



D4.3 Guidelines for enabling uptake in project and policy cycles

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1 Preface

The importance of biodiversity, natural capital and healthy ecosystems and the services they supply has increasingly been acknowledged in diverse policy initiatives (e.g., the EU nature restoration and amending Regulation from 2024, EU Biodiversity Strategies 2020 and 2030, Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), UN's Natural Capital and Ecosystem Services Accounting (SEEA EA), Intergovernmental Panel on Climate Change (IPCC) and Convention on Biological Diversity (CBD)).

The EU Horizon Research and Innovation Action “Science for Evidence-based and sustainable decisions about NATural capital” (SELINA) aims to provide robust information and guidance that can be harnessed by different stakeholder groups to support transformative change in the EU, to halt biodiversity decline, to support ecosystem restoration and to secure the sustainable supply and use of essential Ecosystem Services (ES) in the EU by 2030.

SELINA builds upon the Mapping and Assessment of Ecosystems and their Services (MAES) initiative that has provided the conceptual, methodological, data and knowledge base for comprehensive assessments on different spatial scales, including the EU-wide assessment (Maes et al. 2020) and assessments in EU member states. Knowledge and data for different ecosystem types are increasingly available.

The overall objective of Work Package (WP) 4 “Ecosystem services mapping and assessment” is to refine the ES knowledge base that is available from prior EU Actions by diagnosing, developing and testing the capabilities of ES assessment approaches, models and indicators that can increase the likelihood of uptake in decision-making.

The Deliverable D4.3 “Guidelines for enabling uptake in project and policy cycles” presents a set of guidance templates to support decision-makers in the writing of the Terms of Reference when commissioning ecosystem service assessments through a call for tender. The guidance templates cover three sections of a Terms of Reference: Frame & Scope, Methodology, and Evaluation Criteria. They have been designed with preformatted text that the commissioners can directly use in their own Terms of Reference. Extensive material has also been developed to provide commissioners with basic to advanced understanding of the concepts underlying ecosystem service assessments.



2 Summary

Despite growing needs for policy-relevant information on ecosystems and their services, recent literature reviews show that the uptake of valuation of ecosystem service findings in decision-making remains limited. SELINA Work Package 4 (WP4) diagnoses why ecosystem service assessments have low uptake. Our work is based on two background hypotheses motivated by the IPBES Values Assessment¹ regarding barriers to uptake:

1. **Practitioners need to strengthen selected study design features of ecosystem service assessments.** A list of seven ‘diagnostic topics’ were developed in Deliverable D4.1 to mainstream guidance on these features in the design of ecosystem service assessment. The assumption is that this will increase their reliability, credibility, legitimacy and timeliness, making them more suitable for decision-support. These diagnostic topics include: (1) Spatial resolution and scaling capabilities; (2) Ecosystem condition in ecosystems service assessments; (3) Ecosystem service capacity, potential, supply-use and demand; (4) Uncertainty documentation; (5) Economic valuation; (6) Social benefits; and (7) Health benefits.
2. **Decision-makers’ need ecosystem services knowledge to be better communicated to practitioners.** Due to a lack of internal expertise, decision-makers often commission ecosystem service assessment to external contractors through a call for tender. The Terms of Reference detailing the boundaries of the requested assessment is at the heart of this process. The assumption is that guidance on writing this document will increase its clarity and facilitate the communication between decision-makers and practitioners.

Deliverable D4.1 developed checklist questions per diagnostic topics designed to help practitioners improve the likelihood of uptake of their ecosystem service assessment findings in decision-making. Deliverable D4.2 tested and refined these checklists with Demonstrations Projects (DPs) and Test Sites (TSs) with Work Package 4 grouped by five specific families of ecosystem services: (1) Agriculture and Forestry; (2) Hydrology and Water; (3) Air quality and Climate; (4) Recreation and Amenities; and (5) Fishery, Aquaculture and Marine. Deliverable D4.3 rephrased D4.2 questions and structured them as Terms of Reference to make them directly actionable for commissioners. The work was done through a transparent and inclusive co-design and testing process involving volunteering DPs and TSs from WP4, as well as broader stakeholders from Work Packages 2, 8, 9, and 10.

Deliverable D4.3 guidance focuses on supporting the commissioners in the writing of the Frame & Scope, Methodology and Evaluation Criteria sections of a Terms of Reference while raising their awareness about the concepts such assessments entail. The guidance has been designed as templates with questions that the commissioners can answer. Each of the questions is supported by descriptions and examples, as well as links to more advanced content. To write their Terms of Reference, preformatted text has been designed and can be copy-pasted and further refined by commissioners. Further work is still needed in Deliverable D4.4 to test and deploy our D4.3 guidance to broader stakeholders and derive some potential conclusions on the mainstreaming of diagnostic topics and the impacts on the uptake.

¹ [Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Values Assessment](#), 2022.



3 List of abbreviations

CSRD	Corporate Sustainability Reporting Directive
DPs	Demonstration Projects
DT	Diagnostic Topic
EIA	Environmental Impact Assessment
ES	Ecosystem Service
EU	European Union
FIEA	Framework for Integrated Ecosystem Assessment
GfV	Governance for Valuation
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
LLM	Large Language Model
ToR	Terms of Reference
TSs	Tests Sites
WP	Work Package



4 Scientific report

This Chapter describes the scientific context and process of the guidance that was produced. The guidance documents themselves are designed for decision-makers and stakeholders. They are presented separately in the subsequent chapter [5. Guidance to commission ecosystem service assessment](#).

4.1. Introduction

4.1.1 Context

Growing awareness and concern about the impacts of human activity on ecosystems and biodiversity have led to a number of binding international agreements to mitigate and reverse these impacts, including the [Sustainable Development Goals](#) (*i.e.*, 6 – Clean Water and Sanitation, 14 – Life Below Water and 15 – Life on Land; United Nations General Assembly, 2015), the [Kunming-Montreal Biodiversity Framework of the Convention on Biological Diversity](#) (United Nations, 2022), the [EU Nature Restoration Law](#) (European Council and Parliament, 2024a) and [Corporate Sustainability Reporting Directive](#) (CSRD; European Council and Parliament, 2022). Ecosystems and their services are at the center of these policies and regulations.

To achieve their goals and targets, public and private decision-makers have growing needs for policy-relevant information on ecosystems and their services (Pascual et al., 2023). Scientific research is increasingly seen as needing to support evidence-based public and private decision-making. Over the years, the international community has increased their funding towards research programs aimed at assessing and mapping ecosystems and their services, such as the UN-initiated Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005), the EU-wide Mapping and Assessment of Ecosystems and their Services (Maes et al., 2020), and the more recent [ESMERALDA](#) and [SELINA](#) EU projects. More locally, to meet the new EU reporting requirements in challenging areas such as ecosystem accounting (European Council and Parliament, 2024) and CSRD, national public and private entities often commission the work they need from external expert organisations, including research institutes.

