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PART 2/3

COMMISSION STAFF WORKING DOCUMENT

EU guidance on integrating ecosystems and their services into decision-making

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4. ECOSYSTEMS AND THEIR SERVICES IN EU POLICY IMPLEMENTATION

4.1. KEY EU DECISION-MAKING AND FUNDING INSTRUMENTS

4.1.1. Environmental assessments

Environmental assessments aim to ensure that the impacts of plans, programmes or projects on key environmental assets, including biodiversity, are properly evaluated and duly taken into account before decisions are made. They can be undertaken for individual projects on the basis of the EU Environmental Impact Assessment (EIA) Directive (2011/92/EU) or for public plans or programmes, on the basis of the EU Strategic Environmental Assessment (SEA) Directive (2001/42/EC). Furthermore, plans or projects affecting Natura 2000 areas have to be subject to an Appropriate Assessment (AA) in accordance with Article 6 of the Habitats Directive. Consultation of stakeholders is a key feature of environmental assessment procedures.

The EU EIA Directive and in particular the EU SEA Directive, as well as the Habitats Directive in the case of Natura 2000 areas, provide the key framework within which potential synergies as well as impacts on ecosystems and their services can be identified, assessed, addressed and integrated in the development of policies, programmes and projects, including in relation to spatial planning and national programmes and plans for the implementation of EU sector policies.

The entry points for the assessment of ecosystems and their services and the range of instruments presented in Chapter 3 can be consistently applied within the SEA or EIA or AA processes. The process, key entry points and the tools will necessarily be embedded in the specific Member State context, and tailored to the ecological and socio-economic conditions, scope and objectives of the planning.

The SEA process involves a number of steps and the most relevant ones for the inclusion of biodiversity are screening, scoping (including the development of the Environmental Report), consultation and monitoring. The SEA Directive does not per se require the avoidance or reduction of impacts that are identified in the process, but if correctly applied, SEA should help to:

- Build biodiversity and ecosystem services objectives into land use, urban and sectoral policies, plans and programmes
- Identify and manage apparently minor impacts, which, when accumulated, may pose severe threats to biodiversity and critically important ecosystem services
- Identify alternatives and mitigation strategies that would be compatible with sustained delivery of ecosystem services

- Ensure that effective monitoring programmes are in place to provide information about biodiversity and ecosystem services
- Allow relevant specialists and decision-makers and/or planners to engage, and
- Integrate *ecosystems and their services* into activities *such as agriculture, minerals and forestry, from the level of central government downwards*.

The Commission guidance documents on the implementation of the EU SEA¹ and EIA² Directives in relation to climate and biodiversity explicitly address ecosystems and their services as part of assessments, put forward concrete recommendations (including principles, tools and on how to approach this task, and highlight challenges that still need addressing. The refit evaluation of the SEA Directive, due later in 2019, will allow to draw lessons from implementation.

Box 19. A Practical Example : Strategic Environmental Assessment (SEA) To Integrate Ecosystems And Their Services Into Coastal Zone Management, Portugal

Integrated coastal zone management (ICZM) strategies supported by strategic environmental assessments (SEAs) provide a good framework for integrating ecosystem services into coastal planning. The Portuguese National ICZM Strategy process used the SEA process as means to incorporate information on ecosystems and their services into the design and implementation of the management plan.

For the full case study, see **Section C, Case study 15**.

4.1.2. EU instruments and national and regional programming for their implementation

Funding from the EU budget plays an important role as a catalyst for the integration of ecosystems and their services into different sectors.

The [EU LIFE Programme](#) — and LIFE Nature and Biodiversity in particular — can support the integration of ecosystems services into sectoral interventions and policies. The assessment of ecosystem condition and ecosystem services in a number of LIFE projects helps to provide information at local/regional level on the added value of Natura 2000 beyond its main objective, as well as to demonstrate the importance of investing in biodiversity and nature protection to support also humankind or other policy objectives through the establishments of mapping and monitoring platforms or accounting frameworks, trialling of novel governance mechanisms and processes, or engaging with sectoral stakeholders.

The *guidance for LIFE projects ‘[Assessing ecosystems and their services](#)’*³ presents a stepwise approach based on MAES for the identification of ecosystem types and services within an area. This guidance is mostly intended for practitioners and non-experts.

¹ [Guidance on Integrating Climate Change and Biodiversity into SEA](#), European Union (2013).

² [Guidance on Integrating Climate Change and Biodiversity into EIA](#), European Union (2013).

³ Assessing ecosystems and their services in LIFE projects: A guide for beneficiaries. 2018. https://ec.europa.eu/easme/sites/easme-site/files/life_ecosystem_services_guidance.pdf

Information on project impacts on MAES ecosystem or service types is provided by the beneficiaries during project implementation and is reported by them is available in the LIFE **Key Performance Indicators (KPI)** web tool and can be sorted per MAES ecosystem or service types.

[LIFE Integrated Projects](#) (IPs) provide funding for plans, programmes and strategies developed on the regional, multi-regional or national level. IPs allow Member States to make use of other EU funding sources, including agricultural, structural, regional and research funds — as well as national funds and private sector investment — this way explicitly encouraging the integration of biodiversity, ecosystems and related services into other policy sectors. For example, LIFE IP projects can be used to support the implementation of national or regional green infrastructure strategies.

[EU framework programmes for research and innovation](#): The EU framework programmes (FPs) for research and innovation — including the ongoing [Horizon2020 programme](#) — have contributed to the knowledge base on ecosystems and their service with many EU-wide research projects. In recent years, research funding has been increasingly oriented to supporting the operationalisation and uptake of ecosystem service knowledge in the context of different sectors.

From the perspective of integrating ecosystem services into different sectors — at the policy level and in practice — it is the EU instruments for agriculture and rural development, fisheries, aquaculture and marine policy, cohesion and regional development, and transport that are of key importance. Given that the EU instruments are, first and foremost, focused on socio-economic sustainability of key sectors, being able to use and access these funds for conservation requires understanding of how biodiversity and well-functioning ecosystems support wider wellbeing and sector-specific policy objectives.

The role of EU sectoral funding in supporting the integration of ecosystems and their services is two-fold, as outlined in the [EU guidance on biodiversity proofing the EU budget](#). First, there is a need to avoid — or at least minimise — potential harmful impacts of EU spending on biodiversity, ecosystems and their services. Second, sector instruments need to support biodiversity and the benefits it delivers to society and the economy.

Various EU sectoral instruments have integrated opportunities to finance biodiversity and ecosystem conservation and restoration, including the European Agricultural Fund for Rural Development (EAFRD), European Maritime and Fisheries Fund (EMFF), European Regional Development Fund (ERDF), European Social Fund (ESF) and the Cohesion Fund (CF). The [EU guidance on biodiversity financing](#) provides a comprehensive overview of opportunities available for funding biodiversity and ecosystem services during the 2014 – 2020 period.⁴

Key decisions on the use of EU funding are made at the **national** and **regional** level during the design and implementation of fund-specific programmes. These programmes outline investment priorities.

Box 20. A Practical Example : Capacity Building For Integrating Ecosystems and Their Services To Regional Development Policies Across The EU.

⁴ As part of the ESIF open data platform, the newly released '[data story](#)' on Cohesion policy support for biodiversity explains cohesion policy and offers the possibility to explore investments and indicators per year, per Member State or other criteria: <https://cohesiondata.ec.europa.eu/stories/s/gznm-sv2i>.

EU funding can support capacity building and establishment of science-policy structures needed for the integration of ecosystems and their services to regional development policies. The [BID-REX](#) projects brings together seven European regions with a view to improve the integration of biodiversity and ecosystem services to existing policy instruments.

For the full case study, see **Section C, Case study 11**.

4.1.3. EU Better Regulation Impact Assessment tools

The Commission encourages the integration of ecosystems and their services into EU level policy making through the Better Regulation Impact Assessment tools. In order to make sure that its proposals meet policy goals and deliver maximum benefits at minimum cost, the Commission's Better Regulation Guidelines⁵ set out principles, objectives, tools and procedures for each step in the EU policy cycle, from policy design and preparation and adoption, through to implementation, application (including monitoring and enforcement), evaluation and revision.

The Better Regulation Toolbox provides non-binding guidance and advice on how to apply the principles, carry out impact assessments of planned policies, identify impacts, develop models and assessments, prepare proposals, monitor implementation, carry out evaluations and consult stakeholders. The Toolbox makes explicit references to ecosystem services in relation to Impact Assessments within [Better Regulation Tool #35](#) (Resource Efficiency). It encourages consideration of potential impacts of policies that could 'contribute [...] to the creation of new demand, markets, skills and business models (e.g. [...] **new markets from ecosystem services**). It puts forward questions to help define potential resource issues, including e.g.:

- Whether we are close to critical thresholds [...] in terms of **natural ecosystems' capacity to provide certain services** (e.g. pollination services for agriculture).
- What incentives there are for business and society to use resources efficiently — noting that 'some elements of our **natural capital** are not valued, even though they are necessary to economic prosperity and social well-being (e.g. **ecosystem services** such as the provision of clean air and water)'
- Whether the policy options considered involve **trade-offs with other resources or ecosystem services** considering the full supply chain and all environmental impacts.

The tool makes reference to indicators on nature and ecosystems included in the [European Resource Efficiency Scoreboard](#), as well as the [MAES framework](#) and [Natural Capital Accounting](#).

The approach, steps and some of the tools highlighted in Chapter 3 can be useful reference also for Commission services preparing impact assessments and for experts contracted to produce studies or models to support policy development. An EU level integrated assessment of ecosystems and their services, to be delivered under MAES in 2019, will provide a

⁵ Better Regulation Guidelines and Toolbox, European Commission (2017) https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en

baseline to inform the mainstreaming of ecosystems and their services in EU level decision-making.

4.2. NATURE AND BIODIVERSITY

The ecosystem approach is at the core of biodiversity policy. As enshrined in the CBD Ecosystem Based Approach and discussed in Chapter 1 of this guidance, biodiversity needs to be protected and managed for its intrinsic value as well as for the essential services it provides to society and the economy. In turn, making human dependency on nature and biodiversity visible often strengthens the case for protecting and restoring vulnerable ecosystems.

This sub-chapter outlines the most relevant EU legal and policy frameworks on nature and biodiversity, which can both support and benefit from the integration of ecosystems and their services into decisions.

