emissions of around 20 $tCO_2eq/ha/year$. It is a cost-effective measure to reduce greenhouse gas emissions. The ratio between benefits, including biodiversity benefits and costs is expected to be considerably larger when also considering the other ecosystem

services, including tourism and socio-economic benefits which are challenging to quantify.

Organic soils represent a significant proportion of arable land in some countries (e.g. Netherlands, Finland and Germany) where rewetting will consequently have a larger socio-economic impact, including a considerable opportunity cost. At the EU level however, agriculture on organic soil represents only around 1% of cropland and 4% of grassland (EU-15) meaning overall costs from lost productivity on these soils will be small relative to their climate and biodiversity benefits. Depending on the socioeconomic and ecological context of a given site, losses can be compensated through land purchase/acquisition, compensation schemes or by incentivising the establishment of alternative land uses such as paludiculture or extensive grazing.

In addition to the targets mentioned above, specific **indicators** can be used to provide evidence of enhancement of biodiversity: the grassland butterfly index, the share of agricultural land with landscape features, the organic carbon content in cropland mineral soils and the percentage of species and habitats of Community interest related to agriculture with stable or increasing trends. Increasing trends for this set of indicators would further provide overall important benefits to the environment, society and the economy.

Urban ecosystems *(see also Annex VI for a more detailed analysis)*

The proposed targets aim to end the current steady decline in the quality of urban ecosystems in cities and their commuter zones, that has been taking place over recent decades, and then to slowly reverse this trend and help to restore them. The targets address two fundamental indicators of urban ecosystem health: the total area of natural/green space, along with the sub-group comprising the total area of tree canopy cover, in 'Local Administrative Units' classified as 'cities' and as 'towns and suburbs', which together represent more than 20% of total EU land surface and represent more than 70% of the population. (i.e., the most densely populated areas)

For 2030, a target has been set to ensure, 'no-net loss' of 'urban green' including 'tree canopy cover' in all individual LAUs classified as 'cities' and 'towns and suburbs'. For 2050, the targets aim for an average 5 percentage point increase in the total area of green space (including tree canopy cover) averaged across these LAUs in each Member State (with an intermediate stop of a 3-percentage point increase by 2040), and that the minimum level of tree canopy cover in all individual LAUs reaches at least 10%.

The levels of targets proposed have been selected so as to be realistic, and achievable within the bounds of existing urban planning process. They are not only fully in line with EU and international objectives, but they will also do not need to be restricting for urban development, but rather help with steering it to be greener progressively over time. In relation to overall levels of urban green space, starting with 'no net-loss' but giving until 2030 to achieve this basic, common-sense, target will allow for some flexibility in approach. It should be borne in mind that urban development can be 'green' and can enhance the local environment if undertaken with due attention of urban ecosystem

condition, such as by using, green roofs, permeable 'green' parking lots, focused tree/hedge planting and incorporation of biodiversity supporting features. Alternatively, or additionally, brownfield/abandoned sites can also be restored elsewhere in compensation. This impact assessment has shown there is potential for such land to significantly contribute to the targets proposed. Thus no-net loss of urban green is considered as a realistic and simple baseline for protecting, and later restoring, urban ecosystems. Having this target will provide a focus for urban planning process, steering them to help achieve the objectives of the biodiversity strategy.

The idea of the targets, and the levels to which they are set is to ensure that the amounts of green space and tree coverage become an integral part of the urban planning process, and that the reach good levels in terms of providing healthy urban ecosystems, by 2050. They can be achieved by restoring degraded and industrial land, greening new developments over time as they are built or replaced (i.e. industrial buildings, housing, retail, local authority builds including hospitals and schools) using options such as tree planting, (including tree-lining streets) green roofs, new green spaces, as well as other "multifunctional" green infrastructure, such as new green mobility lanes or by creation of new parks and woodlands in urban fringes.

In terms of the tree canopy cover targets these are considered as an important sub-set of urban green overall, (so the same arguments apply), but with a very high biodiversity and climate mitigation and adaptation value. It is vital that any urban greening targets ensure the provision, protection and increasing of tree canopy cover in EU urban ecosystems. There is significant capacity within all LAUs for the provision of some increase in tree canopy cover, so the aim of this target is to start moving in the right direction, in line with the planting of 3 billion trees commitment made under the Green Deal. The target for an absolute minimum of 10% tree canopy cover in the LAUs will help to ensure a minimum level of urban ecosystem restoration is undertaken, and support key climate change mitigation and adaptation objectives, in turn supporting air and water pollution objectives.

For 2050 achievable increases in the targets have been proposed that continue the restoration at a similar pace post 2030 and 2040, but over the following decades. Again, they have been set at a relatively low levels per year, to stimulate better urban planning processes, rather than to restrict growth / development.

Overall, there is good evidence related to the costs and benefits of increasing urban green space, albeit almost all in case study form. These demonstrate convincingly a wide range of positive benefits coming from increasing and maintaining higher levels of urban green space. Due to the wide variation, however, in many aspects of the studies, such as the (climate/locations/type of urban space), and the (often limited) parameters being investigated (pollution, energy, water runoff, health and well-being, climate mitigation etc) it is not possible to monetize some of these benefits in a generalized manner. Indeed, the high number of multiple co-benefits provided by using nature-based solutions to urban challenges tends to mean often the full benefits of urban green space and tree cover are underestimated. So, while it has not been possible to undertake a traditional

cost/benefit analysis, as can be done on single issues, evidence points to the clear net positive values of halting the loss of, and then restoring green urban spaces.

Administrative impacts **(score: 2)**

The administrative costs for option 3 are estimated as the same as for option 2. However, to this is added a one-off cost of **EUR 6.56 million** for establishing an EU wide methodology (see detailed calculation in Annex VII). Similarly to option 2, the costs for 27 Member States together are estimated to amount to nearly **EUR 14 billion until 2050**. See Annex VII section 5 and Annex III for more details on administrative costs.

Administrative costs for option 3		
	One-off costs	***Annual costs***
Surveys of ecosystems	1 099 000 000	
Development of national restoration plans;	12 800 000	
Development of methodologies and indicators (5 ecosystems)	6 580 000	
Administration of restoration measures (2022-2030; 15 % target)		438 321 000
Monitoring of restored ecosystems		20 643 103
Reporting progress against restoration targets		107 000
Sub-total	***1 118 380 000***	***459 071 103***
Costs from 2022 to 2050	***1 118 380 000***	***12 853 990 884***
Total costs from 2022 to 2050		***13 972 370 884***

Given the large positive impacts of establishing common approaches and methods across the EU for ecosystems without defined indicators, and methods to define good condition, this represents particularly good value for money. It avoids the inefficiency costs if Member States would do it individually under option 2. It will further support efforts for more frequent and regular monitoring on the condition of ecosystems and biodiversity, in line with the requirements of the 8th Environmental Action Programme. Therefore, a more positive score is allocated for administrative impacts than in option 2.

The rate of restoration linked to Annex I habitats targets was also considered, i.e., either at the rate of 15 % by 2030, 40 % by 2040, and 100 % by 2050, or faster at the rate of 30 % by 2030, 60 % by 2040, and 100 % by 2050. An analysis is provided at the end of Annex VI and summarised below. This indicates that faster restoration pathway (30 %, 60 %, 100 %) provides better overall benefit to cost ratios, and a conclusion is that this version of the target should be used.

Overall, due to different levels of data availability, **different forms of benefit and cost estimates** were carried out for different ecosystem targets. For targets linked to wetlands, heathland and scrub, forests and rivers, numerical cost and benefits were calculated, and clear benefit/cost ratios were established, as shown in the table below.