Despite these requests for assessing ecosystems and their services, scientific research and decision-making, whether public or private, can at times seem disconnected, like two trains traveling at different speeds, struggling with communication and knowledge transfer. Previous reviews have shown that the uptake of research findings in decision-making in terms of their direct uses and applications by decision-makers remains low (Laurans et al., 2013; Barton et al., 2022; Termansen et al., 2022; Walther et al., 2025). Indeed, the assessment of Nature's Contributions to People, produced by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), showed that less than 5% of research studies on valuation of nature's contributions to people documented uptake in policies (Barton et al., 2022; Termansen et al., 2022; Pascual et al., 2023). The recent work of Walther et al. (2025) found a similar percentage with only 4% of their analysed published studies on ecosystem services documenting actual uptake in policies. Despite the difficulty of measuring uptake (Gunn and Mintrom, 2021; Walther et al., 2025), these figures suggest a



surprisingly low impact of scientific knowledge on ecosystem services being used to inform decisions on the management and use of ecosystems and their services.

This science to policy gap may have several root causes. Already in 1979, Nathan Caplan introduced the “Two-Communities” theory, whereby researchers and policy-makers have two different cultures, notably using different languages and timescales (Gollust et al., 2017; Reichmann and Wieser, 2022). In 2015, Brian Head studied the relationships between researchers and public servants. Some of his conclusions aligned with this view as he pointed out that there was a need for better communication channels, as well as a need for timeliness and salience in research studies. He also mentioned that public servants often lack the resources (*e.g.*, time, expertise) to dig into the scientific findings, but that internally conducted or externally commissioned studies had higher chances to be taken up in policies than other types of research (Head, 2015). More recently in the IPBES, Barton et al. (2022) summarised by stating that the uptake depended on a number of factors including the timeliness of the research, its salience, credibility and legitimacy, but also the cost for information. Uncertainties have also been pointed out as an important hurdle to the uptake (Laurans et al., 2013; Lautenbach et al., 2019; Vári et al., 2024; Walther et al., 2025). Some recent studies seem to suggest that a more participatory approach to science with a higher involvement of stakeholders could help the uptake of research findings in decision-making (Reichmann and Wieser, 2022; Vári et al., 2024; Walther et al., 2025).

Here, we argue that the challenge to uptake can be viewed in two ways: (i) the uptake of research findings *in decision-making*; and (ii) the uptake of decision-making needs *in research*. Both types of uptake are dependent on each other, and at the heart of them are communication and learning. Uptake (i) is about properly conveying research findings to make them accessible and relevant to decision-making so they can be used and applied by decision-makers. While uptake (ii) is about clearly conveying needs and expectations from decision-making so they can be translated into concepts and methodologies by science. But simply conveying information won’t be enough to bring the “Two-Communities” of Nathan Caplan together if it is not underlaid with listening and learning (**Figure 1**). In this simple framing of interactions between science and decision-making, there is a need for tools that enable communication while raising two-way awareness and understanding around both scientific concepts and decision-making needs and constraints.

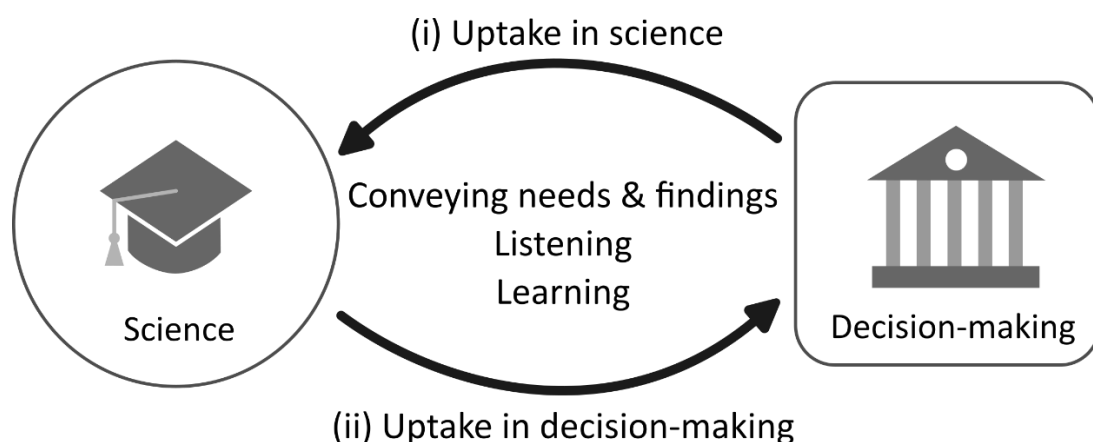


Figure 1 - Two-way uptake between science and decision-making



The simple uptake model above assumes a willingness on the part of both scientists and decision-makers to listen and learn in an ecosystem service (ES) assessment process. Real-world governance interactions are obviously more complex. Political actors' use of the knowledge may mean that actual uptake is determined by power dynamics within and between organisations and political expediency (Barton et al., 2024). We will return to this discussion, but for now the communication tool we develop in this report assumes an “affirmative” or “confirmative” context for the ES assessment (Jacobs et al., 2023).

For ES assessments, the crucial entry point for this communication tool is the call for tender. Public and private entities often publish a call for tender to commission ES assessments when internal expertise is not available. The foundation of a call for tender is the Terms of Reference (ToR), which outlines the collaboration between both a **commissioner** (*i.e.*, public or private entities) and a **contractor** (*i.e.*, practitioners or experts, usually from research entities). A ToR notably defines the agreement between the involved parties on the content and boundaries of the assessment. The background hypothesis of our work is that uptake (i) would increase uptake (ii). We suggest that working on uptake (i) by addressing commissioners' knowledge on ecosystems, their condition and services through the development of clear guidance for writing a ToR to commission ES assessments, would facilitate the uptake of the findings of the commissioned studies in decision-making. We believe that uptake (ii) depends on commissioners thoroughly understanding their own needs and their ability to properly translate them in their ToR when they open a call for tender to commission ES assessments.

In this report, we present a series of guidance to support commissioners in both the writing of their ToR to commission ES assessments, as well as in the understanding of the different associated scientific concepts and their implications (see Chapter [5. Guidance to commission ecosystem service assessments](#)). Caplan's “Two-Communities” is a simplification. It might be more relevant to talk about a spectrum of interactions between public servants, private consultants and researchers (Newman et al., 2016). Furthermore, public decision-makers and researchers represent several personas, all having different degrees of interactions and involvement with each other (Head, 2015; Newman et al., 2016). Overall, these works seem to suggest that the relationships between decision-makers (or commissioners), and research (or contractors) are multi-coloured and complex, occurring in multiple different ways. Our guidance is an attempt at improving these interactions by enhancing communication and mutual understanding between commissioners and contractors of ecosystem assessments. Aimed at directly supporting the writing of a ToR, our guidance intends to act as an interface which allows the commissioners and contractors to exchange complex information on concepts, methods, data and information needs in a streamlined way.



4.1.2 Terms of Reference

4.1.2.1 Principles of a call for tender

Lack of available internal knowledge and expertise often leads public and private entities to commission ecosystem service (ES) assessments through a call for tender. The process of hiring a contractor through a call for tender is broadly described in **Figure 2** below. Our guidance focuses on supporting commissioners for steps: (1) Write the Terms of Reference, and (4) Evaluate and rank proposals. Chapter [5. Guidance to commission ecosystem service assessments](#) presents a recommended workflow detailing when our guidance should be used in the process of call for tender.