4.2.1. EU Biodiversity Strategy to 2020

The EU Biodiversity Strategy to 2020⁶ aims to halt the loss of biodiversity and ecosystem services and restore them in so far as is feasible by 2020. **Target 2** of the Strategy aims to maintain and enhance ecosystems and their services through a number of actions. These actions set the EU agenda and instruments for integrating ecosystems and their services into decision-making:

- Action 5: EU initiative on the Mapping and assessment of ecosystems and their services (MAES)⁷ aims to improve knowledge on ecosystems and their services, assess their state and value and promote the recognition of their economic worth into accounting and reporting systems across Europe. As presented in Chapters 1 and 3, MAES provides a common methodological framework with indicators for the mapping and assessment of ecosystems and their services in the EU. All EU Member States are engaged in mapping and assessment of ecosystems and their services on their national territories⁸.
- Action 6a aims to restore degraded ecosystems and their services in the EU. It recognises the added value of ecosystem services for a convincing narrative and stakeholder support for restoration projects (e.g. links to climate change adaptation, human well-being, financing of restoration and funding opportunities)⁹.
- Action 6b promotes the deployment of Green Infrastructure (GI)¹⁰. The EU Green Infrastructure Strategy (2013)¹¹ promotes investments in green and blue infrastructure, to restore the health of ecosystems, ensure that natural areas remain connected, and

⁶ [Our life insurance, our natural capital: an EU Biodiversity Strategy to 2020 \(COM\(2011\) 244\)](#)

⁷ http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm

⁸ https://biodiversity.europa.eu/maes/maes_countries

⁹ See [Promotion of ecosystem restoration in the context of the EU biodiversity Strategy to 2020, final report](#) and [Priorities for the restoration of ecosystems and their services in the EU](#), final report, January 2014.

¹⁰ http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

¹¹ [EU Green Infrastructure Strategy \(COM\(2013\) 249 final\)](#)

allow species to thrive across their entire natural habitat, so that nature keeps on delivering its many benefits. The new EU Guidance on the deployment of strategic EU green and blue infrastructure further defines criteria for strategic EU GI and outlines financing opportunity as well as technical support tools.

- Action 7a seeks to biodiversity-proof the EU budget, as outlined in the [EU guidance on biodiversity proofing the EU budget](#).
- Action 7b aims to ensure no net loss of biodiversity and ecosystem services. The Operational principles developed by the Working Group on NNL and further studies and reports on approaches, metrics and good practice for achieving NNL of biodiversity and ecosystem services¹² and guidance on measures to achieve NNL through the application of the mitigation hierarchy (avoid-reduce-restore-compensate).

In addition, the [EU Pollinators Initiative](#) outlines a range of concrete actions for enhancing populations of wild pollinator and related pollinating service across the EU.

This guidance builds on, and further implements aspects of the above actions under Target 2, as referenced in different parts of the document. It also implements Action 1b of the **Action plan for nature, people and the economy** which aims to improve the implementation of the EU Nature Legislation by highlighting the socio-economic case for safeguarding biodiversity within and beyond Natura 2000, while also drawing on the conservation management framework supported by the Directives (see below).

4.2.2. EU nature legislation

Legal framework

The EU Birds¹³ Directive and Habitats¹⁴ Directives are the pillars of EU nature legislation protecting all wild bird species, over 1000 rare, threatened or endemic animal and plant species and over 200 habitat types in the EU. The Habitats Directive also established the EU-wide Natura 2000 network of inter-connected protected areas. Member States must ensure that the sites are managed in a sustainable manner. Natura 2000 is the key EU instrument supporting the protection and restoration of species and habitats, this way directly contributing to the status of ecosystems and ecosystem services.¹⁵

Ecosystems and their services in Natura 2000 areas

Natura 2000 areas can cover a wide range of natural and semi-natural habitats. The MAES framework for the mapping and assessment of ecosystem condition also integrates conservation status indicators for different ecosystem types based on reporting under the Nature Directives.

¹² http://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm

¹³ Directive 2009/147/EC on the conservation of wild birds; codified version of Directive 79/409/EEC.

¹⁴ Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

¹⁵ Extensive information and guidance documents relating to the implementation of the Natura 2000 network are available at http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.

While the primary objective of Natura 2000 is to ensure the conservation of valuable habitats and species, protection and restoration measures in Natura 2000 that improve ecosystem condition can simultaneously enhance the delivery of a wide range of ecosystem services from these ecosystems. Various studies have been carried out to identify the ecosystem services provided by the Natura 2000 network and estimate their economic benefits¹⁶.

These include, for example, the moderate use of provisioning services in line with the site objectives and management regime (such as extensive grazing in high nature value grasslands, forest products such as berries, mushrooms, herbs or game, restored fish stocks from protected marine sites or from wetlands serving as nursery areas, provisioning of fresh water etc.), regulating and maintenance services (such as pollination by wild insects, flood protection by forests or wetlands, local climate regulation or the sequestration of CO₂) as well as cultural services (such as spiritual and aesthetic enjoyment, recreation opportunities or tourism).

For example, a 2013 study on the economic benefits of Natura 2000 estimated the total carbon stock value of all Natura 2000 habitats at between EUR 607 and EUR 1,130 billion in 2010, depending on the choice of carbon prices and habitat type. A policy scenario of full protected area coverage (terrestrial PAs + fuller MPAs) with a move to full favourable conservation status was estimated to generate a gain of at least EUR 1.7-2.9 billion by 2020, compared to a policy inaction scenario. It further found that Natura 2000 sites had supported on average about 12 million jobs each year in the period 2006-2008 (excluding employment generated by hotels and restaurants), providing estimated incomes of about EUR 145 billion per year. The value of the range of provisioning, regulating and cultural ecosystem services from terrestrial Natura 2000 were estimated at between € 200 and € 300 billion per year in 2013 (or 2 % to 3 % of EU GDP). This value should be seen as ‘gross benefits’ delivered by sites, rather than the net benefits of the Natura 2000 designation and associated conservation measures¹⁷.

Assessment of ecosystem services from Natura 2000 sites can support the conservation agenda by:

- Highlighting the socio-economic case for protecting and enhancing biodiversity and ecosystem services,
- Providing evidence to engage and mobilise stakeholder support for Natura 2000 designation or management measures,
- Providing evidence to help prioritise habitat conservation and restoration measures that also deliver socio-economic co-benefits; and to mobilise funding from public or private sources for the restoration and management of valuable natural and semi-natural habitats,
- Increasing acceptance of the costs involved in Natura 2000 management and their recognition as investment in nature that pays back.

¹⁶ http://ec.europa.eu/environment/nature/natura2000/financing/index_en.htm

¹⁷ IEEP (2013) The Economic benefits of the Natura 2000 network. Report prepared by the IEEP under a contract for the European Commission. http://ec.europa.eu/environment/nature/natura2000/financing/docs/ENV-12-018_LR_Final1.pdf.

Key decision-making processes

Assessment and integration of ecosystems and their services can support decision-making in relation to Natura 2000 site designation, stakeholder engagement, the setting of conservation objectives and measures, and the development of site management plans.

Engaging stakeholders in the mapping and assessment of ecosystem services flowing from natural and semi-natural areas can not only yield local knowledge and important information, but help to raise awareness of and understanding about the benefits of nature, and create local ownership of decisions.

The establishment of conservation measures of Natura 2000 sites offers a significant opportunity for integrating ecosystem services assessments, as these might provide complementary information on various socio-economic and other services provided by ecosystems hosted in the sites and hence clarify and enhance the protection and management regime of the sites, e.g. in the context of preparing and adopting management plans.

Projects and plans likely to have significant effects on Natura 2000 sites are subject to the appropriate assessment and authorisation requirements set out in Article 6(3) and 6(4) of the Habitats Directive. The Commission has provided guidance on those provisions¹⁸. Assessing ecosystems and their services might provide complementary information on risks of damage or loss to regulatory or other ecosystem services from potential damage to Natura 2000 areas in the context of the Habitats Directive Articles 6(3) and 6(4) procedures.

Species protection measures taken under the directives (e.g. species action plans) also offer opportunities for promoting services provided by ecosystems critical to species.

National **Prioritised Action Framework (PAFs)** outline the financing needs for implementing the EU Nature Directives and identify sources to match these needs. While PAFs are first and foremost focused on supporting the delivery of nature and biodiversity conservation objectives, they can also identify and plan for financing opportunities maintain and restore ecosystem services. The current process of updating the PAFs may be an opportunity to mobilise financing for ecosystem-based management and awareness-raising on the health, social and economic benefits flowing from Natura 2000.

Box 21. A Practical Example : Ecosystem Service Assessment to Support Biodiversity Conservation In The Oglio Sud Protected Area In Lombardy, Italy

In the regional park Oglio Sud, a Special Protection Area in Lombardy Italy designated under the EU Birds Directive, mapping and assessing ecosystem services is used to establish payment mechanisms for ecosystem services.

For the full case study, see **Section C, Case study 14.**

¹⁸ General guidance on the management of Natura 2000 sites, including sector specific guidance, interpretative guidance on Article. 6, as well as methodological guidance on Article 6(3) and (4) are available on http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.

Box 22. References, resources and tools

Extensive information and guidance documents relating to the implementation of the Natura 2000 network are available at

http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.

[The Natura 2000 Viewer](#) is an on-line tool that presents all Natura 2000 sites, provides key information on species and habitats for which each site has been designated, data on their estimated population size, conservation status and allows for various searches.

The guidance for LIFE projects '[Assessing ecosystems and their services](#)'¹⁹ presents a stepwise approach based on MAES for the identification of ecosystem types and services within a project area.

The [Interpretation Manual of European Union Habitats — EUR 28](#) aims to help clear any ambiguities in the interpretation of the Annex 1 of the directive by developing common definition for all habitat types.

The [EU Handbook on Financing Natura 2000](#) and biodiversity under the different EU funds (2014-2020) provides information on the opportunities for EU funding for biodiversity, ecosystems and related services across different funds.

4.3. EU WATER POLICY

4.3.1. Legal and policy framework

The EU Water Framework Directive (WFD) aims to protect and enhance aquatic ecosystems in order to achieve good ecological status of all EU water bodies by 2027. It requires Member States to develop integrated River Basin Management Plans (RBMP). While not explicitly using the term ecosystem services, the WFD addresses the need to safeguard the benefits that people derive from the sustainable use of water ecosystems, in particular the mitigation of floods and droughts, and the provision of water. The EU Floods Directive further requires Member States to map and assess flood risks and take adequate and coordinated measures to address them. The RBMP process and the requirement for public participation provide key frameworks for integrating the benefits of healthy water ecosystems into decision-making.