For other ecosystems, a mixture of qualitative and quantitative estimates were used. For these too, positive benefit/cost ratios can be deduced. These are added to the table below to provide an overall summary, and indicating that **in all cases, the benefits are estimated to outweigh the costs.** However, the absence of aggregated monetary cost and benefit calculations for the assessments of four ecosystems should not be misinterpreted as meaning that target options assessed would stand out less positively in terms of their net benefit to reach the objectives.

Ecosystem type / Species	**Benefit to cost ratio (With Annex I targets: 15 % by 2030, 40 % by 2040, 100 % by 2050)**	Benefit to cost ratio **(With Annex I targets: 30 % by 2030, 60 % by 2040, 100 % by 2050)**
Inland wetlands (for peatland only)	7.1 (2.2 if carbon only)	8.3 (2.5 if carbon only)
Forests	4.1 (0.1 if for carbon only*)	4.1 (0.1 if for carbon only*)
Heathland and scrub	6.9 (1.3 if carbon only)	8.2 (1.5 if carbon only)
Agro-ecosystems	8.6 (0.6 if carbon only)	9.2 (0,7 if carbon only)
Rivers, lakes and alluvial habitats	24	26
Coastal wetlands	35.3 (0.2 if carbon only)	38.1 (0.2 if carbon only)
Median cost-benefit ratio between ecosystem types	7.9	8.8
Marine	Quantitative/Qualitative estimates indicate benefits very likely to outweigh the costs, in particular, in the longer term.	Quantitative/Qualitative estimates indicate benefits very likely to outweigh the costs, in particular, in the longer term.
Pollinators	Quantitative/Qualitative estimates indicate benefits very likely to outweigh the costs.	Quantitative/Qualitative estimates indicate benefits very likely to outweigh the costs.

In conclusion, for almost all the targets, the benefits outweigh the costs, and the approach also ensures that risks of delayed action are reduced as much as possible. Based on the above and the thematic summaries, the following scores are given: **4** for environmental impacts, **3** for socio-economic impacts and **2** for administrative impacts.

Robustness and limitations of the calculations: All cost and benefit calculations of ecosystem restoration are based on the best available evidence. The cost estimates are most robust for Annex I habitats, where we have more precise and reliable data (based on

more experience and better data collection) than for other ecosystems. The approaches to estimating the costs and benefits of ecosystem services and their restoration are based on methods (both quantitative and qualitative) that have been developed extensively in the area of environmental economics. The IA has also been able to draw on evidence from a range of restoration programmes (for example under LIFE-nature), various specific studies, meta- and case-studies, as well a detailed study of the financing needs of meeting the restoration target of the EU Biodiversity Strategy to 2020. However, costs and benefits are to a large extent determined by local circumstances, which makes them more difficult to scale up in an exact manner. More details on the analytical methods are provided in Annex IV.

Risks that potentially limit the benefits of ecosystem restoration

There are a range of risks that the estimated benefits will not be realized, for instance if measures are not implemented as required; restoration actions fail to achieve the target condition because of scientific uncertainties, failure to undertake appropriate actions or adverse effects of climate, pollution, invasive species, conflicts etc. Even if ecosystems are restored to good condition, they may not deliver the anticipated benefits to people – e.g. because benefits occur in places remote from people and property. There is a risk of delay in achieving good ecosystem condition and of additional costs of restoration.

These risks can lead to a failure to meet the restoration targets, lower than foreseen benefits or/and costs that higher than anticipated. Accompanying measures such as incentives and guidance can mitigate these risks. The risks, their consequences and mitigation measures are listed in more detail in Annex IV.

Overall, these risks are significant, particularly because of the range of scientific uncertainties, locational variations and environmental factors that influence the effectiveness of ecosystem restoration and its benefits and costs. However, they can be mitigated through application and sharing of best available evidence; a robust approach to restoration planning; guidance, technical support and skills development; and monitoring and adaptive management. **The high benefit:cost ratios estimated for each ecosystem type, with benefit:cost ratios ranging from 4:1 to 38:1, leave a sufficient margin to ensure that ecosystem restoration will be efficient even if benefits are less than anticipated.**

Box 8: Views of stakeholders and authorities on the potential socio-economic impacts of ecosystem-specific targets.

*During the consultation exercise, a number of stakeholders stressed that **the restoration agenda should be a positive agenda** and the **multiple benefits** from ecosystem services to various stakeholders need to be made more visible. **State forestry representatives** emphasized that restoration needs to be integrated with rural economies. A representative of an environmental NGO stressed that ecosystem restoration is becoming a matter of survival, turning the tide on the nature crisis. Environmental NGOs saw restoration as a positive agenda for solutions, but noted that the benefits for various stakeholders should be made more visible: farmers, fishermen and foresters will be harmed if we do not act on climate change (through nature restoration).*

National authorities and stakeholders across the board called for an integrated strategy that considers ecosystem preservation as well as socio-economic development in urban and rural areas. Some national authorities underlined positive (voluntary) experiences with restoration, but also the complexity and cost of restoring ecosystems (such as peatlands).

***Forest owners and forestry sector stakeholders** expressed preference for a focus on restoration measures rather than on results. The need to ensure respect for **property rights** in the implementation of the targets at the national level was underlined, in relation to restoration on private land that needs prior and informed consent of the owner. They emphasized that, in order to bring forest managers and owners on board, proper consultation and support are needed including finance to compensate them for costs that bring broad benefits to society. Forestry sector stakeoholders further stressed the need to consider impacts **in the value chain**. The potential impacts of forest protection and restoration measures on the production of raw wood in the EU and potential relocation to third countries were also highlighted. Alignment with national forest acts' obligations on forest owners was also stressed.*

*Several stakeholders pointed to the need to be clear on **who would be responsible to implement** the targets and obligations. Two NGOs commented that the burden of implementation should be placed not only on the nature authorities, but also on other relevant administrations (e.g. water).*

*An environmental NGO in the Baltic Region pointed to likely impacts from restoration on fishermen, the recreational sector and other commercial sectors such as shipping, boating and energy production, for instance by displacement of their activities. New conflicts may arise with restoration when predators return and compete with human uses, making enemies from former allies (such as small fishers). Possible conflicts were also flagged with the objectives of the **Common Fisheries Policy**.*

How views of stakeholders and authorities have been taken into account:

The impact assessment highlights that the benefits far outweigh the costs of restoration. The proposal also emphasizes that Member States will need to involve stakeholders, including land owners (and users) in their National Restoration Plans. Member States will have the liberty to involve other departements than only the nature authorities in the implementation. The impact assessment report also addresses the issue of possible foregone incomes cause by restoration measures, by pointing out that they can already be compensated for totally or partially under EU funds such as the CAP, the EMFF, the Just Transition Fund and others, as well as under various national funds in most EU Member States.

6.4. Impacts of policy Option 4 (Ecosystem-specific targets and an overarching objective)

A combination of ecosystem-specific targets and an overarching objective would overcome some of the weaknesses of the previous two options. An overarching objective would provide impetus and clarity of overall ambition. As such, it has an important added performance value for communication, as a political driver at EU-level, in the Member States as well in international context, and for mainstreaming purposes. It would raise public awareness and a common agenda for action that can appeal to a broad group of stakeholders. In this way the headline objective would be more likely to have an impact in mainstream politics, rather than risk remaining in the domain of environmental administrators. Lastly, since the overarching objective addresses most ecosystems, this further underlines the need to complement the targets in step 1 with further targets in step 2.