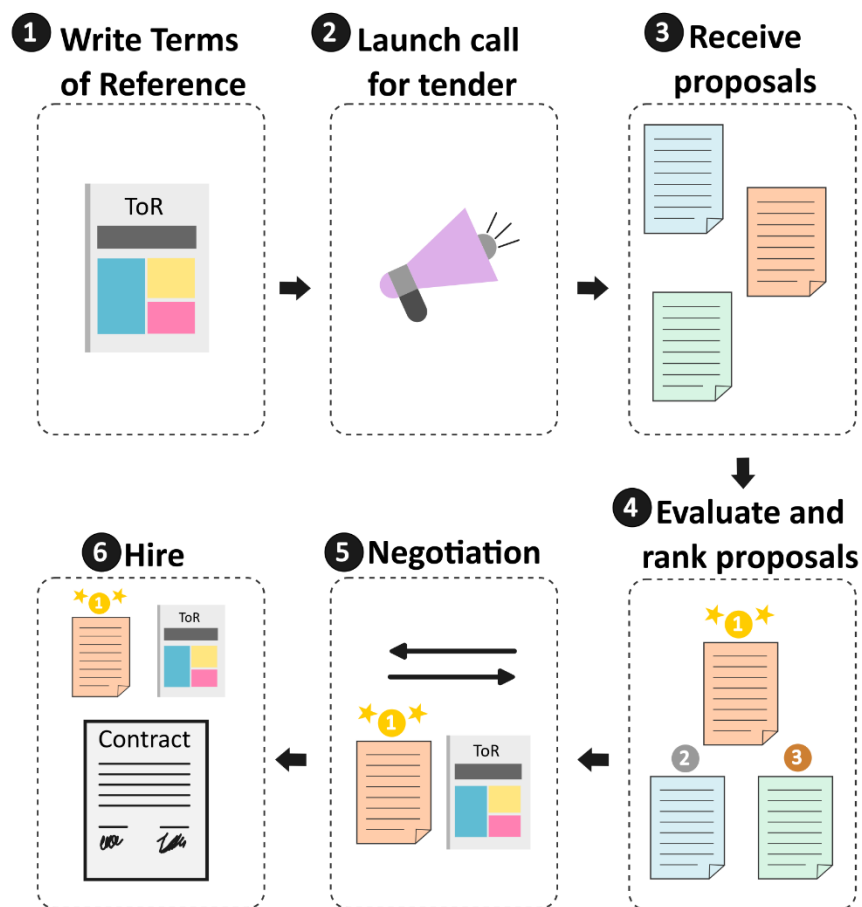


Figure 2 - Main steps of a commissioning process through a call for tender

The policy cycle developed by Pascual et al. (2023) for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) – Value Assessment (2022) defines the different stages of a decision-making process (**Figure 3**). Although it represents a very simplified policy decision-support process for public sector purposes, the steps described have similarities with private sector assessments (see [Annex 8.1 Typology of purposes](#)). Each of the steps in the policy cycle have different purposes, which means that ES assessments will differ depending on the step(s) it is intended to inform. Our guidance was designed to be



flexible and general, allowing for specific adaptations from commissioners so it can be applied at any steps and associated purposes in the policy cycle (**Figure 3**).

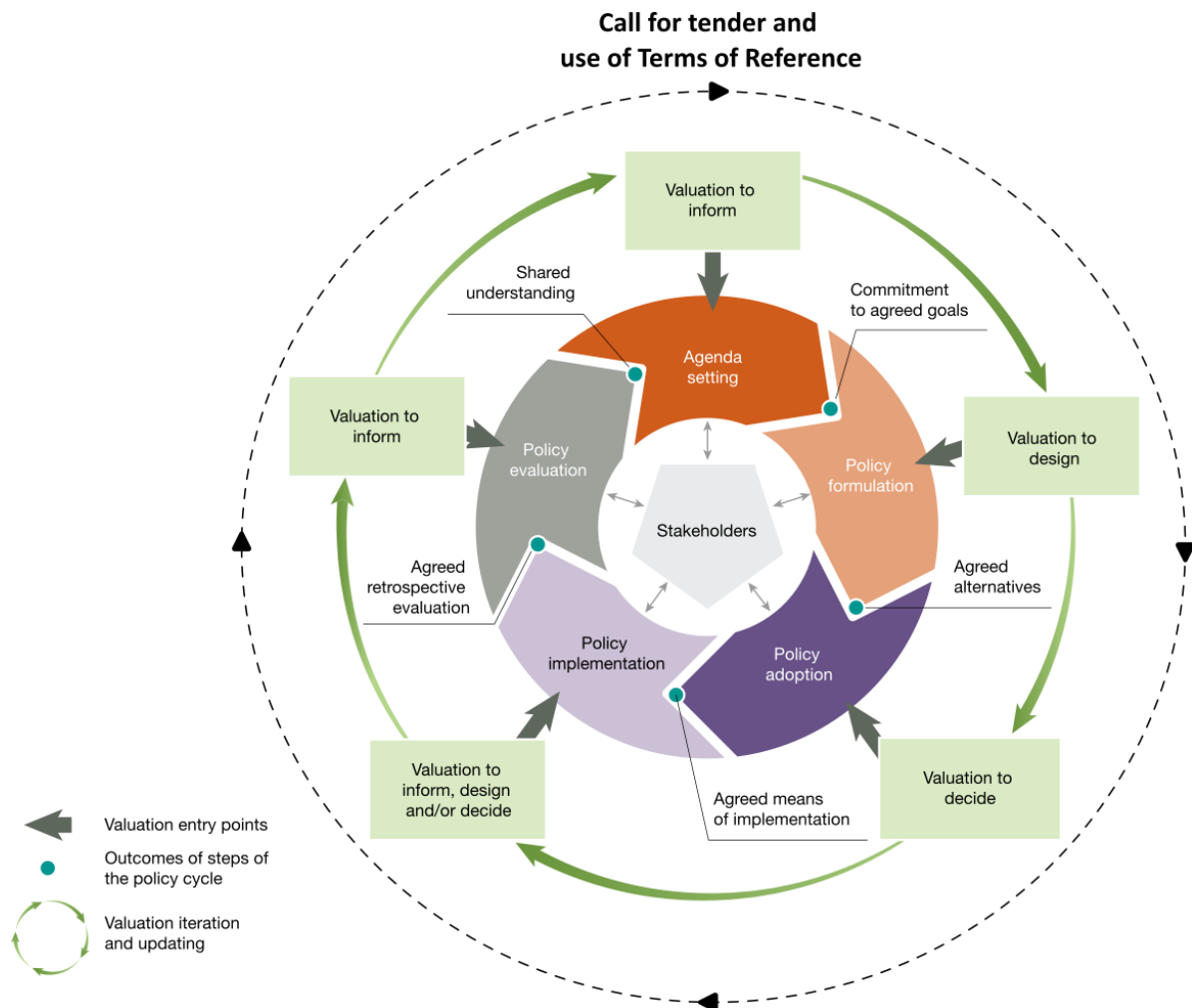
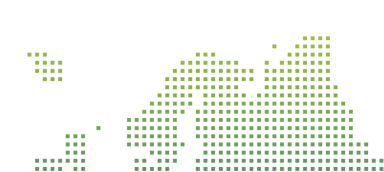