4.3.2. Why integrate ecosystems and their services into water policy?

The ecosystem services approach strengthens the implementation of EU water policy²⁰ by:

- Emphasising the social and economic benefits of achieving good ecological status
- Enabling further integration of water policy with sector policies (e.g. agriculture, fisheries)

¹⁹ Assessing ecosystems and their services in LIFE projects: A guide for beneficiaries. 2018. https://ec.europa.eu/easme/sites/easme-site/files/life_ecosystem_services_guidance.pdf

²⁰ OpenNESS policy brief No 8 (2017).

- Justifying the costs of aquatic ecosystems restoration (for the multiple benefits they deliver)
- Motivating even broader public engagement (by making visible the socio-economic value)
- Providing cost-effective solutions to mitigating flood risks and impacts.

The range of provisioning, regulating and cultural services provided by freshwater ecosystems is provided in Section B.

4.3.3. Decision-making frameworks for integrating ecosystems and their services into water policy

The principles in Chapters 2, and the entry points and instruments provided in Chapter 3 can be — and in many cases are already being — applied by water management authorities in the formulation and implementation of RBMP, e.g. to assess the potential, demand and supply of ecosystem services in view of developing nature-based solutions to address a range of key water management challenges.

In turn, practical experience in the implementation of the EU water legislation can provide a basis for the development of sector-specific guidelines to strengthen the ecosystem services approach. The review of the WFD implementation, due in 2019, presents an opportunity to draw lessons and strengthen progress.

Box 23. A Practical Example (see also Box 3.15):

Ecosystem services in the River Basin Management Plan for Scotland, the UK.

The River Basin Management Plan (RBMP) for the Scotland River Basin District integrates a range of ecosystem services, including recreation, aquaculture and fish farming, angling, renewable energy generation, provision of freshwater, waste recycling and manufacture of food and drink.

For the full case study, see **Section C, Case study 2.**

Box 24. References, Resources and Tools

Water Information System for Europe (WISE) Freshwater: <https://water.europa.eu/freshwater> is a gateway for information on European water issues.

The **Water Data Centre**, hosted at the European Environment Agency (EEA), provides a central access point to several web-services: interactive maps, data viewers, European datasets and indicators. www.eea.europa.eu/themes/water.

The **Joint Research Centre** conducts environmental monitoring and water resources modelling including nowcasting and forecasting services. For more information: <https://ec.europa.eu/jrc/en>

- Droughts:
 - <http://edo.jrc.ec.europa.eu>
 - <https://ec.europa.eu/jrc/en/research-topic/desertification-and-drought>

- Floods:
 - <https://www.efas.eu/>
 - <https://ec.europa.eu/jrc/en/research-topic/floods>
- Fate and impacts of pollutants:
 - <http://fate.jrc.ec.europa.eu>

The [WFD Common Implementation Strategy](#) includes a set of Guidance Documents on a wide range of WFD implementation topics of potential relevance to integrating ecosystems and their services, including e.g. guidance on [public participation](#), [analysis of pressures and impacts](#), [economics](#), [RBM in a changing climate](#) etc.

The fifth Water Framework Directive Implementation Report – assessment of the second River Basin Management Plans and the first Floods Directive Implementation Report – assessment of the first Flood Risk Management Plans (2019) includes implementation review as well as suggestions for the improvement of the plans. http://ec.europa.eu/environment/water/water-framework/impl_reports.htm

The [European Innovation Partnership on Water](#) (EIP Water) was set up in 2013 to support collaborative processes for innovation and change in water management across the public and private sector. Among the eight EIP Water priorities, [ecosystem services](#) in particular promotes the development and testing of valuation and payments for ecosystem services, as well as innovative management schemes addressing water-related ecosystem services. Voluntary, multi-stakeholder [Action Groups](#) are at the core of EIP Water, working, *inter alia*, to develop tools and address innovation challenges for the assessment and integration of water ecosystem services ((such as the [ESE — Ecosystem Services for Europe](#), [NatureWAT — Nature-based technologies for innovation in water management](#), [MAR Solutions — Managed Aquifer Recharge Strategies and Actions](#) or [RiverRes](#)).

WFD [Policy Document on Natural Water Retention Measures](#)

The MAES 2nd Report (2014) provides indicators for ecosystem services and the MAES 5th report (2018) provides indicators for ecosystem condition assessment including in relation to freshwater ecosystems.

OpenNESS [Brief no 08 — Enhancing Water Framework Directive implementation through the ecosystem service approach](#)

EEA briefing '[Why should we care about floodplains?](#)'

Synergies and differences between Biodiversity, Nature, Water and Marine Environment EU policies (*aquacross* Project): www.aquacross.eu

[Support for policy development for the integration of ecosystem services assessments into the WFD and FD. \(Resource document prepared by COWI under European Commission contract, 2014\)](#)

4.4. EU MARINE POLICY

4.4.1. Legal and policy framework

The EU [Marine Strategy Framework Directive](#) (MSFD) enshrines the ecosystem approach in the marine environment: it aims to achieve Good Environmental Status (GES) of EU marine waters by 2020 and emphasises the crucial importance of a healthy marine environment for wellbeing and socio-economic policy objectives. Member States are required to develop Marine Strategies and follow an **adaptive management** approach. The MSFD aims to ensure coherence between these policy objectives and sets three goals for Europe's seas: to be 'productive', 'healthy', and 'clean'. These efforts are aligned with the EU's Blue Growth agenda — a long-term strategy to support sustainable growth in the marine and maritime sectors as a whole, which is accompanied by the Maritime Spatial Planning Directive. The EU policies in this domain are also aligned with the [Sustainable Development Goals](#), in particular, Goal 14.

4.4.2. Marine ecosystem services

Oceans deliver life-supporting benefits to humans such as supplying atmospheric oxygen and seafood, decomposing organic waste and pollution, sequestering carbon, regulating the planet's climate and protecting coastline infrastructure and people from storms, floods and erosion.

The range of provisioning, regulating and cultural services provided by marine ecosystems is provided in Section B.

4.4.3. Why integrate ecosystems and their services into marine policy?

Human-induced pressures from overfishing, pollution, invasive alien species, acidification, climate change as well as physical disturbances are making marine ecosystems vulnerable to collapse and weakens their capacity to deliver many benefits. Such impacts are particularly strong on coastal communities, but they are increasingly felt across society, requiring urgent action.

Mapping of marine and coastal ecosystems and their services, while still limited and faced with significant challenges due to the specific characteristics of marine ecosystems, can help decision-makers define critical areas for intervention and for the regulation of maritime activities. (See also Chapter 5.3 regarding MSP for detail on approaches and challenges).

Box 25. References, resources and tools

Water Information System for Europe (WISE) marine: <https://water.europa.eu/marine>. A gateway for information on European water issues.

The [Marine Strategy Framework Directive \(MSFD\) Competence Centre \(MCC\)](#), hosted and supported by the Joint Research Centre (JRC), the European Commission's in-house science service, supports the MSFD Common Implementation Strategy with up-to-date, harmonised policy and science knowledge.

The MAES 2nd Report (2014) provides indicators for ecosystem services and the MAES 5th

report (2018) provides indicators for ecosystem condition assessment including in relation to marine ecosystems.

EEA briefing '[Why should we care about floodplains?](#)'

Synergies and differences between Biodiversity, Nature, Water and Marine Environment EU policies (*aquacross* Project): www.aquacross.eu

[Marine Ecosystem Services Partnership](#) including resources, webinars, a [valuation library](#) (map) and an [ecosystem services assessment toolkit](#).

The [European Atlas of the Seas](#) provides information about Europe's marine environment with predefined and ready to use maps, covering topics such as [nature](#), [tourism](#), [security](#), [energy](#), [passenger transport](#), [sea bottom](#), [fishing stocks and quotas](#), [aquaculture](#), and much more.

4.5. EU THEMATIC SOIL STRATEGY

4.5.1. The EU policy framework

The EU Thematic Strategy for Soil Protection²¹ aims to protect soil and ensure its sustainable use, prevent further degradation, preserve soil function and restore degraded soils.

4.5.2. The importance of soil ecosystem services

Soils ecosystems are integral components of all terrestrial ecosystems, essential for the production of food, materials and energy, and for water, carbon and nutrient cycles regulation and the mitigation and adaptation to climate change. Soil ecosystem services are fundamental in solving societal challenges such as food, water and energy security, climate change, migration and biodiversity decline.

The [MAES Soil Final Report](#) provides the most comprehensive overview of soil ecosystem services.

The ability of soil to support food production, maintain genetic biodiversity and regulate the environment is under increasing pressure. Land and soil degradation continues throughout the EU at high rates due to soil sealing, erosion, contamination and decline in organic matter and in biodiversity, compaction, salinisation, floods and landslides. A combination of some of these threats can ultimately lead in arid or sub-arid climatic conditions to desertification. ([EEA SOER 2015](#)).

Land use decisions often do not properly take all societal costs and benefits of land and soil management options into account. The prevalence of sectoral approaches, a short-term horizon and a narrow spatial scale, prevent the optimal and sustainable use of land and soil in the long run. A good understanding of the contribution of soil ecosystem services to human well-being will enable practitioners to develop management practices that stimulate the provision of multiple services.

²¹ COM(2006) 231.

4.5.3. Frameworks for the integration of soil ecosystem services into decision-making

Land planning and management decisions have a crucial impact on soil quality. Spatial planning should guarantee the sustainable use of this important natural resource through prior assessment of the impact of decision options on the condition of the soil and the delivery of ecosystem services. Relying on soil monitoring and information, including on local knowledge and stakeholder consultation, is essential in this process.

Box 26. Further Resources and References

The [MAES Soil Final Report](#) provides practical guidance to EU institutions and Member States on methods and tools for assessing soil ecosystem services. While recognising that there is no standard recipe for good soil or land management, the MAES Soil Final Report notes that structural analysis and good understanding of soil ecosystem services can enable practitioners to manage soil for multiple benefits, and recommends considering the entire list of soil ecosystem services to prevent that less obvious aspects are overlooked.

The voluntary guidelines for sustainable soil management²² from the Global Soil Partnership can help policy makers and land managers to develop a holistic and sustainable land management approach.

4.6. EU CLIMATE POLICY

4.6.1. The EU policy framework for climate action

The EU has set itself targets for reducing its greenhouse gas emissions by at least 40% compared to 1990 and presented in November 2018 its strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050²³.