Making this an overarching objective in the law, and coupling it with ecosystem specific targets of option 3, would avoid the difficulties in enforceability described under option 2. The ecosystem-specific targets can help make sure there will be a measurable delivery on biodiversity, by making the restoration objectives concrete, measurable and enforceable, and help ensure that all ecosystems/habitats that require restoration will be addressed. Evidence in the implementation of nature policy has shown that more targeted approaches in terms of specific biodiversity objectives, measures and tracking can greatly improve effectiveness and the achievement of objectives. The specificity of a number of ecosystem specific targets, coupled with an overarching objective makes this option a very effective one.

Effectiveness (average score: 3.6)

In terms of effectiveness the analysis is virtually the same as option 3. However, the addition of the overarching objective makes the ecosystem-specific targets even more **achievable**. It namely has an important added performance value for communication,

political and mainstreaming purposes. First, it expresses the common ambition across Member States and stakeholders, thereby bringing the different specific target options under one umbrella and driving overall direction. Second, it makes clear that the legislation intends to go beyond only restoring those ecosystems for which targets are set in step 1. This would strengthen the requirement for Member States to already consider restoring ecosystems for which targets may only be set in step 2. Third, it provides a clear link to the vision of the Biodiversity Strategy for 2030[1], as well as the global vision under the Convention on Biological Diversity. In sum, the various aspects of this option, complemented by the advantages of an overarching objective, makes it feasible to attain the policy objectives, and is therefore considered very effective.

Policy option 4: effectiveness	**Score**
Timing	3
Specificity	4
Measurability	3
Achievability	4
Coordinated action	4
Comprehensiveness	4
Enabling measures	3
Total	*25*
Average	*3.6*
Assessment	*Very effective*

Policy coherence (score: 3)

Option 4 has at least the same level of coherence as option 3, but with the addition of an overarching goal, bringing it more in line with the ambition level of the Green Deal.

Efficiency (average score: 3)

For option 4 environmental and social impacts are likely to be higher than in option 3, however the differences in scoring level is not fine grained enough to represent these differences (scores are however different for effectiveness). Administrative impacts are likely to be the same. As such, it receives the same scores as option 3 i.e.: **4** for environmental impacts, **3** for socio-economic impacts and **2** for administrative impacts.

Estimates of total costs for Option 4 *(see Annex III, VI and XII for more details)*

The total **restoration and maintenance costs** for peatlands, marshlands, forests, heathland and scrub, grasslands (including pollinators), rivers, lakes and alluvial habitats, and coastal wetlands can be estimated at around **EUR 140 billion** under the scenario of 30-60-100% targets for 2030-2040-2050 for HD Annex I. This includes foregone income as an opportunity cost resulting from restoration by businesses such as farmers. However, restoration and maintenance costs for marine and urban ecosystems as well as pollinators

are not included due to uncertainties and data gaps, although it is likely that pollinators will benefit from actions taken (and associated costs) to restore terrestrial ecosystems such as grasslands.

Besides restoration and maintenance costs, there are costs foreseen for enabling measures (**administrative costs**) such as establishing methodologies and indicators, developing National Restoration Plans and monitoring progress. These costs are exactly the same as for option 3, including an estimated one-off cost of about EUR 1.1 billion and annual costs of about EUR 459 million (or a total annual costs of EUR 13 billion counting from 2022 to 2050), leading to a total cost for enabling measures of about **EUR 14 billion**.

The total costs for this policy option are therefore estimated to be at least **EUR 154 billion** (140 + 14) up to 2070[124], not including restoration and maintenance costs for marine and urban ecosystems as well as pollinators.

Overview of costs for the preferred option – until 2070 (present values)					
Action	**One-off costs in EUR million**	**Annual costs in EUR million**	**Total in EUR million for scenario A (15-40-100% targets by 2030-2040-2050)**		**Total in EUR million for scenario B (30-60-100% targets by 2030-2040-2050) Comments**
Costs for restoration and maintenance per ecosystem type for both Member States and businesses					
Peatlands			4 779		5 125
Marshlands			3 643		3 721
Coastal wetlands			5 141		5 852
Forests			50 082		53 850
Agro-ecosystems			26 559		27 732
Steppe, heath and scrub			3 051		3 111
Rivers, lakes and alluvial habitats			35 232		40 211
Sub-total			***128 487***		***139 602***
Marine, urban, pollinators			(na)		(na)
Costs for enabling measures for Member States					
Surveys of ecosystems	1 099				
Development of national restoration plans	12.8				
Development of methodologies	6.6				

[124] Costs until 2070 are given in line with the benefits. It takes into account that for restoration measures undertaken up to 2050, especially in the final years, the benefits would only be visible beyond 2050. All cost 'actions' are foreseen to be undertaken up to 2050, except for maintenance costs, which extend to 2070.

Overview of costs for the preferred option – until 2070 (present values)					
Action	**One-off costs in EUR million**	**Annual costs in EUR million**	**Total in EUR million for scenario A (15-40-100% targets by 2030-2040-2050)**		**Total in EUR million for scenario B (30-60-100% targets by 2030-2040-2050) Comments**
and indicators (5 ecosystems)					
Administration of restoration measures		438.3			
Monitoring of restored ecosystems		20.6			
Reporting progress against restoration targets		0.1			
Sub-total	***1 118.4***	***459***			
Costs from 2022 to 2050	***1 118.4***	***12 854***	***13 972.4***		***13 972.4***
Total costs: restoration, maintenance and enabling measures					
Total			***142 459.4***		***153 574.4***

While these figures provide order of magnitude estimates only, as described in Annex XII there is a variety of sources of funding available to finance these costs for restoration, maintenance, compensation and enabling measures. The short-term possible costs linked with lost incomes that certain population groups such as to farmers, forest owners or fishers, may incur while they transition to more sustainable practices could be partially or totally covered under EU and other sources funding. Member States would also need to consider the social implications. As described in more detail in Annex XII, and **based on order of magnitude estimates, there should be sufficient funding available to cover these costs in the period up to 2050.** Specifically, the estimated EUR 14 billion annual biodiversity spending under the MFF (2021-2027) could cover to a large extent the annual total costs of restoration of EUR 6-8 billion. For instance, the CAP will be an important source of funding of restoration measures and support to farmers faced with transitioning costs. This could be further complemented with other sources of national and public-private and business sources of financing. However, the details will depend on the NRPs of the Member States on how exactly financing will be channelled towards ecosystem restoration. At the same time, it can be expected that legally binding targets will significantly contribute to stimulating such further financing. Member States may also need to consider and address shortages in labour and skills needed to implement the restoration measures, e.g. through training programmes such as the European Solidarity Corps.

Estimates of total benefits for Option 4 *(see Annex III, VI and XII for more details)*

The total **benefits** for peatlands, marshlands, forests, heathland and scrub, grasslands (including pollinators), rivers, lakes and alluvial habitats, and coastal wetlands can be estimated at around **EUR 1 860 billion** under the scenario of 30-60-100% targets for 2030-2040-2050 for HD Annex I. This is 12 times more than the estimated costs. The benefits include carbon removal and storage and many other ecosystem services. Benefits resulting from the restoration of marine and urban ecosystems as well as pollinators are not included due to uncertainties and data gaps. More background and detail on these data are provided in Annex III and VI.