Figure 3 - Call for tender and use of Terms of Reference in the policy cycle. Adapted from Pascual et al., 2023. Note: “Valuation” as used by the authors and the IPBES Values Assessment covers nature’s contributions to people, including assessment of biophysical ecosystem services and economic, health and social benefits, as defined by the diagnostic topics in this report

In the private sector our ToR guidance is also relevant for the Framework for Integrated Decision-making (2024a) developed by Capitals Coalition specifically to support the private sector in integrating natural, social, human and produced capitals in their decision-making. This framework introduced seven steps for the consistent and transparent integration of the four types of capitals. These steps are supported by two technical guidance documents providing details on how to conduct an integrated capitals assessment (Capitals Coalition, 2024b), and how to build transparency and confidence in the results of such an assessment (Capitals Coalition, 2024c). **Figure 4** summarises how these steps and supporting documents interact within the Framework for Integrated Decision-making. Our ToR guidance can partially support *Step A - Agree on the decision to inform*, but it could also be partially applicable for *Step E – Validate and verify key assumptions*. Aspects from our ToR guidance could also support the Governance for Valuation (GfV) document, in particular the through ensuring the



transparency of the methodological design of an ES assessment. Similarly, our ToR guidance could partially support the Assemble step of the Capitals Protocol which helps define the frame and scope of an ES assessment.

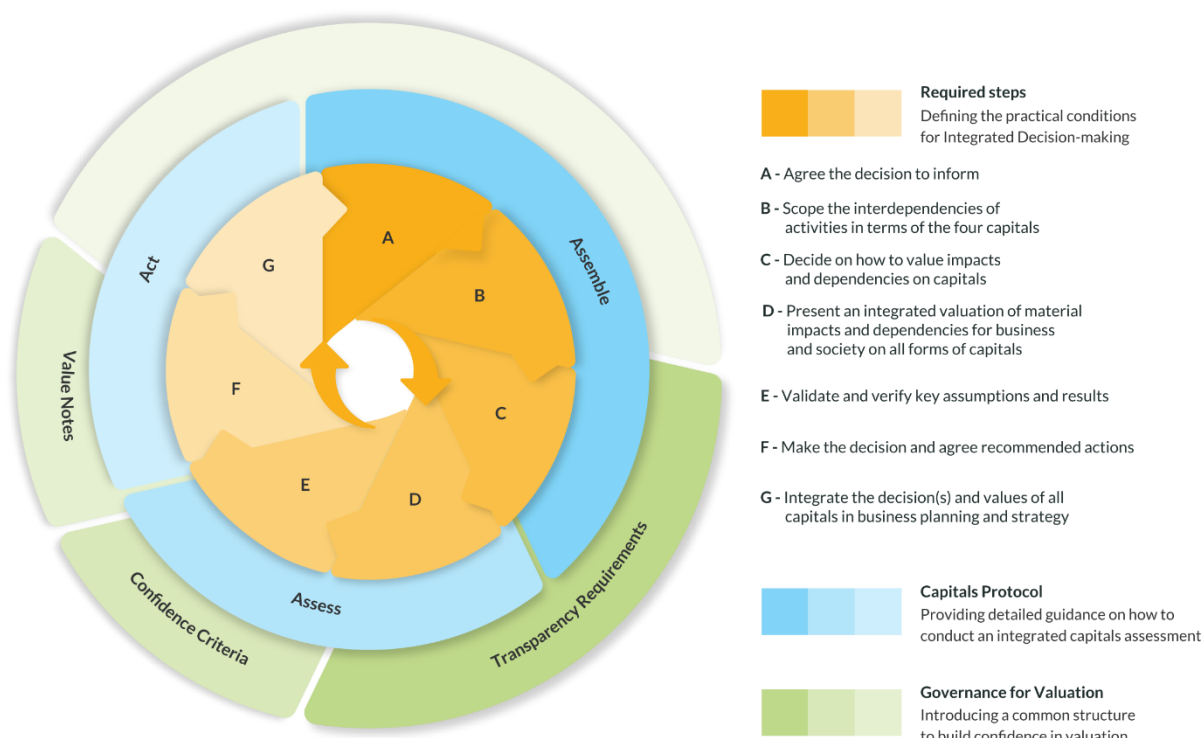


Figure 4 - Guidance for an integrated decision-making in the private sector. *Source: Framework for Integrated Decision-making (Capitals Coalition, 2024a)*

Further developments are needed to adapt our guidance to the private sector. This is further discussed in [4.1.3 Needs for Terms of reference from Stakeholders in SELINA](#) and in [4.3.2 Adaptations of our guidance to the private sector](#).

4.1.2.2 Definition and structure

In the context of our report, we define the ToR as a document that establishes the collaboration between a commissioner and a contractor to conduct an ES assessment. In addition to defining the roles and responsibilities of each party, it thoroughly describes the agreed boundaries of the assessment including its context, purpose, timeline, methodology and outputs. A ToR presents similarities with “project charters” and Description of Action but is more detailed.

A generic ToR can be viewed as encompassing fifteen sections (**Figure 5**). In our guidance, we support the writing of solely three sections:

(3) Frame & Scope which defines the boundaries of the ES assessment;



(4) Methodology which details the technical design and techniques of the ES assessment, as well as the involvement of stakeholders; and

(13) Evaluation Criteria which mainly lists the criteria upon which the commissioners will evaluate the proposals received by contractors.

More details are provided in [4.1.6 Objectives](#) and in [5.1 General information](#).



Figure 5 - General structure of a Terms of Reference. See section [4.2 Methodological design](#) for more information on how it was derived.

4.1.3 Needs for Terms of reference from Stakeholders in SELINA

To ensure transparency, reliability and stakeholder engagement, we worked collaboratively with work packages (WP) WP2, WP8, WP9 and WP10. We scoped the needs of a ToR guidance to commission ES assessments together with the stakeholders from these work packages. The following sections summarises the feedback that was obtained from these discussions. Stakeholders from WP8 are strictly from the public sector, while those from WP9 represent the private sector or hybrid private-public cases. Stakeholders linked to WP2 and WP10 could include representatives from both the public and private sectors.

4.1.3.1 Communities of practice and seeds of transformative change (WP2)

Within WP2, Communities of Practice (CoP) were established in most of the SELINA project partner countries. These CoPs showed the need to bring practitioners and policymakers from the public and private sector together. Over 2024-2025, CoPs met to discuss a variety of topics. Two CoPs (Slovenia and Latvia) explicitly discussed the work done in WP4 to develop a ToR guidance. During these meetings, participants of both CoPs shared their experiences and challenges in commissioning for ES assessments. Participants mentioned that limited internal expertise, time and personnel resources made it difficult to formulate precise



requirements when commissioning ES assessment. They also recognised limitations in their ability to check the quality of results after the contracted research has been completed. According to participants, this would sometimes lead to situations where an ES assessment is contracted and completed, but the practical use of results is limited. In that regard, the two CoPs showed interest in the D4.3 ToR guidance aimed at supporting the writing of a ToR to help commissioners request assessments that would meet their needs.