The revised EU [Renewable Energy Directive](#)²⁴ establishes a binding EU target of at least 32 % share for renewable energy by 2030 and sustainability criteria for biofuels, bioliquids and biomass. The revised [Energy Efficiency Directive](#)²⁵ sets a 2030 target of 32.5 %. Both EU targets may be revised upward in 2023.

The [EU Climate Adaptation Strategy](#) aims to make Europe more climate-resilient by enhancing the preparedness and capacity of all governance levels to respond to the impacts of climate change. Beside national adaptation strategies, it promotes ‘climate-proofing’ key vulnerable sectors such as agriculture and fisheries, encourages **better informed decision-making** by addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT) as the ‘one-stop shop’ for adaptation information in Europe.

²² FAO 2017. Voluntary Guidelines for Sustainable Soil Management. Food and Agriculture Organisation of the United Nations Rome, Italy.

²³ COM(2018) 773 final.

²⁴ (EU) 2018/2001. <https://europa.eu/!Jk96 mM>

²⁵ (EU) 2018/2002. <https://europa.eu/!gP79Ht>

The Commission published an evaluation of the strategy in November 2018²⁶. The evaluation shows progress against each of the eight actions of the Strategy, but also outlines how Europe is still vulnerable to climate impacts within and outside its borders. Follow-up to the evaluation presents an opportunity to draw lessons and strengthen integration of ecosystem-based approaches to adaptation.

4.6.2. The role of ecosystems and their services in climate mitigation and adaptation policies

Biodiversity and climate change are closely interconnected. Ocean and terrestrial plants and soil sequester carbon from the atmosphere. Natural ecosystems help to mitigate the impacts of climate change such as heat waves, droughts, floods and storms. In turn, climate change presents a major and growing threat to biodiversity, and tackling its causes is essential for maintaining resilient ecosystems. The estimated value of nature's contribution to climate regulation in the Europe and Central Asia is EUR 400/ha/year (IPBES ECA Assessment 2018).

Climate change is causing increasing frequency of floods, prolonged droughts and heat waves which affect agricultural productivity, deteriorate urban living conditions, facilitate the spreading of invasive alien species and weaken ecosystems' resilience to other man-induced pressures. Although some of the likely impacts of climate change in marine and coastal regions can be anticipated, their extent and location are difficult to predict.

The crucial role of resilient ecosystems for climate adaptation and mitigation is recognised in the **Paris Climate Agreement**. The **Sendai Framework for Disaster Risk Reduction** prioritises 'ecosystem-based approaches ...to build resilience and reduce disaster risk'. CBD COP13 encouraged Parties, Governments and relevant organisations to 'integrate ecosystem-based approaches to climate change adaptation and mitigation and disaster risk reduction into their strategic planning across sectors'²⁷.

An ecosystem services approach can strengthen the implementation of the EU long-term strategy and the EU Climate Adaptation Strategy, by promoting nature-based solutions that:

- tap into the potential of healthy ecosystems to sequester carbon and other greenhouse gases and keep them out of the atmosphere (e.g. through the restoration of peat bogs and the improvement of soil condition);
- restore and enhance ecosystems in order to increase their resilience to climate change, as well as to support climate adaptation efforts, e.g. through improved water cycle regulation (water retention capacities of ecosystems), local climate regulation (e.g. reducing urban heat waves), or the protection of coastal areas from storms (e.g. marine seagrass meadows).

²⁶ https://ec.europa.eu/clima/policies/adaptation/what_en#tab-0-1

²⁷ [Decision XIII/4](#)

Box 27. Practical Implementation Examples :

Nature-based approaches to climate adaptation in Copenhagen, Denmark. Nature-based solutions that build on the understanding of ecosystem services form an integral part of climate adaptation plans for urban areas. Copenhagen has developed an ecosystem services-based urban planning approach to climate adaptation, supporting decision-making at project level.

For the full case study, see **Section C, Case study 4**

Delivering wetland ecosystem services through climate change adaptation strategy in the Attica Region, Greece. The integration of ecosystem service knowledge into climate change adaptation plans can improve management and conservation measures of wetlands, ensuring their ability to continue providing multiple services. The climate change adaptation strategy for Attica Region, Greece, commits to conserve Attica's wetlands and increase their resilience by simultaneously improving the provision of multiple ecosystem services.

For the full case study, see **Section C, Case study 6**

Climate bonds to support establishment of green spaces in Paris, France. Climate bonds provide a possible means to considerably increase the amount of green urban areas, supporting both conservation objectives and wellbeing. In Paris, 3.4 hectares of green spaces had been created and close to 2 200 trees planted in about a year's time (2016), estimated to sequester 1600t CO₂ during their lifetime.

For the full case study, see **Section C, Case study 13**

Box 28. Further key resources and references

CBD COP 14 in December 2018 adopted [Voluntary guidelines for ecosystem-based approaches to climate change adaptation and disaster risk reduction](#)²⁸. The guidelines provide a comprehensive framework for the integration of ecosystem based approaches to climate change adaptation.

[ICLEI Climate Change adaptation and urban resilience](#)

Burke, F. [Artificial wetlands purify water as nature recruited to help deal with climate change](#). *Horizon, the EU Research & Innovation Magazine* (2016)

²⁸ <https://www.cbd.int/sbstta/sbstta-22-sbi-2/EbA-Eco-DRR-Guidelines-en.pdf>

4.7. EU AGRICULTURE AND FOREST POLICIES

4.7.1. The EU policy frameworks for agriculture and forest management

The EU Common Agricultural Policy (CAP) has a key role in ensuring the sustainable management of agro-ecosystems. It can also support sustainable forest management measures, in line with the *EU Forest Strategy*²⁹ which promotes the multifunctional role of forests.

There are opportunities to enhance biodiversity and ecosystem services in the framework of the current EU CAP (2014-2020):

1. By supporting and encouraging the uptake of targeted measures to enhance biodiversity and ecosystems, within the greening of direct payments and rural development.
2. By mitigating potential negative impacts on biodiversity and ecosystem services from agricultural practices and intervention measures supported by the CAP.

The Commission proposal for the new CAP (2021-2027) makes concrete reference to ecosystem services, by setting the following policy objectives (as part of a broader set) with related indicators:

1. Contribute to climate change mitigation and adaptation, as well as sustainable energy;
2. Foster sustainable development and efficient management of natural resources such as water, soil and air;
3. Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes;
4. Improve the response of EU agriculture to societal demands on food and health, including safe, nutritious and sustainable food, as well as animal welfare.

4.7.2. The importance of agricultural and forest biodiversity and ecosystem services

According to Food and Agriculture Organisation (FAO) definition, “biodiversity for food and agriculture is the subset of biodiversity that contributes in one way or another to agriculture and food production”. It includes domesticated plants and animals and their wild relatives, harvested forest and aquatic species and other wild species harvested for food and products.

“Associated biodiversity” is the vast range of organisms that live in and around food and agricultural production systems, sustaining them and contributing to their output. Biodiversity for food and agriculture is indispensable to food security and sustainable development. It supplies vital ecosystem services, such as creating and maintaining healthy soils, pollinating plants, controlling pests and providing habitat for wildlife, including for fish and other species that are vital to food production and agricultural livelihoods. Biodiversity makes production systems and livelihoods more resilient to shocks and stresses, including those caused by climate change. It is a key resource in efforts to increase food production while

²⁹ Due for review in 2019.

limiting negative impacts on the environment. It makes a variety of contributions to the livelihoods of many people, often reducing the need for food and agricultural producers to rely on costly or environmentally harmful external inputs.³⁰

Agriculture and forest ecosystems together cover almost 80 % of the EU territory. Our society and economy depend on these areas, not only for the production of food, materials and fuels, but crucially for a wide range of life-supporting regulating services, as well as for the cultural values and services of rural landscapes including outdoor recreation activities.

MAES defines agro-ecosystems in two broad categories: cropland and grassland (Maes et al., 2013). They are being in good condition when they support biodiversity, their abiotic resources (soil-water-air) are not depleted, and they provide a balanced supply of ecosystem services (provisioning, regulating, cultural). The 2nd MAES report (2014) provides a set of indicators for measuring ecosystem services from agro-ecosystems and from forests. The 5th MAES report provides a framework for assessing ecosystem condition based on indicators for pressures, ecosystem structure and functions. MAES links agro-ecosystem condition to the flow of services, and through this to broader policy objectives, demonstrating how the viability and economic stability of the agriculture sector depend on less visible regulating ecosystem services. The 5th MAES Report also provides an integrated framework with indicators for assessing forest ecosystem condition and links to forest ecosystem services, as well as examples of the potential uses of the framework for assessing policy options in degraded ecosystems, restoration opportunities and facilitating the integration of different policy streams relevant to forest ecosystems into an ecosystem based approach.

Taking account of these dependencies implies the need for considering, in policy implementation, the full range of ecosystem services provided by agro-ecosystems. Provisioning services need to be understood in the context of the regulating and maintenance services that underpin them, and the latter should be prioritised, if the sustainability of agriculture is to be ensured as provider of public goods and services.

It is therefore imperative to manage agricultural and forest ecosystems in a way that:

- Maintains critical ecosystem services that underpin agro-ecosystems' and forest ecosystems' productivity in the medium and longer term
- Preserves and enhances the range of provisioning, regulating and cultural services provided by agricultural landscapes to society
- Minimises negative impacts on adjacent natural areas and the services they provide.

4.7.3. Frameworks for the integration of ecosystems and their services into agricultural and forest management decisions

The principles in Chapter 2 and the approaches and instruments presented in Chapter 3 provide a guiding framework for the integration of ecosystems and their services into policy and practice. They can be applied in the context of national programming and implementation for agricultural funds under the current CAP (2014-2020), as well as in the development and

³⁰ [FAO Commission on Genetic Resources for Food and Agriculture \(2019\). The State of the World's Biodiversity for Food and Agriculture](#)

implementation of Strategic Plans under the proposed green architecture of the future CAP (2021-2027). The *EU Biodiversity Proofing Framework* developed by the Commission provides further guidance on how to ensure that sector policy and funding, including the CAP, support and enhance biodiversity and ecosystem services.

Box 29. A Practical Example :

Guidelines for the design of multiple cropping systems to provide multiple ecosystem services.

This voluntary guidance by the French Institut National de la Recherche Agronomique (INRA) (2015) aims to help farm sector stakeholders to integrate and support soil quality and the delivery of multiple ecosystem services, via improved agricultural practices (multiple cropping).