Overview of benefits for the preferred option – until 2070[125] (Present Value)					
	Scenario A (15-40-100% targets for 2030-2040-2050)			**Scenario B (30-60-100% targets for 2030-2040-2050)**	
Restoration of ecosystem type/species	**Carbon benefits in EUR million**	**Benefits from all ecosystem services (including carbon) in EUR million**		**Carbon benefits in EUR million**	**Benefits from all ecosystem services (including carbon) in EUR million**
Peatlands	10 629	38 702		13 042	47 488
Marshlands	(na)	6 388		(na)	7 838
Coastal wetlands	1 091	181 614		1 339	222 842
Forests	3 832	203 564		4 701	249 775
Agro-ecosystems	17 073	229 589		18 624	250 451
Steppe, heath and scrub	3 971	24 191		4 722	28 768
Rivers, lakes and alluvial habitats	(na)	862 349		(na)	1 053 042
Sub-total	***36 596***	***1 546 397***		***42 428***	***1 860 204***
Marine	(na)	(na)		(na)	(na)
Urban	(na)	(na)		(na)	(na)
Pollinators	(na)	(na)		(na)	(na)

Although in theory the EU should aim to restore all degraded ecosystems by 2050, and targets should align with this goal, **in practice complete implementation is unlikely to be achievable.** Some sites may be inaccessible, face insurmountable technical barriers to restoration, be adversely affected by external pressures such as pollution, be earmarked for changes in land use, or be subject to disputes between land owners, managers and the authorities. The analysis for the impact assessment assumed that **restoring 90% of degraded ecosystems could be regarded as a realistic level of full implementation.** The benefit: cost analyses are therefore based on a 90% restoration target by 2050.

A failure to restore 90% of the area of degraded ecosystems by 2050 would reduce both the benefits and costs of ecosystem restoration. In Annex IV, estimates are presented on

[125] Benefits until 2070 are given to take into account the benefits from restoration measures undertaken up to 2050, especially in the final years, of which benefits would only be visible beyond 2050.

the value of the benefits and costs of restoration of different ecosystem types, for scenarios in which lower (70% or 80%) rates of restoration are achieved. **This shows that, if full implementation is not achieved, there is a reduction in costs as well as benefits, such that benefit:cost ratios still remains favourable by far**.

Impacts on areas surrounded by ecosystems in which restoration measures are taken

Restoration can have an impact on surrounding areas. For instance, the rewetting of inland wetlands could cause indirect opportunity costs for agriculture in some areas, especially in small wetland sites surrounded by intensive agriculture where mitigation measures to avoid seepage are not in place. However, they represent only a small share of the total area of inland wetland ecosystem considered in the assessment. As such 'external' negative impacts of measures would likely be relatively limited, their inclusion in the cost-benefit analysis would probably not have made a significant difference on the overall cost estimate. Therefore, the assessment did not quantify such indirect costs of restoration.

The impacts would be similar as those assessed for inland Annex I habitats and would require different management practices by private landowners and land managers, in return for incentive payments which include compensation for opportunity costs relating directly to land management (e.g. income forgone through reduced yield or grazing). As explained in Annex III, such practices and incentive schemes are in place, as well as public budgets to support their increased uptake.

Considering the large positive benefit to cost ratios of nature restoration across the different ecosystem types, even if external costs excluded would nonetheless significant, they would likely still be (far) outweighed by larger benefits and would not have changed the overall findings of the assessment. Inland wetland rewetting for example could also have positive impacts on water availability for agriculture during droughts likely to increase with climate change in most regions.

Distribution of benefits and costs between EU Member States

As set out in Annex III (Table III-3), the distribution of estimated costs and benefits differs between EU Member States. The two main defining cost variables are 1) the extent of ecosystem in the Member States and 2) its condition, i.e. the share of extent which is degraded and will require restoration measures[126]. As a result the Member States

[126] In the case of the Phase 1 targets, ecosystem extent is mainly represented by HD Annex I habitat, and its condition its area reported as being in not-good status. See Annex IV ('Analytical methods') and Annex VII ('Background information for potential restoration targets') for method and Annex I extent and condition information respectively.

with larger degraded Annex I habitats face the largest effort: The largest absolute costs are incurred in France (EUR 2.1 billion), Spain (EUR 1.5 billion) and Finland (EUR 0.9 billion). Some Member States have relatively large areas of several ecosystems, but also record a relatively small proportion to be in not-good condition, such that costs of restoration and maintenance are relatively low compared to ecosystem area (e.g. Austria, Germany, Greece, Italy, Sweden).

Member States face differentiated costs for different ecosystems too. For example, the largest costs for each ecosystem are, in order of magnitude, as follows:

- Coastal wetlands - Denmark, the Netherlands, France and Germany;
- Fresh waters – France and Finland;
- Forests – France and Spain;
- Grasslands – Spain and France;
- Heath, steppe and scrub – Spain and Finland;
- Peatlands – Finland and Sweden.

Despite these variations, when looking at the overall picture, costs and benefits are reasonably equally spread between EU Member States. Annual costs expressed as share of GDP range from 0.01% of GDP in the case of Belgium, Germany, the Netherlands and Luxembourg to 0.39% in the case of Finland, but most Member States are closer to the average of 0.06% for the EU (median 0.08%). Benefits expressed as share of GDP range from 0.02% in Malta to an exceptional 4.11% in Finland, with average benefits representing 0.48% on average (median 0.58%). Annual costs per MS citizen range from less than EUR 1 Euro in Malta (against EUR 4 benefits) to more than EUR 168 in Finland (against over EUR 1750 benefit), but average annual costs per EU citizen are less than EUR 17 and benefits EUR 144 (median EUR 14 and EUR 117 respectively). **Error! Reference source not found.** table below provides a full overview of annual benefits and costs as share of GDP and per citizen.

Overview of annual costs and benefits as share of GDP (Eurostat, 2020) and per citizen (Eurostat, 2021)

Member State	Benefits (million €)	Costs (million €)	Benefits/ GDP	Costs/ GDP	Benefit/ Citizen (€)	Cost/ Citizen (€)
AT	774	65	0,20%	0,02%	87	7
BE	631	65	0,14%	0,01%	55	6
BG	630	69	1,03%	0,11%	91	10
CY	38	7	0,18%	0,03%	42	8
CZ	361	41	0,17%	0,02%	34	4
DE	2.595	190	0,08%	0,01%	31	2
DK	3.171	176	1,01%	0,06%	543	30
EE	449	38	1,67%	0,14%	338	29

ES	7.939	1.451	0,71%	0,13%	168	31
FI	9.694	931	4,11%	0,39%	1.752	168
FR	14.618	2.060	0,63%	0,09%	217	31
GR	541	34	0,33%	0,02%	51	3
HR	622	63	1,24%	0,13%	154	16
HU	1.392	133	1,02%	0,10%	143	14
IE	1.922	134	0,52%	0,04%	384	27
IT	2.424	261	0,15%	0,02%	41	4
LT	1.081	80	2,18%	0,16%	571	42
LU	32	5	0,05%	0,01%	50	7
LV	611	54	2,07%	0,18%	323	29
MT	2	0	0,02%	0,00%	4	1
NL	1.056	53	0,13%	0,01%	60	3
PL	5.981	545	1,14%	0,10%	158	14
PT	915	149	0,46%	0,07%	89	14
RO	-	-	-	-	-	-
SE	5.881	638	1,24%	0,13%	567	61
SI	415	63	0,88%	0,13%	197	30
SK	473	98	0,51%	0,11%	87	18
TOTAL	**64.248**	**7.405**				
AVERAGE			0,48%	0,06%	**144**	**17**
MEDIAN			0,58%	0,08%	**117**	**14**

Transboundary Issues

Ecosystems and their species are transboundary by nature, and on the whole the restoration objective and targets will have positive effects for nature across the EU. For areas near or at the borders, cooperation and joint management on both sides can be encouraged through promotion of sharing good practices and building synergies (for example such as Interreg funds that have helped in many cases). Cooperation across borders beyond the EU may also be addressed in a similar manner. These might be most successful in areas where transboundary collaboration is already established (such as for example following from implementation of existing legislation) and collaborative

structures are in place. For some ecosystems (e.g. rivers, ecosystems spanning borders) transbordery cooperation may be more relevant than for others.