Other CoP meetings showed that there are still a lot of questions around all the concepts underlying ES assessment and on how to perform qualitative ecosystem (services) assessments. This feedback was particularly useful in scoping for the design of D4.3 ToR guidance as it highlighted the need for it to also raise awareness around ES assessments and what they entail.

The work of WP2 in SELINA is about transformative change. To understand what is at the foundation of it, WP2 searched for projects that were perceived as “seeds of transformative change” (*i.e.*, social, technological, economic, or socio-ecological initiatives, or alternative ways of thinking and doing, that have the potential to contribute to a positive future but are not currently dominant in society; Bennett et al., 2016). When doing so, WP2 also scoped for whether and how the results of ES models and assessments were used. The results of the survey showed that often ecosystem (services) models and maps are used as a basis for communication and collaboration with stakeholders on the management and restoration of ecosystems. It also underlined that the usefulness of scientific knowledge is strongly linked to the complexity and quality of the data and the involvement of stakeholders in the assessment. This feedback highlighted the need for the ToR to be flexible enough to help with commissioning ES assessments whose results would be fine-tuned to specific decision-support purposes (*e.g.*, those in **Figure 3** and **Figure 4**). It also revealed the importance of having sections on the involvement of stakeholders in the process of ES assessments.

4.1.3.2 Public stakeholders (WP8)

There is a growing need for practical, accessible guidelines to support the development of ToR for ES assessments in public decision-making. As ES concepts become increasingly embedded in policy and planning processes, public administrations often lack clear frameworks to structure assessments in a way that aligns with institutional priorities and procedural realities.

To better understand the role and potential of ToRs in this context, WP8 conducted interviews with representatives from the seven SELINA public Demonstration Projects (DPs) between December 2024 and January 2025 in collaboration with WP4. These interviews explored how ToRs for ES assessments are currently used or perceived, and whether they could support both general policy-making processes and specific decision windows, defined as key moments when public policies or plans are revised and where ES-related information can be introduced. Across the DPs, ToRs were viewed as beneficial for organising ES assessments from the outset, helping to clearly define deliverables, enhance coordination, and establish evaluation criteria for external proposals. In particular, representatives from ministries valued the clarity that ToRs provide when commissioning work. ToRs were also regarded as potentially useful for



guiding the application of ES evidence during decision windows and aligning outputs, such as mapping or impact analysis, with broader planning or communication objectives.

However, several challenges were identified. Some interviewees noted that ToRs, while designed to provide structure, could feel overly abstract or disconnected from administrative practice, particularly when drafted without input from those familiar with institutional procedures. The need for simpler language and practical examples was emphasised. Broader challenges regarding stakeholder involvement and limited awareness of WP4's ongoing ToR work also emerged as barriers.

Addressing these issues in D4.3 would require involving commissioners as those responsible for contracting or managing ES assessments, in co-developing and testing the ToR tool (refer to [4.2.2 Co-design of the Terms of Reference templates, testing and validation](#)). Doing so should help ensuring that ToRs are practical, aligned with real-world policy processes, and capable of supporting effective, evidence-based decision-making.

4.1.3.3 Private sector stakeholders (WP9)

A key motivation of ES assessments for the private sector is the pursuit of greater organisational resilience in the face of climate change and economic uncertainty. Assessments enable businesses to better understand the interdependencies between their operations and the ecosystems and services they rely on. This insight can drive proactive measures to protect or enhance these ecosystems, thereby safeguarding the continuity of business activities. Moreover, such assessments can inform critical decisions, such as site selection, and contribute to securing or maintaining a social license to operate. When negative environmental impacts are identified, businesses can use the findings to shape strategic goals, policies, and mitigation or compensation measures.

The Value Commission, hosted by the Capitals Coalition, published the Governance for Valuation to increase the confidence and credibility of assessment results. Simultaneously, D4.3 ToR is developed to structure assessments in a way that aligns with institutional priorities and procedural realities. D4.3 ToR guidance is however currently designed for the public sector and misses aspects that are essential to the private sector. Our hypothesis is that assessments conducted by the private sector would become more robust when the GfV, that focuses on assessment outputs and creating confidence in assessment results, and D4.3 ToR, focusing on the criteria at the initiation of an ES assessment, are linked. Once adapted to the private sector through the support of the GfV, D4.3 ToR will provide guidance to the private sector of what needs to be considered in order to commission a robust ecosystem assessment (often referred to as “integrated capitals assessment” in a corporate context). Its outputs can then be reviewed according to the Confidence Criteria provided in the Governance for Valuation.

In combination, D4.3 ToR and the Governance for Valuation would support Corporate Performance & Accountability. With both documents an evaluation process to measure performance and address accountability could be created between the commissioning of an ecosystem service assessment and the outputs of the assessment. Once adapted to the private sector, D4.3 ToR would support the procurement processes within the private sector



to select the best providers for an ecosystem service assessment in order to manage performance of the contractor. WP4 and WP9 will work collaboratively to develop an adapted ToR that fits the needs of the private sector.

4.1.3.4 Science-Policy-Society Dialogues (WP10)

SELINA Task 10.3 concerns Science-Policy-Society dialogues. These dialogues are notably aimed at supporting the co-development of the SELINA Compendium of Guidance (CoG). As our D4.3 ToR guidance will eventually be part of the CoG (refer to [4.1.5 Place of the Terms of Reference in SELINA](#)), WP4 and WP10 worked collaboratively to organise a Science-Policy-Society Dialogue around D4.3 ToR and scope for its usefulness.

The Dialogue was held in December 2024 and gathered 37 attendees. Its primary goal was to allow participants to share stories, experiences and challenges when commissioning ES assessments. Overall, the discussions pointed to a large interest in having a guidance that would (i) help to clearly outline scope; (ii) explain the value and rationale of ES assessments; (iii) may be linked more broadly to the integrated assessment concept; and (iv) raise awareness on topics such as stakeholder involvement, social value and justice. This feedback was very helpful as it supported the need flagged by WP2 in designing a guidance that would directly support the writing of a ToR, while explaining the concepts of an ES assessment and why they are relevant to consider. It also confirmed the choice of WP4 to focus on three ToR sections: Frame & Scope, Methodology, and Evaluation Criteria.

4.1.4 Links with previous SELINA Work Package 4 deliverables

The guidance developed in this document relies upon two previous deliverables of work package 4 (WP4): **D4.1 Systematic review of ecosystem assessment model uptake for decision-support** (D4.1), and **D4.2 Diagnostic of ES model decision-support capabilities** (D4.2).

In D4.1, we developed check-lists for contractors to improve the likelihood of uptake of their ES assessment findings in decision-making. These check-lists were organised per so-called *diagnostic topics* (DTs). D4.1 identified seven DTs (Barton et al., 2024):

- (1) Spatial resolution and scaling capabilities;
- (2) Ecosystem condition in ecosystems service assessments;
- (3) Ecosystem service capacity, potential, supply-use and demand;
- (4) Uncertainty documentation;
- (5) Economic valuation;
- (6) Social benefits;
- (7) Health benefits.