For the full case study, see **Section C, Case study 1.**

Box 30. Further references and resources

[LIFE VIVA Grass project](#): grassland ecosystem services.

The [EU Pollinators Initiative](#) sets strategic objectives and a set of actions to be taken by the EU and its Member States to address the decline of pollinators in the EU

Franke, T. & B. Delbaere. [How landscape and nature management offer multiple benefits in an intensive-farmland](#). *HERCULES Cultural Landscapes blog* (2016)

FAO resources on ecosystem services and biodiversity in agriculture: <http://www.fao.org/ecosystem-services-biodiversity/en/>

[The State of the World's Biodiversity for Food and Agriculture](#). FAO (2019). This report assesses biodiversity for food and agriculture and its management worldwide.

5. MAINSTREAMING ECOSYSTEMS AND THEIR SERVICES IN SPATIAL PLANNING

This chapter is addressed at policy-makers, authorities and practitioners engaged in spatial planning at the local and regional levels. It highlights the benefits from integrating ecosystems and their services and provides cross-reference to available tools. It should be used in connection with Chapter 3.

5.1. Landscape and spatial planning frameworks in the EU

Landscape and spatial planning support the spatial arrangement of human activities and land management across a landscape or a region. Spatial planning is a competence of the Member

States with a variety of systems, settings and practices across the EU Member States. The European Spatial Development Perspective ([ESDP, 1999](#)) promotes spatial planning as a cross-cutting and coordinating policy that allows the spatial impacts of sectoral developments to be addressed and conflicts between different stakeholders and land uses to be prevented. It provides a framework for cooperation between authorities responsible for spatial development, for sectoral policies and for environmental protection. The EU Territorial Agenda for 2020 supports the integration of ecosystems and protected areas into Green Infrastructure networks at all levels. It encourages integrated development in cities and regions and the safeguarding and sustainable use of ‘territorial capital’ and the ecological functions it provides.

EU sectoral policies and legislation have direct and indirect influence on spatial planning in the Member States. Several EU policies and legislation use spatially explicit measures to achieve their objectives. Furthermore, EU financial support to the implementation of its policies can function as a driver for spatial planning decisions. Key EU sectoral policies and legislation guiding spatial planning include, for example, the cohesion policy and regional funds, the Nature, WFD and the Floods Directive, MSFD, climate change policies and the EU’s Urban Agenda³¹. Soil protection in line with the Soil Thematic Strategy is crucial, as is ensuring a holistic approach to sustainable forest management as encouraged in the EU Forest Strategy. The EU **SEA Directive** provides a framework for integrating ecosystem services knowledge into spatial planning across all sectors. In marine areas, spatial planning is also subject to the **EU Maritime Spatial Planning Directive**. The integration of ecosystems and their services in the MSP context is discussed in Chapter 5.3.

5.1.1. Rationale for integrating ecosystems and their services into spatial planning

Environment and spatial development are strongly related since:

- competing demands on land can have negative impacts on natural ecosystems and their services.
- strategic planning can help to avoid conflicts and tap into synergies between land-use interests.

The Ecosystem Approach is a recommended good practice in spatial planning, by providing for:

- more effective strategic protection of biodiversity and the delivery of essential ecosystem services where they are needed,
- the identification of synergies among policy objectives that can be achieved through nature-based solutions, thus tapping into environmental and socio-economic co-benefits,
- the early identification of potential risks of damage, conflicts and trade-offs of ecosystem services, and addressing them in a strategic manner, as well as

³¹ Natura 2000 and spatial planning’ report, 2017. The report also provides an overview of spatial planning definitions and systems in different EU Member States.

- prioritisation of areas for certain measures such as restoration, Green Infrastructure enhancement or agri-environment schemes that benefit biodiversity and enhance the flow of ecosystem services.

Using the ecosystem approach in integrated spatial planning can steer land uses that safeguard natural ecosystems and the provision of ecosystem services across the landscape, and make land use choices complementary to each other, by facilitating or constraining activities in a certain area. Furthermore, participatory spatial planning can provide social and economic benefits by instilling transparency and clearer rules, improving coordination and increasing cross-border cooperation.

The steps for generating and integrating information from ecosystem services assessments into spatial planning are consistent with the policy and planning cycle set out in Chapter 3 of this guidance document, starting with policy formulation (context setting and definition of integrated objectives), through decision-making, implementation, monitoring and evaluation, and policy review, and including a continuous adaptive and learning process and input from stakeholder participation.

Mapping ecosystems and their services can provide baseline data more relevant to the spatial planning process. Ecosystem services maps can be used as a source for investigating impacts of planning options and for comparing alternatives³². The flow of services from supplying areas to beneficiaries can be illustrated with maps, including by means of participatory mapping methods. This can help to identify mismatches between supply and demand, as well as trade-offs or compensation actions to be undertaken in decisions.

The consideration of ecosystem services can help to create synergies between policy objectives. Spatial planning is the main strategic process through which nature-based solutions and synergies among policy objectives can be achieved in a strategic way across the landscape (Sub-chapter 3.1.3). For best results, synergies and co-benefits need to be addressed from the earliest planning stages when needs are being identified, objectives defined and options are still open.

Spatial planning can greatly facilitate the proper application of the mitigation hierarchy by identifying, at an early stage in the planning cycle, options to avoid impacts e.g. through the strategic location of activities in the landscape. It can also identify opportunities for locating offsets in a landscape context that can increase their strategic ecosystem service and biodiversity benefits (e.g. by linking up fragmented ecosystems and thereby increasing their resilience).

Ecosystem service information helps to identify overcome institutional and administrative boundaries and enhance cooperation. Planning for administrative areas that do not match natural geographic boundaries can create externalities: costs can fall on those who do not benefit. This can be the case in particular for regulating ecosystem services (e.g. impact on forests and wetland habitats in one territory that regulate floodwaters downstream). Implementing spatial planning along natural boundaries such as river basins provides a way to address these externalities. In some cases, PES arrangements can be implemented (IEEP 2016).

32 Geneletti, D and Mandle, L (2017) Mapping ecosystem services for impact assessment. In: J. Maes and B. Burkhard (Eds) Mapping Ecosystem Services, Pensoft, pp. 352-355., 2017, Chapter 7.8.

Integrating ecosystems and their services into spatial planning can also contribute to good governance through improving coordination and cooperation among authorities, whereas a participatory planning process can foster awareness, ownership and support for implementation.

5.2. Urban ecosystem services and urban planning

5.2.1. Why integrate ecosystems and their services into urban planning?

Urban ecosystems, from Natura 2000 sites to parks, gardens, green roofs and tree-lined streets, can provide solutions to many urban challenges such as air pollution, noise, extreme summer temperatures or flooding. They also provide opportunities for recreation, education, cultural and aesthetic enjoyment. They encourage physical activity and spending time outdoors, and can even help to maintain the social fabric in urban neighbourhoods. Importantly, people who live in neighbourhoods with a higher density of trees on their streets or with higher amounts of green space are found to be healthier. (MAES 4th Report, 2016).

Integrating ecosystems and their services can greatly improve urban planning due to a number of factors:

- Urban areas feature high concentrations of people and infrastructure, and hence an increased demand for a range of provisioning, regulating and cultural ecosystem services. At the same time, pressure on urban ecosystems means that many ecosystem services are compromised
- Re-integrating nature into urban planning can provide effective and sustainable solutions to many pressing health, social and economic challenges, from climate adaptation (heat waves, floods, droughts) through strengthening the social fabric in cities to wellbeing & health (exercise, stress reduction, mental health)
- This also creates opportunities for re-connecting citizens with nature in urban areas, which can increase health and quality of life, as well as awareness of the importance of nature and support for the conservation agenda. Achieving citizen support also requires attention to possible ecosystem ‘disservices’ (such as possible mosquito breeding) in well-designed urban green areas.
- Urban areas can provide a refuge for valuable and vulnerable nature and sometimes for surprisingly high biodiversity. About 11 000 Natura 2000 sites cross urban borders; rare and protected species are present in many gardens and parks, and pollinators sometimes thrive better in nature-rich cities than in intensively managed countryside. Such areas can benefit from planning aimed at enhancing and reconnecting them with peri-urban habitats.
- Access to nature is increasingly discussed as a question of rights and social fairness, and gives rise to further debates on quality of the green space, the need for innovation (e.g. in densely built-up areas) and reconsidering of priorities (e.g. in cities with heavy traffic).

- The knowledge base and experience in assessing and integrating ecosystems and their services in urban spatial planning is growing fast (MAES Urban Ecosystems³³; EnRoute project on Urban Green Infrastructure; TEEB, Cities across Europe etc. – see references below), revealing a **complex but rewarding task** for urban planners and citizens.

5.2.2. Policy framework and ongoing initiatives on urban ecosystem services

The EU Urban Agenda proposes to work on smart cities; low-carbon, climate-resilient cities with good social inclusion. It also schedules impact assessment, benchmarking and monitoring on the basis of new data. Through the EU Urban Agenda national governments, cities, European institutions and other stakeholders will be working together for a sustainable, innovative and economically powerful Europe that offers a good quality of life. The EU Green Infrastructure Strategy provides for the deployment of, inter alia, urban green and blue infrastructure, as well as for improving the connectivity between urban green areas and peri-urban landscapes.

The EU EnRoute project (Enhancing Resilience of urban ecosystems through green infrastructure) supports the implementation of the EU Green Infrastructure Strategy. The project included 18 city labs and provided robust scientific knowledge of how urban ecosystems can support urban planning at different stages of policy and for various spatial scales and how to help policy-making for sustainable cities. It aims to promote the application of urban green infrastructure at local level and delivers guidance on the creation, management and governance of urban green infrastructure. Importantly, it illustrates how collaboration between and across different policy levels can lead to concrete green infrastructure policy setting.

Box 31. References, resources and tools

[EU EnRoute project \(Enhancing Resilience of urban ecosystems through green infrastructure\)](#) including a range of case studies from cities across the EU

[EnRoute Final Report: Making the most out of our green spaces, January 2019](#)

The [URBES project](#) aims to inform urban management and decision-makers on how to best integrate the natural environment and human needs.

[Green Surge](#) (Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy) FP7 research project

EU Horizon2020 report ‘Nature-based solutions and re-naturing cities’ lays out the opportunities of NBS for urban areas.

EU Horizon2020 NBS for climate and water resilience — projects including UNALAB,

³³ [MAES 4th report on urban ecosystems and their services](#)

Connecting, Green Growth and Urban Green up.