A focus on specific, near or at border areas can be addressed as part of the National Restoration Plans – Member States could foster synergies with the national restoration plans of other Member States – as well as by identifying appropriate sources of funding. The development of the EU wide methodology can also help when developing definitions of good condition so as to ensure that ecosystems would have consistent criteria and indicators across borders. Furthermore, transboundary activities can also be supported by the definition of restoration measures: i.e.: restoration measures include measures taken for the improvement of the condition of an ecosystem, for the re-establishment of an ecosystem where it was lost as well as measures to improve connectivity of ecosystems**,** including across national borders.

Impacts on the rights to equality and non-discrimination

The options will aim to address various sources of risks to the right to non-discrimination and require that possible sources of biases embedded in the national restoration plans should be properly addressed and mitigated. Restoration measures set out in national restoration plans may not be used to discriminate between different groups in society, and all groups in society will be entitled to equally reap the benefits of restoration, including in terms of employment opportunities. Transparency obligations during the preparation of national restoration plans as well as specific provisions on access to justice, including for vulnerable and marginalized groups, will minimize the risk of discrimination and mitigate inequalities. Based on previous examples of equality mainstreaming in environmental policy at EU level, the issue is not expected to be prominent.

Impacts on food security

Recent geo-political developments have underlined the need to safeguard food security and the resilience of food systems. A review of scientific evidence shows that ecosystem restoration and sustainable farming practices have a positive impact on food productivity and resilience[127]. For example:

- Natural insects' pollination is known to maintain or enhance yields, food quality and economic returns to farmers. It has been estimated that a collapse in pollinators could cause a global drop in GDP of 1-2%, due to reduced agricultural production. The full implications of the collapse for human welfare have yet to be

[127] Liquete C. et al., *JRC Science for Policy Report: Review of scientific evidence showing the impacts of nature restoration actions on food productivity*, to be published soon.

estimated, but they would reach far beyond the mere damages in crop yields. Scientific evidence shows a great potential of **nature restoration measures to support pollinators** by providing them habitat with high quality food, nesting and overwintering resources or by reducing their exposure to pesticides.

- Inclusion of **landscape features in farms**, increasing landscape complexity: there is evidence of positive effects on pest control (in particular around arable land) and pollination (emphasized by floral abundance), with a 1.4-fold increase in pest control and the 1.7-fold increase in pollination observed in landscapes with high edge density. In some cases, these positive effects can translate into higher yields.
- **No-tillage** leads to a significant restoration of soil quality, even more acute if this is combined with organic fertilisation. When no-tillage is combined with cover crops, it can maintain or even increase crop yield and reduce costs while enhancing soil fertility.
- A **combination of various sustainable agricultural practices** multiply their positive effects on the environment and on food productivity. **Agroecology**, the most integrative approach to farming, food and socio-economic systems, seem to produce the best results. Several meta-analyses and reviews conclude that agroecological practices have positive outcomes on food security through higher yields, improved nutritional content and stronger resilience and stability against climate and socio-economic disturbances.
- **Restoration of marine ecosystem** through protection of certain areas: around 80% of properly enforced marine protected areas have been observed to have a positive spillover effect in the surrounding fisheries, and this effect can increase gradually over decades. The spillover effect is of major importance around no-take zones, with examples of catches raised 5-fold in only four years time and beneficial side effects in fishers' income, tourism, social wellbeing and the regeneration of distant fisheries.

7. HOW DO THE OPTIONS COMPARE?

This chapter first provides a summarised comparison of the policy options based on the assessment of effectiveness, policy coherence and efficiency in Chapter 6. It is followed by a comparison in terms of, subsidiarity and proportionality. Based on the criteria for effectiveness, policy coherence and efficiency the preferred option can be selected.

Effectiveness

Options 3 and 4 score very positively for **specificity**, **coordinated action** and **comprehensiveness** because they include specific targets over a broad range of ecosystems and species, whereas this is not the case for options 1 and 2. For **timing,** options 2, 3 and 4 score positively because targets are clearly time-bound. In terms of **measurability**, only options 3 and 4 score positively because the targets mainly build on the monitoring mechanisms of the BHD and because they would entail establishing an EU-wide methodology for determining condition and monitoring framework for ecosystems and species not covered under existing legislation. The 2030 and 2050

timeframes for restoration are realistic. Moreover, the targets contain both aspects of "restoration" and "recovery of good condition" and are both legally verifiable. Options 3 and 4 score high with **enabling measures** since the overall implementation framework of NRPs, and periodic review and assessment ensure implementation regime to 2050, furthermore the EU wide methodology provides significant added value. Option 4 is expected to be more effective than option 3 for **achievability**, since the addition of the overarching objective explicitly in the legal text makes the ecosystem-specific targets even more **achievable** (rather than the overarching objective itself which, again, is only aspirational); it namely has an important added performance value for communication, political orientation and ambition, and mainstreaming purposes. Even though the Biodiversity Strategy to 2030 has an overarching aspirational objective, the difference here is that the inclusion of this objective in the legal text as a clear overarching objective makes a significant difference in the terms of legal obligations: in that all Member State have the obligation to strive towards this objective. In sum, option 4 is expected to be the most effective to achieve the specific objectives.

Effectiveness	**Policy option 1**	**Policy option 2**	**Policy option 3**	**Policy option 4**
Timing	0	3	3	3
Specificity	0	0	4	4
Measurability	0	1	3	3
Achievability	0	1	3	4
Coordinated action	0	3	4	4
Comprehensiveness	0	2	4	4
Enabling measures	0	2	3	3
Total	*0*	*12*	*24*	*25*
Average	*0*	*1.7*	*3.4*	*3.6*
Assessment	*Neutral/baseline*	*Moderately effective*	*Effective*	*Very effective*

Policy coherence

Option 1 is assessed as the least coherent because, even though it is coherent with elements in the BDS2030, there is no additional stimulus to actively promote synergies with them. Option 2 would be slightly coherent because it provides a legally binding time-bound goal that strengthens existing restoration requirements under the BHD, WFD and MSFD but is not explicit in the specific interrelationship. Options 3 and 4 are assessed as coherent because synergies are foreseen between the ecosystem-specific targets and aspects such as monitoring and legal obligations under existing and upcoming legislation, including for climate, thereby also accelerating implementation.

Policy coherence	**Policy option 1**	**Policy option 2**	**Policy option 3**	**Policy option 4**
Score	0	1	3	3
Assessment	*Neutral/baseline*	*Slighty coherent*	*Coherent*	*Coherent*

Efficiency

Options 3 and 4 are the most efficient options because, overall, the environmental and socio-economic benefits will outweigh the administrative and socio-economic costs. While both options 3 and 4 are scored equally efficient, option 4 is expected to have slightly higher environmental and socio-economic benefits as a result of the overarching objective, however, this benefit is too small to show in the range of numbers used in the scoring system. Option 2 is only moderately efficient mostly because it is expected to yield notably lower environmental benefits. Because of this it is expected that the amount of ecosystem services supplied to the benefit of the economy and society is lower as well, resulting in a lower score for socio-economic impacts. Administrative costs for option 3 and 4 would be the same, amounting to about EUR 14 billion to 2050.