DTs address knowledge gaps in ES assessment. They represent the background hypothesis of D4.1, which assumes that strengthening biophysical assessment (DTs 1-4) and deepening plural valuation (DTs 5-7) aspects of ecosystem service assessments increases the likelihood of uptake of ecosystem assessment results. The idea behind this assumption is that designing ecosystem service assessments with the DTs in mind would make ecosystem service assessments more salient, robust, credible and legitimate, and thereby more suitable for decision-making. This work was based on a Milestone 08 review of 111 guidance documents on ES assessment in 12 European languages (Immerzeel et al., 2023).

D4.1 check-lists were then tested in D4.2 by SELINA DPs and Tests Sites (TSs). DPs participating in WP4 carry out ES assessments funded by SELINA, whereas Test Sites also include case studies funded by other sources wishing to test SELINA's ToR on their ES models and data. DPs and TSs participating in WP4 self-selected their participation in "ES Groups" representing five broad types of ecosystems services (Immerzeel et al., 2024):

- (1) Agriculture and Forestry related ESs;
- (2) Hydrology and Water related ESs;
- (3) Air quality and Climate related ESs;
- (4) Recreation and Amenities related ESs;
- (5) Fishery, Aquaculture and Marine related ESs.

After testing, the check-lists were refined by each above-mentioned group through the re-phrasing of pre-existing questions, or the addition of new ones (Immerzeel et al., 2024).

In **D4.3 Guidelines for enabling uptake in project and policy cycles** (D4.3), we used the refined and extended checklists from D4.2. However, as noted before, the questions presented in D4.1 and D4.2 checklists were directed at researchers and contractors. In D4.3, we rephrased D4.2 questions and structured them as Terms of Reference to make them directly actionable for commissioners. As for D4.2, this work was done through a co-design process with DPs and TSs (refer to [4.2 Methodological design](#) for a description of the methodological approach of D4.3).

Figure 6 below summarises how D4.1, D4.2 and D4.3 are related.



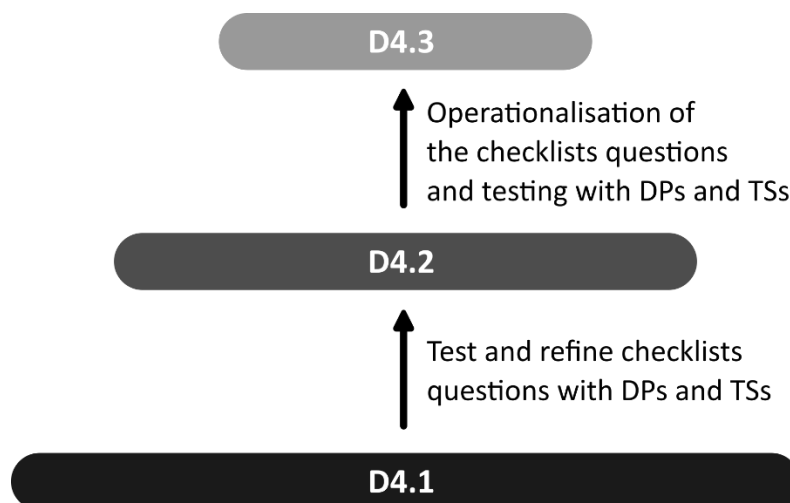


Figure 6 - Relationships between the three SELINA work package 4 deliverables. *D4.1 stands for “D4.1 Systematic review of ecosystem assessment model uptake for decision-support”, D4.2 stands for “D4.2 Diagnostic of ES model decision-support capabilities”, D4.3 stands for “D4.3 Guidelines for enabling uptake in project and policy cycles”, DPs stands for “Demonstration Projects”, and TSs stands for “Test Sites”.*

4.1.5 Place of the Terms of Reference in SELINA

SELINA is organised into 3 “strands” of research: A: Engaging stakeholders; B: Understanding ecosystems and their services; and C: Informing decisions on the ground in DPs and TSs. Our guidance is an attempt at operationalising Strand C to directly inform the design of ES assessment in Strand B, hence increasing the likelihood of uptake.

In terms of SELINA work packages, the guidance presented in D4.3 is complementary to work package 6 (WP6). In particular, the ToR can be viewed as a “line of integration” facilitating the integration of different concepts needed in ES assessment, such as ecosystem condition, biophysical - economic - sociocultural values, or different spatial and temporal scales. Our guidance supports such an integration by explicitly presenting “entry points” for these concepts through our DTs approach (initiated in D4.1). As explained later in this report, the questions presented in this guidance refer to specific DTs, allowing the commissioners to select which aspects are focused on in designing an ecosystem service assessment.

While facilitating integrated ES assessment, our guidance is not aimed at supporting the development of such assessment in its entirety. **D4.3 guidance is restricted to supporting the commissioners of an ES assessment design tailored to their needs.** Supporting integrated ecosystem assessment with different assessment knowledge domains is the role of the Framework for Integrated Ecosystem Assessment (FIEA; **Figure 7**), developed by SELINA WP6.

Discussion is ongoing on how the FIEA will be operationalised in the CoG, developed by SELINA WP10, for supporting evidence-based decision-making. How the assessment knowledge in each step of the FIEA, including that of ES assessment, is to be represented in the CoG is work in progress to be completed over the final two years of the project.



In the CoG, the FIEA presented in **Figure 7** below may be implemented as a web-page interface, with each step and substep being hyperlinked to specific subpages with guidance on that topic. If the user is a potential commissioner, this can be viewed as the interface between the commissioners and contractors. If that approach is chosen in WP10, our D4.3 guidance could be considered as a tool that is part of the FIEA toolbox as designed in the CoG.

Figure 7 below shows where our D4.3 guidance provides content to the FIEA. The primary objective of the ToR is to help commissioners in commissioning the relevant design of ecosystem service assessments. Our guidance could however also support other steps and sub-sections of the FIEA, with the disclaimer that it is not its primary purpose, including most of the subsections of steps Frame and Scope, as well as most of the other substeps of the Design step.