EU Horizon2020 projects addressing business, governance and financing models (NATURVATION, Nature4Cities, NAIAD).

CLLD (Community-led local development) is a tool for use at sub-regional level, which is complementary to other development support and aims to mobilise and involve local communities to achieve sustainable development.

[Greater Manchester Natural Capital Investment Plan](#) 2019.

Box 32. Some practical examples:

Green urban infrastructure strategy for Vitoria-Gasteiz, Spain. Urban green infrastructure plans provide a key framework for operationalising ecosystem services to support both human wellbeing and conservation objectives. Vitoria-Gasteiz Green Urban Infrastructure Strategy shows how green infrastructure planning can support supply of ecosystem services and enhance ecological connectivity in an urban and peri-urban setting.

For the full case study, see **Section C, Case study 8.**

Mapping and assessment of ecosystems and their services to support the urban plan of Trento, Italy. Urban green infrastructure plans provide a key framework for operationalising ecosystem services to support both human wellbeing and conservation objectives. The urban plan of Trento, Italy, shows how mapping and assessment of ecosystems and their services can support the development of an urban planning.

For the full case study, see **Section C, Case study 9.**

5.3. Integrating ecosystems and their services into maritime spatial planning

5.3.1. Rationale for integrating ecosystems and their services into Maritime Spatial Planning

Maritime Spatial Planning is an integrated process of analysing and allocating human activities in marine areas in order to achieve ecological, economic and social objectives. It can help to reduce conflicts between users as well as to avoid or mitigate potential negative impacts on marine ecosystems. Ecosystem services assessments can help to safeguard these services in a fair and equitable manner.

5.3.2. Legal and policy context

The *EU Maritime Spatial Planning Directive*³⁴ requires Member States to establish Maritime Spatial Plans (MSP) by 2021 and to revise them at least every ten years. It also sets requirements for adopting an Ecosystem Based Approach. As a spatial and holistic process, MSP promotes coherence with environmental and sector policies, including the achievement of Good Environmental Status of marine ecosystems under the MSFD, Good Ecological Status of coastal and transitional waters under the WFD, favourable conservation status of habitats and species under the Birds and Habitats Directives and the Action Plans of the European Regional Sea Conventions.

5.3.3. Entry points to integrating ecosystems and their services into MSP

MSP is a continuous and adaptive process, allowing for the adjustment of objectives and the integration of lessons learned.

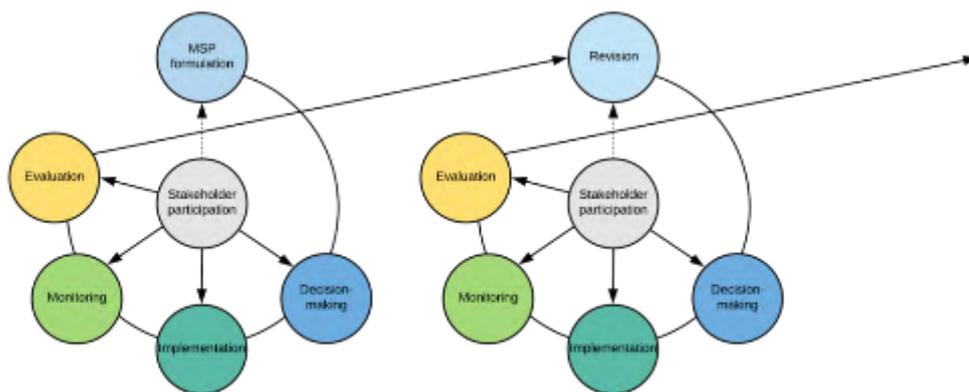


Figure 1. The Maritime Spatial Planning cycle (adapted from UNESCO 2018)

SEA is key mechanism for the consideration of potential environmental impacts in the planning process.

The decision-making cycle outlined in Chapter 3, and with it, the key entry points and deliberations for integrating ecosystems and their services, also apply in the context of MSP. At the policy formulation stage, objectives could be defined to safeguard and enhance marine ecosystems for their conservation value or to improve the delivery of ecosystem services. They can later translate into concrete measures to reduce pressures, restore ecosystems, designate and manage marine protected areas or establish blue-green infrastructure (with elements such as e.g. artificial reefs). The objective-setting exercise is an opportunity to **make interlinks explicit**, i.e. highlight how socio-economic objectives (within and beyond the marine sector) depend on marine ecosystems' capacity to deliver services.

When characterising the MSP area, it is important to identify all ecosystems therein and the range of ecosystem services they provide, to the extent possible. Involving stakeholders in identifying and listing ecosystem services can provide important insights and increase

³⁴ 2014/89/EU.

engagement. A list of marine ecosystem services provided by coastal and transitional waters, shelf and marine ecosystems, is provided as reference in the 2nd MAES report).

Mapping marine ecosystem services enables the identification of critical areas for intervention and facilitates the management of maritime activities. It can be conducted with primary data, expert judgment based on habitat maps or with modelling tools, such as the InVEST toolkit or ARIES. Methodologies and actual mapping of marine ecosystem services are still limited and decision-making needs to take account of the levels of uncertainty related to data. Several platforms provide spatial information on ecosystem services, such as SeaAroundUs and MFA on fisheries, AquaMaps on global marine species distribution, the Baltic Sea data and map service of the Helsinki Commission which provides data on marine biodiversity and human activities, and the Ocean Health Index Project on marine ecosystem services at the global scale.

Ecosystem **condition** assessment can use criteria related to ecosystem structure and function as well as pressures (See 5th MAES report (2018) on ecosystem condition assessment). Data collected under the MSFD, WFD and the Nature Directives can support ecosystem condition assessment, complemented by additional environmental and socio-economic information to assess the supply of ecosystem services.

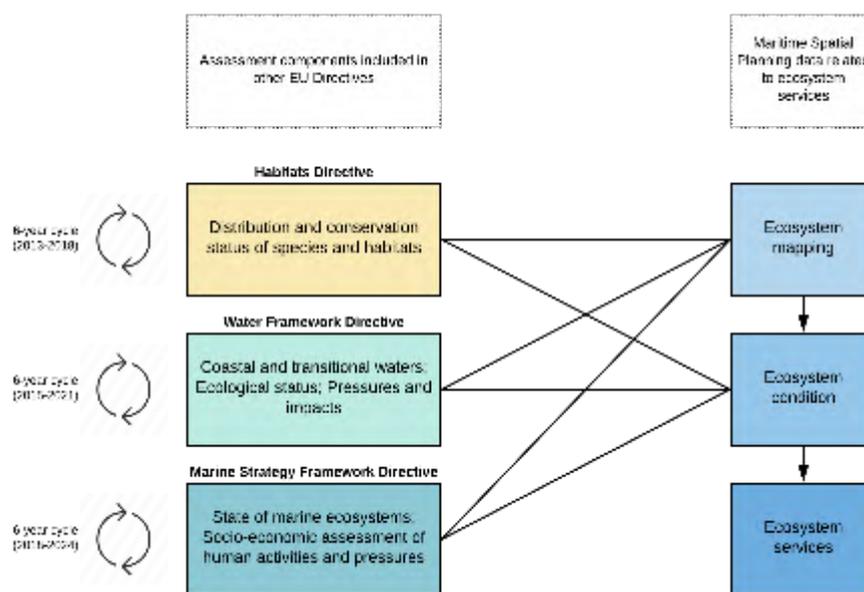


Figure 2. MSP use of data related to ecosystem services and links with other Directives

Depending on data availability and on the scale of the analysis, an approach combining qualitative and quantitative data can be used.

Decision-making can be supported by tools such as Impact Assessments, Multi-criteria Decision Analyses, Social Cost Benefit Analyses, supported by scenarios anticipating future impacts (as detailed in Chapter 3). Using Multi-criteria Decision Analyses helps comparison between different ecosystem services and the integration of data of different nature (both qualitative and quantitative).

Maritime Spatial Plans can set conditions to contribute to ecosystem enhancement, including by reducing key pressures, as well as for avoiding or minimising potential negative impacts in line with the mitigation hierarchy.

Monitoring and evaluation of the MSP is crucial to the following stage of revision of the Plan. Stakeholder participation is part of the entire process, including with regards to links between sea and land issues.

5.3.4. Challenges

Various challenges remain in the way of integrating ecosystems and their services into MSP. Many marine ecosystem functions occur in the water column, which constitutes a third spatial dimension, and they can change depending on the variation of many ecological parameters such as water temperature or salinity. The location of marine ecosystems is also much more dynamic and variable than that of terrestrial ones. As a consequence, ecosystem functions and their related services are difficult to map.

Insufficient knowledge of the ecological functions and processes behind some ecosystem services also makes mapping difficult. Thus, it will be important to advance research in this area, and to strengthen policy-science interfaces for a better uptake of this knowledge.

Examples of assessment of marine biodiversity and ecosystem services are already available from the MSP process in a number of Member States.

Box 33. Some Practical examples :

Natural capital assessment to support marine spatial planning in the Mediterranean Sea, Italy

Natural capital assessment is a useful tool to support spatial planning and zonation of marine protected areas (MPAs) and the wider sea scape, with a view to deliver both wellbeing and conservation objectives. In Egadi Islands Marine Protected Area, Italy, natural capital accounting has helped to identify further, targeted needs for conservation zonation to improve the marine reserve's effectiveness.

For the full case study, see **Section C, Case study 3**

Maritime Spatial Planning, Latvia

As part of the development of the national Maritime Spatial Plan of Latvia in 2015-2016, ecosystems and their services were assessed in order to (i) map areas important for provisioning ecosystem services, (ii) identify impacts of different sea use scenarios and spatial solutions of the Plan on marine ecosystems and their services and (iii) raise stakeholder awareness on the importance of ecosystem benefits and services. The results of the mapping and assessment of ecosystems and their services have been applied to the Strategic Environmental Assessment (SEA) of the draft Plan, which was conducted in parallel to the development of the Plan (still pending adoption)

For the full case study, see **Section C, Case study 5**

6. NATURAL CAPITAL AND ECOSYSTEM SERVICES IN BUSINESS DECISION-MAKING

This chapter presents current best practices and existing tools used by front-runners in the business community to integrate ecosystems and their services in their decision-making.

6.1. Why integrate ecosystems and their services into business decisions?

All business activities are to some extent dependent on natural capital, i.e. the stock of renewable and non-renewable resources (including ecosystems and their services that yield a flow of benefits to people. The 2019 Davos Global Risks Report highlighted biodiversity loss and ecosystem collapse as key global economic risks (World Economic Forum 2019). Taking into account ecosystems and their services can help businesses reduce risks and become more resilient.