It should also be noted that the more we delay restoration, the higher the administrative and socio-economic costs will be in the future. One must also avoid the potential of irreversible damage. These investments are necessary in order to prevent significantly larger costs in the future.

Efficiency	**Policy option 1**	**Policy option 2**	**Policy option 3**	**Policy option 4**
Environmental impacts	0	2	4	4
Socio-economic impacts	0	2	3	3
Administrative impacts	0	1	2	2
Total score	*0*	*5*	*9*	*9*
Average score	*0*	*1.7*	*3*	*3*
Assessment	*Neutral/baseline*	*Moderately efficient*	*Efficient*	*Efficient*

Subsidiarity and proportionality

Subsidiarity

The legal basis for this legal proposal, Article 192(1) of the Treaty on the Functioning of the European Union, as outlined in section 3.1, states that "Union policy on the environment shall contribute to pursuit of […] preserving, protecting and improving the quality of the environment". EU competence thus encompasses the entire environment including all ecosystem types. Many environmental issues occur and have impacts at a large geographical scale. See also section 3.2 and 3.3. At the same time, restoration is an activity that in practice is carried out at a national, regional or local level. It can strongly depend on specific characteristics at the national, regional, or local level, such as biogeographical regions, specific regional, or local, biotic or abiotic features. Restoration thus lends itself naturally to an approach that needs to account for local, regional, and

national specificities, whilst maintaining an overall large-scale perspective and direction. This provides the context to consider how to balance effectively what should be best carried out at EU level with what should be best carried out at Member Sates level.

In option 1 there is no new EU level requirement to attribute between EU and MS responsibilities, thus the neutral score is attributed. For option 2, quite a large degree of discretion is left to member States on how to reach the EU overarching target. This option attributes a large degree of responsibility to Member State level.

Options 3 and 4 attribute ecosystem specific targets to Member States and Member States develop National Restoration Plans on how to reach them. These plans will thus enable the planning and execution of restoration according to their national situation.

Options 2, 3 and 4 attribute responsibilities at EU or Member State level in an effective manner, since there is an appropriate balance between the EU level objective and responsibilities at Member State level.

Subsidiarity is assessed as moderately positive for option 2. It leaves the most flexibility to Member States to determine how they would achieve the overarching target set by the EU. However, the objectives cannot be sufficiently achieved by leaving so much to the Member States in a way that is not specific enough, and more specification at EU level is needed. Options 3 and 4 require Member States to restore certain percentages of their ecosystems within certain timeframes, thus leaving less room for discretion by Member States. However, in their National Restoration Plans, Member States still get considerable discretion to choose what areas, measures and financing mechanisms to employ at national, regional or local level as needed; this leads to a positive score. Each option could also entail further EU level guidance as needed, as has been the case for existing relevant environmental Directives.

Furthermore, for some ecosystems such as forest or urban, for which legislation at EU level is partial and patchy, little or no action has been carried out by Member States, often in a way that is inconsistent with EU policies, undermining the possibility to achieve the related EU objectives. An EU framework on restoration targets would help coherent action at national level, with standards and comparable definitions, monitoring and reporting on progress. This would bring synergies and more effective joint action at EU and national level.

Proportionality

Following from Article 5 of the TFEU: the content and form of proposed option should not exceed what is necessary to achieve the objectives. This is used as the basis to analyse the proportionality of the options.

For **Option 1,** this does not apply, since baseline does not establish new action, therefore a neutral score is given. **Option 2** is only moderately proportionate. It leaves a large degree of scope for national decision making, since it is up to Member States to determine how to reach the overarching target through the development of NRPs. The

problem is that it leaves too much undefined in terms of specific restoration requirements in order to be able to reach the objective. Technically speaking it does not exceed what is necessary, but rather significantly falls short of what is needed to achieve the objective. **Option 3** is proportionate. Even though this option introduces a number of ecosystem-specific restoration targets, and thus adds content and substance to the proposal, this is necessary to ensure that the objective can be achieved. Furthermore, the 2-step approach is specifically designed not to exceed what is needed, since it builds on existing reporting and monitoring structures whenever possible and appropriate. It sets up new data gathering processes and monitoring requirements only for those ecosystems or habitats where information is not available and needs to be developed. In addition, the EU-wide methodology means that a common and streamlined approach can be developed, leading to efficiency gains. In summary, to be able to address the broad range of ecosystems across the EU, certain additional responsibilities and corresponding costs are necessary and cannot be avoided but can be streamlined based on efficient and common approaches.

Option 4 adds to the advantages of option 3 by including the overarching goal as a clear overall legal obligation that Member States together must strive towards. It also clearly articulates the overall political drive and ambition of the law. Together this further ensures the achievability of the objective. This additional requirement does further ensure the achievability of attaining the objectives in an effective manner, without adding burden to the implementation of the proposal, since the overarching objective sets the orientation and ambition of the law, and obliges Member States to strive towards this objective. There is no specific reporting obligation associated with this objective as such. Progress towards it will be based on the reporting for other ecosystem-specific restoration targets and obligations. Based on this Member States' reporting, the Commission can assess the total areas subject to restoration measures in each Member State and, summed up to the EU-level, progress towards the overarching objective. The enforceability will relate to the ecosystem-specific restoration targets and obligations rather than the overarching objective. This overarching objective will be considered by the Commission in its assessment of the National Restoration Plans. In summary, option 4 sets an overarching goal and ecosystem-specific targets in a way that is commensurate to scale and extent of the objectives to be achieved, and provides assurance that these objectives can be reached. As such it is very proportionate to attain the objectives.

Subsidiarity and proportionality	**Policy option 1**	**Policy option 2**	**Policy option 3**	**Policy option 4**
Assessment for subsidiarity	*Neutral/baseline*	*Moderately positive*	*Positive*	*Positive*
Assessment for proportionality	*Neutral/baseline*	*Moderately positive*	*Positive*	*Very positive*

Overall comparison

Based on the comparison of policy options in terms of effectiveness, efficiency and policy coherence, both options 3 and 4 are clearly the most favourable. Of these, option 4 performs slightly better in terms of effectiveness because having an overarching objective makes the specific targets more achievable. Subsidiarity and proportionality are presented in the table below to give an overview but are not used in the calculation of the overall average, as they are additional qualitative considerations.

From a risk perspective, the **risks of not acting at all** are illustrated by the potential outcomes of the baseline scenario. These risks are progressively turned into opportunities as we step up through the options, with option 4 performing the best in reaching the objectives. Within this option, the two-step approach also reduces the **risks of delaying action** across all of the ecosystem types by acting where it is possible now. This reduces potentially postponed action, increasing negative impacts on the environment, economy and society; and at the same time ensures broad coverage by developing measurement and monitoring methodologies for remaining areas.

The main costs of inaction can be taken to be the same as the lost benefits of action. Lack of action on legally binding targets is equivalent to the baseline. Thus, the long-term costs of inaction can be estimated as the foregone benefits minus the foregone costs, for restoring peatlands, marshlands, forests, heathland and scrub, grasslands (including pollinators), rivers, lakes and alluvial habitats, and coastal wetlands. Thus, the main **costs of inaction correspond to the order of EUR 1 700 billion** (net present value of forgone benefits; roughly 1 860 billion benefits of action, minus EUR 154 billion costs of action). Further costs of inaction would be expected for marine, urban, and for pollinator restoration. It should be noted that these are minimum estimates, since one would also have to add the costs of acting late. Acting late is of particular importance to restoring ecosystems, since restoring an ecosystem that is heavily degraded will costs more than restoring the same ecosystem in a less degraded state.