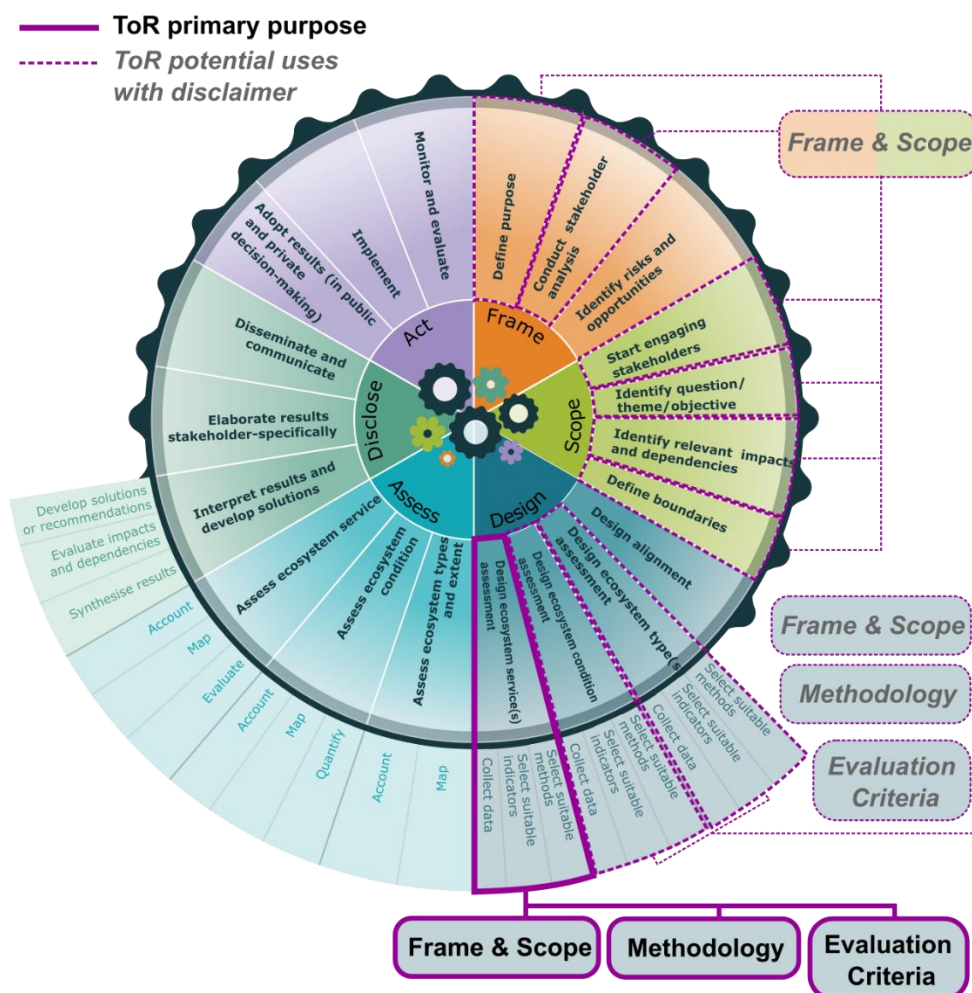


Figure 7 - D4.3 guidance on the Terms of Reference and its relationships to the Framework of Integrated Ecosystem Assessment. Adapted from SELINA WP6 (preliminary version 1.3).

If commissioners are using the FIEA as a tool to support them in their ecosystem assessment process, they might have already gone through the FIEA Frame and Scope steps. Our ToR templates have been structured to accommodate modular uses within and between



templates, which means that the commissioners can potentially decide to not go through the Frame & Scope ToR template but, instead, start with the Methodology template. Modular uses will be further developed in D4.4. The Frame & Scope ToR template targets the framing and scoping for the design of an ecosystem service assessment. Consequently, it is not exhaustive enough to cover the Frame and Scope steps of the FIEA. There is however a partial overlap which highlights two potential needs that will be addressed in D4.4 and in the development of the CoG in collaboration with WP6 and WP10:

- the presence of specific channels of communication between the Frame & Scope ToR template and the Frame and Scope steps of the FIEA to ensure that the information is fully transferrable;
- the potentially confusion brought by the language used in both the ToR templates and the FIEA. For example, one could consider renaming the ToR Frame & Scope. Although the name of this first ToR template was originally chosen to emphasise its alignment with the FIEA, it might bring confusion to commissioners already using the Frame and Scope steps of the FIEA.

4.1.6 Objectives

The objective of D4.3 is to create a guidance to support commissioners in the writing of their ToR when they commission an ES assessment through a call for tender. Although this guidance is more directed towards the public sector, it can still be relevant for the private sector pending specific adjustments (refer to [4.3.2 Adaptations of our guidance to the private sector](#)).

This guidance has been designed to be an interface between commissioners and contractors, by facilitating a streamlined communication between both parties. It is user-friendly and flexible, accommodating for different levels of knowledge and understanding on commissioning ES assessments, as well as accommodating to different assessment-related purposes and needs.

In this document, we provide a series of three guidance templates that will support the commissioners in writing three specific sections of their ToR. The guidance is available in [5 Guidance to commission ecosystem service assessments](#). We do not provide guidance on how to write an entire ToR. We rather focus on the writing of the three following ToR sections:

- (1) **Frame & Scope** in which we support the commissioners defining the boundaries of their ES assessment. This notably covers identifying the context and purpose of the assessment, its intended impacts and users, the format of the deliverables, the general methodological characteristics (*e.g.*, geographical area, time period, ecosystem services of interest), and the key stakeholders that should be involved in the assessment.
- (2) **Methodology** in which we help the commissioners identify the technical characteristics of their ES assessment according to the boundaries they defined with the Frame & Scope guidance. This especially covers *how* ecosystem services and their



benefits should be assessed and valued, *how* the uncertainties pertaining the assessment should be documented and reported, *how* the validation process should be carried out, and *how* the stakeholder should be engaged with.

- (3) **Evaluation Criteria** in which we support commissioners in identifying and selecting the criteria with which they will evaluate the proposals received from the contractors. This guidance template also outlines a formal structure to score and rank the proposals.

Each of the above-mentioned sections have their own guidance template (further described in [5.1 General information](#)). In summary, the templates are presented as lists of questions that the commissioners can choose to answer. They are associated with descriptions, explanations and examples to facilitate a thorough understanding of the commissioners as to why certain aspects should be included in an ES assessment. Each question is also followed by preformatted ToR text that the commissioners can copy-paste and further modify to fit their needs. For commissioners wishing to go beyond what is presented in the guidance templates, advanced content ([Annex 8.2 Advanced content](#)) has been created to help them further refine the content of their ToR. A range of ES-specific ToR examples are also provided in appendix to illustrate what can be obtained by filling out the ToR guidance templates. The scientific report and the ToR guidance have both been written from the perspective of SELINA researchers as ES assessment practitioners or suppliers of knowledge. Although they have been tested with DPs and TSs, a wider deployment of these guidance will be tested with stakeholders in the next deliverable **D4.4 ES model uptake lessons learned in Demonstration Projects** (D4.4) as part of Task 4.4 of WP4.

4.1.7 Caveats, limitations and assumptions

4.1.7.1 General limitations of use

Our guidance do not provide support in:

- (1) Commissioning an integrated ecosystem assessment;
- (2) Compiling, assessing, interpreting and disseminating the results of an ecosystem service assessment;
- (3) Implementing the results in decision-making.

The generic use case for the ToR templates is a commissioner contracting outside of their organisation. The assumption of our guidance is that there isn't sufficient in-house capacity to do ES assessments. An organisation with technical staff capable of doing ES assessments may nevertheless use some or all of our ToR guidance templates to structure an in-house project. Non-technical managers in larger organisations could, for example, use the Frame & Scope and Methodology ToR templates to communicate with technical expertise in other departments. This is a possible use case at least until assessment routines are standardised internally.



As previously mentioned, our guidance has mostly been designed for the public sector. Although still relevant for the private sector, further adjustments are needed and should be considered prior to its use (refer to [4.3.2 Adaptations of our guidance to the private sector](#) and [5.2.4 Adaptations to the private sector](#)).

4.1.7.2 Language

The language used in our guidance is aimed at commissioners. This means that the definitions of some concepts have been simplified and might not always be scientifically complete. They have been designed with the goal of being understandable by non-expert commissioners. For more complete definitions, one can refer to the SELINA Internal glossary (Burkhard et al., 2023).

While we strive to use non-technical language, the English language of our ToR templates is a potential barrier to uptake for commissioners in non-English speaking countries in Europe. This may be of particular concern when commissioners from *e.g.* national regulatory agencies, regional agencies or local governments are using them, or generally when an ES assessment is contracted to comply with regulations written in non-English languages. Ecosystem assessment terminology may not translate directly to the terminology used in national language regulations such as environmental impact assessment or land use planning.