There are two benefits from integrating ecosystems and their services into business decisions. Firstly, it can lead companies to make decisions that have more positive impacts on natural capital, thus benefiting those companies that depend heavily on natural capital. Secondly, the integration of ecosystems and their services is a corporate sustainability practice that can enable external disclosure (**Table 2**). Corporate sustainability can enhance companies' reputation, accountability and legitimacy (Carroll and Shabana, 2010). It can also save costs (Searcy, 2012) and is positively correlated with improved financial performance (McWilliams and Siegel, 2000). Moreover, integrating natural capital contributes to better relationships with stakeholders, increases the loyalty of employees, and creates opportunities for new products (CBD, 2018).

Table 2. Advantages of integrating ecosystems and their services into corporate decision-making (adapted from Tardieu and Crossman, 2016)

Corporate decisions (management system)	External disclosure (integrated sustainability reporting)
<ul style="list-style-type: none"> • Determining more cost-effective investments • Identifying risks and increasing business resilience • Identifying new opportunities and new products • Responding to legal regulations and ultimately reducing taxes, or becoming eligible for other financial incentives • Developing new competitive advantages • Developing leadership in ecosystem 	<ul style="list-style-type: none"> • Responding to consumer demand for green products • New competitive advantages • Enhancing business reputation and image • Strengthening life-cycle assessments or environmental impact assessments by taking into account ecosystem services • Consideration by different investors, and consideration for bank loans and grants • Enhanced loyalty of employees

services integration • Enhancing project design and acceptance	
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6.2. Legal and policy context

The EU **Non-Financial Reporting Directive (NFRD)** requires large listed companies to disclose important information on key environmental, social and governance factors. One of the key performance indicators recommended by the Commission guidance for the first round of reporting in 2018 deals with impacts — and our own dependence — on natural capital and biodiversity.

Corporate social responsibility is the responsibility of enterprises for their impact on society, recognised and developed on a voluntary basis. Its aim is to keep track of business sustainability performance across a variety of fields, including the environment, society, the economy and other cross-cutting topics. Corporate sustainability can also include the integration into business strategy and operations of information from the mapping and assessment of ecosystems and their services.

The **action plan on sustainable finance** will provide new opportunities for the integration of natural capital, ecosystems and ecosystem services into business decisions. The financial sector has great potential to help integrate biodiversity considerations into business. It plays a key role in generating new financial arrangements to support innovative business models or to integrate new risks in the assessment of investments.

The **High-level Expert Group (HLEG) on Sustainable Finance** recommended in January 2018 that:

The Commission should encourage and support the development and use of standards, metrics and methods for quantifying, reporting and managing natural capital risks and opportunities in decisions by financial institutions. This should also consider accounting standards and draw on initiatives targeted at financial institutions, such as the Finance Sector Supplement to the Natural Capital Protocol and the EU Community of Practice on Finance and Biodiversity to standardise approaches, as well as on recent experiences with corporate environmental profit and loss accounting.

Responding to the HLEG, the **action plan on sustainable finance**³⁵ of the European Commission refers in its environmental considerations to the need to address risks related to (i) climate change mitigation and adaptation, and (ii) the environment more broadly³⁶. For climate and environment challenges, there is a strong potential for synergies between (i) finance, (ii) ecosystem-based approaches, and (iii) cost-effective nature-based solutions.

A series of initiatives have emerged in recent years to encourage financial institutions to integrate the risks and opportunities associated with biodiversity and natural capital into their investment decisions. Building on these early initiatives, financial institutions are now

³⁵ https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en#implementing.

³⁶ e.g. covering air and water pollution, resource depletion, and biodiversity loss.

looking for the next steps to take in integrating biodiversity into their assessment and investment strategies.

Since 2016, the Business and Biodiversity (B@B) Finance workstream has organised a forum for 13 financial institutions. The aim of the forum is to ‘share experiences, raise awareness and promote best practices at EU level on how to integrate biodiversity and natural capital into mainstream financial activities and foster investments in natural capital as a new asset class’. The forum focuses on three main topics:

- biodiversity accounting;
- how to have a positive impact on biodiversity;
- ambition and responsibility.

The forum aims to accelerate the process of learning and support implementation, both at strategic level and on the ground. It hopes to thereby support the transition towards a sustainable financial sector.

6.3. Existing communities and resources

There are various communities and platforms that promote useful approaches, tools and case studies on how to integrate ecosystem services into decision making. This sub-chapter presents only a few of these platforms and is not exhaustive.

The Natural Capital Coalition brings together leading global initiatives and organisations to harmonise approaches to natural capital. It includes businesses, academia and public authorities (including the European Commission). The Coalition has developed the Natural Capital Protocol³⁷, a guidance document proposing a step-by-step framework to assess and value natural capital and to inform business decisions. This methodology is accompanied by the Natural Capital Toolkit³⁸, a database of existing tools that can be used at each step of the Protocol. The Coalition gathers case studies and provides guidance for specific economic sectors. More information on the NCP standardised framework is provided in the next section.

The EU Business and Biodiversity Platform (B@B)³⁹ is a platform set up by the European Commission that aims to help businesses integrate considerations of natural capital and biodiversity into business practices. It offers a forum to (i) exchange experience and best practices, and (ii) to develop approaches for assessing, quantifying and valuing companies’ impacts and reliance on natural capital and biodiversity.

The Global Platform on Business and Biodiversity⁴⁰ created by the CBD gathers resources such as guidelines, standards, tools, and studies on the integration of biodiversity into

³⁷ <https://naturalcapitalcoalition.org/protocol/natural-capital-protocol/>

³⁸ <https://naturalcapitaltoolkit.org/>

³⁹ http://ec.europa.eu/environment/biodiversity/business/index_en.htm

⁴⁰ <https://www.cbd.int/business/resources.shtml>

businesses. The CBD's business and biodiversity pledge⁴¹ has been signed by over 100 businesses. The pledge emphasises (i) the importance to businesses of biodiversity and the ecosystem services it provides, (ii) the key role that businesses can play in conservation and in the sustainable use of biodiversity and ecosystem services, and (iii) the urgency of addressing global biodiversity loss and ecosystem degradation.

The World Business Council for Sustainable Development is a global, CEO-led organisation of over 200 leading businesses working together for sustainable development. Its 'redefining value' programme helps companies to improve decision-making and external disclosure by incorporating their environmental, social and governance performance into business and financial systems. Together with the COSO initiative⁴², the World Business Council for Sustainable Development released in 2018 a guidance document on environmental, social and governance risks⁴³. The guidance document makes reference to natural capital.

The UN Global Compact is a voluntary initiative based on CEO commitments to implement universal sustainability principles and to support the UN Sustainable Development Goals (SDGs). The SDG Compass⁴⁴ recommends assessing social and environmental impacts across the entire value chain of the company.

6.4. How to integrate ecosystems and their services into business decisions

6.4.1. A stepwise approach: the Natural Capital Protocol

The Natural Capital Protocol⁴⁵ (NCP) developed by the Natural Capital Coalition⁴⁶ provides a standardised framework⁴⁷ for businesses to identify, measure and value their impacts and dependencies on natural capital. It builds on earlier approaches developed to help businesses measure and value natural capital, including the Corporate ecosystem services review⁴⁸ and the Guide to corporate ecosystem valuation⁴⁹. The protocol focuses on improving internal decision-making and is not a formal reporting framework. The protocol's framework guides the user through four connected and iterative stages, with nine steps and concrete actions to implement them (0).

⁴¹ <https://www.cbd.int/business/pledges.shtml>

⁴² Committee of the Sponsoring Organisations of the Treadway Commission (COSO): <https://www.coso.org/Pages/default.aspx>

⁴³ <https://www.wbcsd.org/Projects/Non-financial-Measurement-and-Valuation/Resources/Applying-enterprise-risk-management>

⁴⁴ <https://www.unglobalcompact.org/library/3101>

⁴⁵ <https://naturalcapitalcoalition.org/natural-capital-protocol/>

⁴⁶ The Natural Capital Coalition brings together leading initiatives and organisations across society and the global economy. <https://naturalcapitalcoalition.org/the-coalition/>

⁴⁷ https://naturalcapitalcoalition.org/wp-content/uploads/2016/07/Framework_Book_2016-07-01-2.pdf

⁴⁸ Hanson, C., J. Ranganathan, C. Iceland, and J. Finisdore. 2012. The Corporate Ecosystem Services Review: Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change. Version 2.0. Washington, DC: World Resources Institute. <https://www.wri.org/publication/corporate-ecosystem-services-review>

⁴⁹ Guide to Corporate Ecosystem Valuation. A framework for improving corporate decision-making. WBCSD, IUCN, ERM, and PwC 2011. <https://www.wbcsd.org/Programs/Redefining-Value/Business-Decision-Making/Measurement-Valuation/Resources/Guide-to-Corporate-Ecosystem-Valuation>

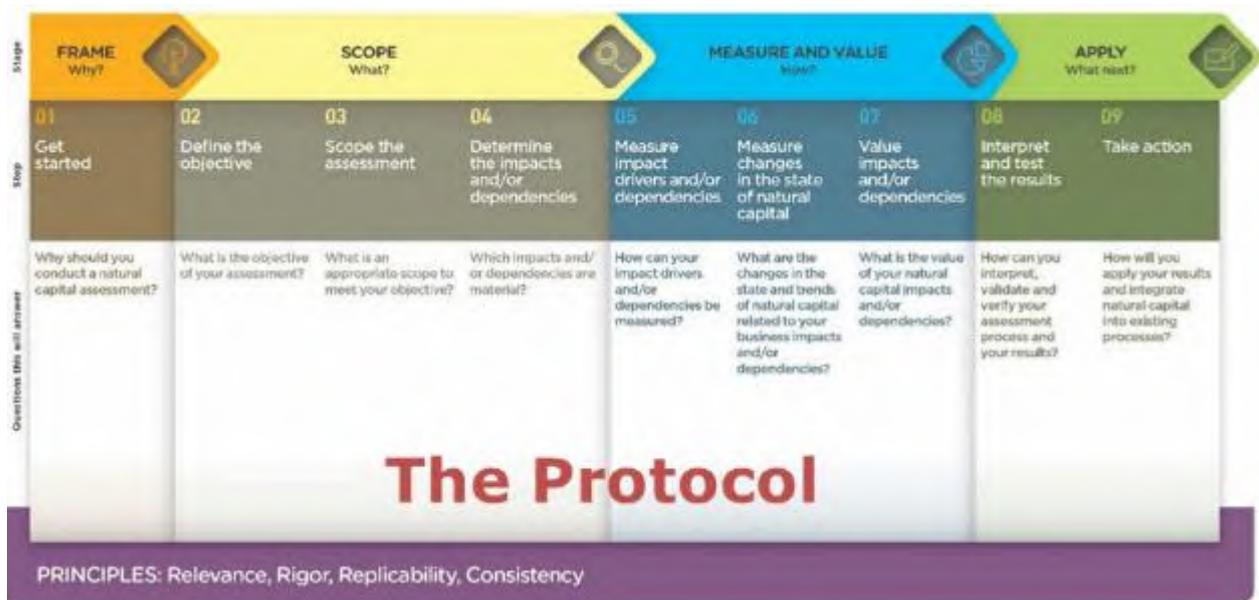


Figure 8. The stages, steps and principles of the Natural Capital Protocol (Source: Natural Capital Coalition 2018).