Overall comparison	**Policy option 1**	**Policy option 2**	**Policy option 3**	**Policy option 4**
Average score for effectiveness	0	2	3.4	3.6
Average score for efficiency	0	1.7	*3*	*3*
Score for policy coherence	0	1	3	3
Overall total score	*0*	*4.7*	*9.4*	*9.6*
Overall average score	***0***	***1.6***	***3.1***	***3.2***
Overall assessment	***Neutral/baseline***	***Moderately positive***	***Positive***	***Positive***
Assessment for subsidiarity	*Neutral/baseline*	*Moderately positive*	*Positive*	*Positive*
Assessment for	*Neutral/baseline*	*Moderately*	*Positive*	*Very*

proportionality		*positive*		*positive*

8. PREFERRED OPTION

Option 4 is the preferred option.

The preferred option proposes a nature restoration law that will establish an **overarching objective** 'to contribute to the continuous, long term and sustained recovery of biodiverse and resilient nature across EU land and sea areas through the restoration of ecosystems and to contribute to the EU's overarching objectives concerning climate change mitigation and adaptation, and to contribute to meeting the EU's international commitments; and that the restoration measures together shall cover, by 2030, at least 20 % of the Union's land and sea areas and, by 2050, all ecosystems in need of restoration'. To support achieving this objective, **the law will establish a number of ecosystem-specific binding targets across a broad range of ecosystems, coupled with an effective implementation framework**. This preferred option for the law will ensure that the objectives of ecosystem restoration can be reached in the timescales proposed in a cost-efficient manner, **with benefits outweighing the costs for each of the main ecosystem type**. The benefits of restoring peatlands, marshlands, forests, heathland and scrub, grasslands (including pollinators), rivers, lakes and alluvial habitats, and coastal wetlands can be estimated as of the order of **EUR 1 860 billion,** with costs estimated at EUR 154 billion**.** The administrative costs are estimated as of the order of EUR 14 billion and would by incurred mainly by Member State authorities. Costs for citizes and businesses are expected to be low and depend on the implementation approach taken by each individual Member State in its National Restoration Plan. Transitioning costs for impacted businesses (mainly farmers, foresters, fishers) could be compensated for through several funding sources. Significant benefits are also estimated the for the ecosystem types, marine, urban, and for pollinator restoration. The risks of not acting, or not acting with sufficient urgency, have also been analysed and estimated as of the order of **EUR 1 700 billion** (Chapter 6).

The law will work in synergy with and add value to the existing acquis: the Birds and Habitats Directives (BHD), the Water Framework Directive (WFD) and the Marine Strategy Directive (MSFD) and will also support the acceleration of the implementation of these directives. It will complement the BHD coverage with time bound targets and by requiring restoration action across the territory of the Member States (including outside Natura 2000) and cover aspects which go beyond the direct scope of the application of the MFSD and the WFD. Significant contributions to climate policies will be established following from carbon removal, storage and disaster risk reduction services of the restored ecosystems. Synergies with several related policies and initiatives such as the soil and forest strategies, LULUCF, CAP, CFP, and others will be ensured. For instance, the CAP will play an important role in supporting restoration measures and compensating transitioning costs for farmers and foresters (see Annex XII). In synergy with the Common Fisheries Policy, the national restoration plans could include the conservation

measures a Member State intends to adopt under the CFP. And the proposed revised LULUCF Regulation includes provisions concerning monitoring systems for land-use units subject to restoration. This more integrated approach will ensure that measures on climate mitigation and nature restoration will now be mutually reinforcing. Overall, the nature restoration law will provide important contributions to the implementation of the Green Deal (Annex X).

Implementation will be carried out via the **National Restoration Plans** that Member States will develop to achieve the targets. Member States will report on progress achieved at national level against the benchmarks set. The Commission will evaluate the plans before their adoption and **check on progress on a periodic basis**, including by using data and monitoring gathered and analysed by the European Environment Agency. Additional specifications or guidelines to the law would be developed as needed (Chapter 5.2).

Overall **cost estimates of the preferred option can be made**, based on numerical estimates for several ecosystems for which data is available. Several funding sources at EU and Member States level can be harnessed to cover these costs, as well as business commitments and private sector engagement. An overall balance of restoration costs and other costs can in principle be met through a number of sources at EU level, at Member States level and through public/private financing (Annex XII).

A fair and cross-society approach will be established that will involve citizens and stakeholders in decision making and restoration activities and assist those potentially affected by change through some of the funding sources identified (Chapter 5.2/Annex III). Member states may need to address potential labour and skill shortages that could prevent delivering on this initiative.

The preferred option will in a first step **restore significant areas of the EU**, with measurable results by 2030, 2040 and 2050. Further, it will ensure an even broader coverage in the future, with targets that can be established in the second step for a broader range of ecosystems such as agro-ecosystems and forests based on an EU wide methodology as set out in the legislation.

The preferred option thus **allows to EU to act with urgency** and start restoring ecosystems based on targets that can be measured and monitored already now. This will ensure that a range of restoration actions can start quickly across Member States. By establishing targets for a further range of ecosystems or species **at later stages, it ensures comprehensive coverage of the EU's ecosystems.**

The preferred option thus paves the way for a broad range of ecosystems in the EU to be restored and maintained by 2050, with measurable results by 2030. It will act as a major enabler at EU level contributing to halting biodiversity loss and bringing nature back to good health and will also give the EU the necessary credibility to lead on the global scene on nature.

International dimension

The overarching objective and the more specific targets will help the EU to deliver on its international commitments, in particular in the context of the post-2020 Global Biodiversity Framework and the UN decade for ecosystem restoration. In addition to setting the example and developing methodologies that can be used elsewhere in the world, achieving these objectives in the EU (including outer-most regions) constitutes an important part of delivering on the headline ambition in the Biodiversity Strategy for 2030 "to ensure that by 2050 all of the world's ecosystems are restored, resilient, and adequately protected". Furthermore, the EU has committed to supporting restoration efforts in other parts of the world, such as the Great Green Wall initiative for the Sahara and the Sahel, as well as support biodiversity, forests and other ecosystems' conservation, restoration and sustainable use efforts in many partner countries and regions. Although it would not be possible within the scope of this initiative to set restoration targets outside the EU-territory, the political ambition as well as the knowledge and experience gained will strengthen the EU's capacity to drive and support the international agenda on nature restoration and synergies would be built between our internal and external action.

Legal form

From an environmental perspective the preffered choice would be a Regulation because it is more precise and detailed and would frame the action to be taken by the Member States much more exactly, and hence it would bring about a higher level of coherence across the EU. For instance, it would be considerably more prescriptive in term of how restoration plan should be prepared, on its structure and content, on its review and on reporting to the Commission. Regulations, contrary to Directives, do not only indicate the goal to be achieved by the Member States, but also identify more precisely the legal requirements and means to be implemented to achieve that goal. In addition, a Regulation is the most effective way to ensure rapid action given the urgency of acting to revert biodiversity loss and ecosystem degradation. While in both cases (Regulation or Directive), Member States would need time to establish National Restoration Plans, a Directive would require an additional transposition step and thus further delay implementation.

How implementation will be ensured

There are three pillars to ensure ownership, engagement, and implementation:

1. **The development, review and implementation of the NRPs**

As described in section 5.2.2., national restoration plans will be developed by Member States. They will be submitted to for acceptance by the European Commission, i.e. the legislation would establish a process for the Commission to evaluate the plans and for the Member States to take into account the Commission's comments before adoption of the plans. When assessing the draft national restoration plan, the Commission will evaluate its completeness and its adequacy for reaching the specific targets and obligations set out in the law, as well as the overarching objective.