The [protocol application program](#)⁵⁰ has delivered webinars and explanatory material to support businesses in their decision-making.

While the protocol provides a standardised process, it remains flexible in the choice of measurement and valuation approaches, and their tools related to these approaches. The subject is under rapid development, driven by a growing number of innovative international companies. Many tools and methodologies for assessing business impacts and dependencies on natural capital have been developed and used, or are being further elaborated and refined⁵¹. Such tools can support the application of the Natural Capital Protocol framework and inform corporate decision-making. A few examples are provided in Section 6.3.2 below.

The [Natural Capital Toolkit](#) is an interactive database that helps interested businesses to find the right tool for their specific circumstances to measure and value natural capital when they use the Natural Capital Protocol.

The [NCP supplement on finance](#) provides a framework for financial institutions to assess the natural capital impacts and dependencies of their investments and portfolios. It was developed in acknowledgement of two facts. Firstly, that the natural systems that underpin the global economy are deteriorating past the point of effective service provision. And secondly, that this will have potentially significant consequences for many businesses, and

⁵⁰ <https://naturalcapitalcoalition.org/protocol/protocol-application-program/>

⁵¹ In addition to [Kering's EP&L](#), examples include [BASF's Value-to-Society](#), [Nestlé's Social Impact Valuation \(PDF\)](#), [AkzoNobel's 4D P&L](#), [Novartis' financial, environmental and social impact \(PDF\)](#), [Solvay's Extra-financial statements](#), [Natura's EP&L and upcoming SP&L](#), and most recently, [Philipps' EP&L](#). Some leading cement companies — [LafargeHolcim \(PDF\)](#), [Argos Cementos](#) and [CEMEX](#) — also have used similar approaches to develop integrated financial-like statements that all use [KPMG's True Value](#) approach. — see <https://www.wbcsd.org/Programs/Redefining-Value/Business-Decision-Making/Masurement-Valuation/Business-Examples>.

for those who have financed or insured these businesses. The NCP supplement places a specific focus on the following activities:

- **banking:** project finance, corporate lending, and underwriting;
- **investment:** investment across the range of asset classes (e.g. equities, corporate bonds, sovereign bonds, property, private equity, infrastructure), active ownership (engagement), and impact investing;
- **insurance:** corporate underwriting and reinsurance, with investment management activities covered under investment.

6.4.2. A few examples of tools and methodologies

The **Environmental Profit & Loss (EP&L) accounting methodology**⁵² enables a company to measure the monetary costs and benefits it generates for the environment, and in turn to make more sustainable business decisions. It is based on seven steps, with guidelines for carrying out each step. The seven steps are as follows.

1. Decide what to measure;
2. Map the supply chain;
3. Identify priority data;
4. Collect primary data;
5. Collect secondary data;
6. Determine valuation;
7. Calculate and analyse your results.

The EP&L methodology can help to uncover opportunities to (i) innovate business models; (ii) improve efficiency; (iii) compare performance in different areas of the business, between different impacts, and over time, and (iv) integrate environmental profits and losses into classic financial reporting. Kering is making the methodology available on an open-source basis.

The [biodiversity footprint tool](#)⁵³ enables a business to measure its impact on biodiversity, based on the two major pressure factors of land use and greenhouse gas emissions. In the updated version of the tool, the pressure factors of water use and emissions (nitrogen and phosphorus) to water will be included.

⁵² <http://www.kering.com/en/sustainability/methodology>

⁵³ <http://www.plansup.nl/expertise/biodiversity-footprint/>

The Natural Capital Toolkit also highlights sector-specific tools such as the [Cool Farm Tool](#)⁵⁴ (an online tool with a calculator for biodiversity, greenhouse gases and water use in farming), or the Cement Sustainability Initiative's [guidelines on quarry rehabilitation](#)⁵⁵.

The **Global Biodiversity Score** (GBS)⁵⁶ developed by CDC Biodiversité aims to enable companies from all sectors to quantify their impacts on ecosystems by using a single indicator. This indicator is expressed in surface area of destroyed pristine natural areas. The methodology makes it possible to quantify a business's biodiversity footprint all the way along the value chain. The GBS is a corporate biodiversity footprint assessment. The results of assessments conducted with the GBS are expressed in the MSA.km2 unit where MSA is the Mean Species Abundance, a metric expressed in % characterising the intactness of ecosystems. MSA values range from 0% to 100%, where 100% represents an undisturbed pristine ecosystem.

Environmental and conservation organisations also partner with research organisations and innovative businesses to develop and test tools for the integration of nature's value into business decision-making. Examples of such partnerships include WWF's [Protected Areas Assessment Tool](#)⁵⁷, the IUCN's **Biodiversity Input-Output for Supply Chain & Operations Evaluation**⁵⁸ ([BioScope](#)), and the [Integrated Biodiversity Assessment Tool](#)⁵⁹ (IBAT for business).

Many of the tools and resources to support assessment and modelling referenced in **Chapter 3** of this guidance — such as [ARIES](#), [InVEST](#) and [TESSA](#) — can also be relevant to businesses.

6.5. Remaining challenges

Analysis of the value chains. The outcomes of the mapping and assessment of ecosystems and their services depend on the scope of the analysis chosen by businesses. Impacts can be assessed all along the value chain. Key impacts and dependencies are often 'upstream' in the supply chain, including in foreign countries and in the work of subcontractors. Adopting a holistic approach can be a challenge for companies that often do not have a fully detailed picture of the upstream part of their value chains. A stepwise approach is necessary to better incorporate information and deliver more sustainable decisions.

Harmonised management accounting frameworks and integrated reporting standards. There are no standardised tools for measuring natural capital impacts and dependencies. Existing tools can be difficult to use or adapt to private sector activities (Tardieu and Crossman 2016). Partnerships between stakeholders, such as the platforms listed above, are crucial to continue the development of these tools. The successful integration of natural capital, ecosystems and their services into corporate decision-making depends on their

⁵⁴ <https://coolfarmtool.org/coolfarmtool/biodiversity/>

⁵⁵ <https://www.wbcdcement.org/index.html>

⁵⁶ <http://www.mission-economie-biodiversite.com/wp-content/uploads/2019/05/N14-TRAVAUX-DU-CLUB-B4B-GBS-UK-WEB.pdf>

⁵⁷ http://d2ouvy59p0dg6k.cloudfront.net/downloads/pa_bat_final_english.pdf

⁵⁸ <https://www.bioscope.info/>

⁵⁹ <https://www.ibatforbusiness.org/>

integration into harmonised management-accounting frameworks and sustainability-reporting standards.

Harmonising natural-capital-related reporting and corporate disclosure is at an early stage of its development. The EU's non-binding guidelines on non-financial reporting⁶⁰ were adopted in 2017 under Directive 2014/95/EU⁶¹ on the disclosure of non-financial information (the 'NFRD Directive'). These guidelines referred to natural capital impacts and dependencies as examples of non-financial information. The guidelines also referred to the Natural Capital Protocol.

Complexity of assessing monetary costs and benefits. For businesses to integrate ecosystems and their services into their strategies and operations, a difficulty can arise from the fact that degradation/loss cannot always be expressed in immediate and tangible costs. Another difficulty is that opportunity costs can be difficult to measure (Houdet et al. 2012). As acknowledged by the Natural Capital Coalition (NCC), sometimes values can be attributed to ecosystems and their services, but many values (particularly those related to underlying ecosystem functions, resilience to change, or the 'intrinsic' values of nature) tend to be hidden or missing altogether. Businesses are encouraged to use qualitative and quantitative metrics while acknowledging uncertainties and adopting a precautionary approach. A number of companies have found that they need more guidance for the biodiversity and ecosystem-accounting component of a comprehensive natural-capital assessment. This means there is a need to strengthen the development of methodologies.

In conclusion, a growing number of businesses and financial institutions are taking up NCA and other methods to assess their impacts and dependencies on biodiversity and ecosystem services. These efforts are yielding practical business benefits from improved decision-making, optimised operations, and better environmental performance. Tools and methods are being applied, adapted and refined, and new metrics are under development.

Further work is needed to propose suitable metrics. Some of this work is already underway, such as the NCC's biodiversity project⁶². An overview and critical assessment of biodiversity metrics has been published⁶³, and related work is ongoing. The EU Business and Biodiversity Platform⁶⁴ is also contributing to this effort.

Box 34. Some practical examples of natural capital accounting:

Integrating ecosystems and their services into standards for private investment - the International Finance Corporation.

The International Finance Corporation Environment and Social Performance standard recognises that protecting and conserving biodiversity, maintaining ecosystem services, and managing living natural resources adequately are key to sustainable development.

⁶⁰ See Communication on Guidelines on non-financial reporting (2017/C 215/01) [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017XC0705\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017XC0705(01)&from=EN)

⁶¹ https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/non-financial-reporting_en.

⁶² <https://naturalcapitalcoalition.org/projects/biodiversity/>.

⁶³ B@B_Assessment_biodiversity_accounting_approaches_Update_Report_1_19Nov2018.pdf.

⁶⁴ http://ec.europa.eu/environment/biodiversity/business/news-and-events/news/news-63_en.htm.

For the full case study, see **Section C, Case study 12**

Ecosystem service market for peatland restoration, UK

Voluntary standards for the private sector can help to create markets for peatland climate benefits. This could make peatland restoration attractive for business sponsors. The UK Peatland Code demonstrates how such a framework can be developed and implemented through targeted science-policy research and pilot projects.

For the full case study, see **Section C, Case study 7**

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