As desctribed in section 5.2.2. the NRPs need to include a financing plan (including EU, national, and public/private financing, and where and how to best deploy this financing). Experience shows that the implementation of legislation is hindered or slowed down due to lack of availability of funding. Proper planning will ensure that available funding sources at all levels are mobilized for the implementation of the restoration activities. Lack of cooperation with stakeholders is another key factor that can hinder implementation, and it is clear that stakeholder engagement is essential to achieve results. For this reason as described in section 5.5.2, the NRPs should include plans on how to engage with stakeholders. This should give stakeholders the opportunity to participate in the preparation of NRPs and various restoration activities, and how to address the potential needs of stakeholders that may require support, for example in transitioning to new practices, in networking and sharing of best practices, in the developing new business models that build on the benefits of improved ecosystem services.

Overall, the development of plans will be fundamental in ensuring the ownership of Member States in the various objectives and stages of planning and implementation to restore ecosystems to reach the targets. The process of review will help ensure that feedback on the objectives planned by Member States is provided, and will contribute to ensuring engagement and ownership. The adoption of NRPs that are clearly insufficient to reach the targets, could lead to infringement procedures to make sure the identified failures are rectified.

2. **Review of restoration progress**

Based on reporting by Member States and required by the legislation this will centre on restoration measures put into place. The Commission will check progress of restoration implementation, i.e. the area subject to restoration measures put into place by Member States aiming to achieve good condition of relevant ecosystems. This will allow an assessment whether the measures put into place and consequently the restored area (in quantitative terms) corresponds to the targets set and are expected to achieve the objectives of good condition of relevant ecosystems, and whether a Member State seems to be on track to reach these targets. Furthermore, this information will be verifiable and will provide objective feedback to Member States to indicate the degree to which they are on track, and in the case of non-compliance could lead to infringement procedures.

3. **Review of improvement of ecosystem condition.**

Based the reporting by the Member States as required by the legislation, the Commission will also check on progress towards good ecosystem condition. In order to alleviate administrative burden, synergies with existing reporting requirements will be sought. Whenever possible, reporting requirements under the Habitats and the Birds Directives will be used for assessing progress towards recovery of ecosystems. For those ecosystems for which no monitoring and reporting requirement exist today (that would therefore be covered in step 2), progress towards their good condition will be assessed based on future reporting requirements. Achieving good condition is the ultimate objective of restoration, which can take long periods of time to achieve for many

ecosystems. As in pillar 2, this information is also verifiable and will provide objective feedback to Member States to indicate the degree to which they are on track.

The Commission will review progress on each of these pillars on a **periodic basis** to 2050, providing guidance and taking measures as appropriate. The Commission may further support the Member States in implementing the legislation, e.g. by developing guidance as needed. **Together, with the overall political impetus provided by the Green Deal, the three pillars will ensure ownership, engagement, enforcement, and implementation of the targets.**

9. HOW WILL IMPACTS BE MONITORED AND EVALUATED?

In the context of new EU nature restoration targets, it will be important to monitor both the progress of restoration measures undertaken by Member States as well as the resulting improvements in ecosystem condition. The Commission should assess in regular intervals Member States' progress towards the overarching objective as well as the specific restoration targets of the new instrument based on Member States NRPs and required reporting. Coherence with other monitoring and reporting requirements relevant to ecosystem restoration (in particular those under the BHD, MSFD and WFD but also the NEC[128] directive and others) is of strong significance and shall provide important administrative and cost synergies at Member States level. Synergies and complementarities are being planned in the **LULUCF** proposed revision, which would develop monitoring requirements on emissions and removals, in particular from high carbon stock land (see section 5.2.2.). The proposed revision would enable, in the longer term, better cross-referencing between land-based climate change mitigation and ecological condition.

While all efforts will be made to keep the burden of reporting low it will be necessary that monitoring activities by Member States are stepped up substantially because this is a precondition for planning and design of national restoration plans, the prioritisation of measures and measuring post-restoration success. The intensified use of new technologies in areas like remote sensing and earth observation (Copernicus) supported by EU funding and research and innovation policy shall accompany and support the efforts made.

- *Monitoring and evaluation in relation to the **ecosystem-specific restoration targets (step 1)***

In response to the ecosystem-specific targets set in the restoration instrument, Member States will have to set out restoration objectives and measures on national level in their NRPs, which they then must regularly review (also in light of better monitoring) and

[128] Directive (EU) 2016/2284 on the National Emission reduction Commitments Directive (NEC Directive).

evaluate regarding the progress made. In addition, NRPs shall be evaluated at EU level to ensure the sufficiency and coherence of the objectives and measures to achieve the ecosystem-specific targets set in legislation.

As regards monitoring ecosystem condition by Member States (which includes the monitoring of all relevant ecosystem attributes), two levels of monitoring with different scales and intensities can be distinguished: On the level of restoration projects or programmes, outcomes need to be monitored to identify treatment effectiveness and to adjust restoration measures as required (i.e. using an adaptive-management framework). It may also be necessary to adapt target conditions of certain areas based on new findings and knowledge on the impacts and projection of impacts of climate change. Restoration, recreation and recovery of restored areas in quality & quantity shall be recorded and reported. On the national and/or (biogeographic) regional level, Member States monitor the condition and trend of habitat types and habitats of species associated with certain ecosystems according to the requirements in existing legislation (in particular Article 17 of the Habitats Directive and Article 12 of the Birds Directive within their 6-yearly reporting cycles). The implemented restoration projects and programmes set out in the NRPs will eventually show a positive impact on that scale of monitoring. Also, the respect of the non-deterioration requirement can be monitored that way.

- *Monitoring and evaluation* ***in preparation of restoration targets that shall be set in the future (step 2)*** *– the planned EU methodology to assess the condition of ecosystems*

In addition to established systems of condition assessment under EU environmental legislation, the development of an overall EU methodology for ecosystem condition assessment is planned for the coming years in cooperation with Member States.

The Commission and the EEA are currently preparing a proposal for an EU methodology and guidance to assess the condition of ecosystems relative to a reference condition with the help of a set of specific indicators per ecosystem type (**5th MAES report**[129], 2018). A core set with key indicators is available already and was the basis of the EU Ecosystem Assessment. The planned guidance will be aligned with the UN's statistical standard on ecosystem accounting. It will integrate current reported data and methods to assess ecosystem condition and restoration needs for ecosystems stemming from environmental directives. It will also make proposals for assessing condition for ecosystems that are currently not covered by these directives.

- ***Mapping and Reporting***

Mapping and reporting related to the various levels of monitoring and evaluation is planned to be integrated (via the adaptation and improvement of the relevant reporting formats and guidelines also in the level of detail of e.g. habitat maps) as far as possible into existing mapping and reporting requirements under EU directives, such as the BHD,

[129] See footnote 114: Tables 5.1-5.2 and 5.3 contain the core indicators for ecosystem condition. They can be monitored at EU level.

the MSFD and the WFD. Furthermore, synergies with other data-flows such as the INSPIRE Directive, the Copernicus programme, the European Biodiversity Partnership, future LULUCF reporting, data from the agricultural sector (CAP), from the Directive on reduction of national emissions of certain atmospheric pollutants (air pollution) and the growing area of citizen science shall be explored. However, a specific reporting requirement under this new instrument cannot be excluded at this stage for those aspects that cannot be sufficiently integrated into existing reporting requirements.