4.1.7.3 ES assessments for regulatory demand and standardisation

The need for support with ToR writing for ES assessments varies with the regulatory or governance level, and with the novelty of the assessment. When ES assessment is requested by international organisations such as EUROSTAT, they follow standardised procedures to ensure comparability across countries. For example, the EU Regulation on Ecosystem Accounting has a minimum set of ES that should be reported. EUROSTAT is currently preparing a handbook gathering all guidance to compile these ES including standard ES modelling approaches and data sets. These have already been made available in the INCA Tool to comply with minimum reporting requirements. These assessments will be repeated periodically with the same purpose and evaluated by EUROSTAT following standardised procedures to ensure comparability across countries. Similarly, environmental impact assessments (EIA) procedures are regulated in the EU, and Member States have their standardised procedures for assessment and consultation. These are examples of the standardisation of ES assessment design which remove the need for ToR support.

4.1.7.4 Alignment of commissioner's and contractor's constraints

Two constraints are crucial to be aligned between commissioners and contractors in a tender process for it to be successful:

- **Budget:** There can be a misalignment between the tender's budget and the cost of the methodology. ES assessments have some fixed costs which don't vary with the geographical scale or resolution of the modeling. Fixed costs mean that there are economies of scale to ES assessment, and some local scales below which the



Contractors cost are likely to exceed the Commissioner’s available budget for the tender. Our guidance does not currently address this. Instead, it assumes that the budget is sufficient to cover all the design features the commissioners select in the templates. Further work in D4.4 will aim at designing scoping questions to identify the constraints of the commissioners and direct them to types of assessments whose features and modelling approaches will respect these constraints (refer to [4.3.5.2 Defining Target users and uses](#) and [4.3.5.3 A tiered system to screen for types of ES assessments](#)). This work should make our guidance more realistic and pragmatic for both commissioners and contractors.

- **Tender deadlines and expertise requirements:** The commissioners should consider the complexity of the proposed ToR in relation to deadlines and contractor’s available expertise and capacities in their jurisdiction. Unlike research grants, public tenders for consulting typically have deadlines of a few weeks. Our guidance does not provide advice on the choice of the deadlines in a tender process. For public tenders, calls and deadlines for submissions are regulated. In principle, the longer the deadline the more flexibility the contractors have to draft a proposal that meets the commissioners’ needs. If the commissioner is designing a ToR which calls for a cross-disciplinary team this may require a consortium of contractors to meet the requirements for expertise (*e.g.*, biophysical modeling, economic valuation, health and social benefit impact assessment, including stakeholder consultation). This requires more time and coordination in proposal writing.

4.2 Methodological design

4.2.1 Basic structure of the Terms of Reference templates

A generic structure of a ToR was generated by prompting three different Large Language Models (LLMs): ChatGPT, Claude, and Perplexity. The prompts were designed after the kick-off meeting of deliverable D4.3 gathering all partners, volunteering DPs and TSs within WP4. They reflect the wording, needs and gaps that were expressed by WP4 partners, volunteering DPs and TSs. The list of the prompts used are presented in **Table 1**.

Table 1 - Prompts used to query ChatGPT, Claude and Perplexity

1	I am from the private sector and I want to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.
2	I am from the private sector and I want to send a tender to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.
3	I am from the private sector and I want to send a call for proposals to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.
4	I am from the public sector and I want to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.
5	I am from the public sector and I want to send a tender to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.
6	I am from the public sector and I want to send a call for proposals to commission an ecosystem service assessment. Write a structure of Terms of Reference for this.



7	I want to commission an EU research grant under Horizon Europe . Write a structure of Terms of Reference for this.
8	I want to commission an EU research grant . Write a structure of Terms of Reference for this.
9	I want to commission an EU Horizon Europe research call . Write a structure of Terms of Reference for this.
10	I want to commission a research grant . Write a structure of Terms of Reference for this.
11	I want to commission an EU research call . Write a structure of Terms of Reference for this.

All the structures obtained from this prompting exercise were very similar across prompts and LLMs. Minor differences were observed in the order of the sections and the wording chosen for their titles. Summarising all of them while taking into account these minor differences resulted in the generic ToR structure presented in **Figure 5**. This generic structure was then verified using both real-world ToRs and previous experiences as contractors from WP4 partners.

The selection of the three ToR sections (*i.e.*, Frame & Scope, Methodology, and Evaluation Criteria) was agreed within a WP4 meeting regrouping all partners, volunteering DPs and TSs. This selection took into consideration the previous feedback received from WP4 partners, DPs, and TSs during the kick-off meeting of deliverable D4.3. The subsections and content of each of these three ToR sections was derived from the initial prompting work, the DT checklists questions from D4.2, and the experiences of WP4 partners as contractors. The subsections of the three ToR sections are further described in [5.1 General information](#).

4.2.2 Co-design of the Terms of Reference templates, testing and validation

We developed the ToR through a process of testing and validation with the DPs & TSs representatives in the ES groups over a period of about 6 months. ES groups were already set up from D4.2 to test and refine checklists for ES assessment design. Membership of the ES groups consisted mainly of SELINA partners with budgets in WP4. In the following D4.3 phase, membership was voluntary as this sub-task structure was not specified in the Description of Action. A total of 9 DPs and 15 TSs signed up and participated actively during the process.

To scope for the needs of ToR, we consulted with coordinators in other work packages to integrate considerations from SELINA Communities of Practice (WP2), public DPs (WP8), private DPS (WP9) and the Compendium of Guidance (WP10). DT task leads also represented lines of integration of relevance for WP6 (e.g, spatial and temporal scale and resolution). Active representatives in the ES Groups were mainly from the public sector-facing case studies. WP8 integrated questions on public agencies' needs for ToR in survey work of all public DPs. To increase representation of private sector perspectives we conducted a survey of private DPs needs for ToR. We then established a working group on private sector needs



with WP9. We will continue into the process with D4.4 to address the particular challenges faced by private sector ES assessment needs. With WP10-lead, we co-organised a “stakeholder dialogue” on knowledge needs for ES assessment ToRs, recruiting stakeholders and consultants with interest and / or experience in commissioning studies through UNEP-WCMC’s networks.

Internally within WP4, we organised an inclusive and transparent co-design process ensuring feedback loops between the case representatives in the ES groups and Diagnostic topic leads (**Figure 8**). ES groups self-organised based on representatives' needs and interests. Each group conducted between 3 and 7 meetings to prepare and test the three ToR guidance templates. Based on their needs, ES groups invited DT leads to follow discussions and provide input on ES assessment design issues. Participation in the ES groups also provided Diagnostic Topic leads with useful feedback to refine their topical ToR questions. A Q&A feedback form was also used by ES groups to post methodological questions to diagnostic topics leads between meetings. At the end of the testing process from ES Group, the leads of each group summarised the feedback from the group on a structured feedback form. This allowed to standardise the feedback among the ES Groups and facilitated its implementation by the coordinators and DT leads. Overall, this process aimed at further increasing the real-world relevance of the ToR questions on methods design.

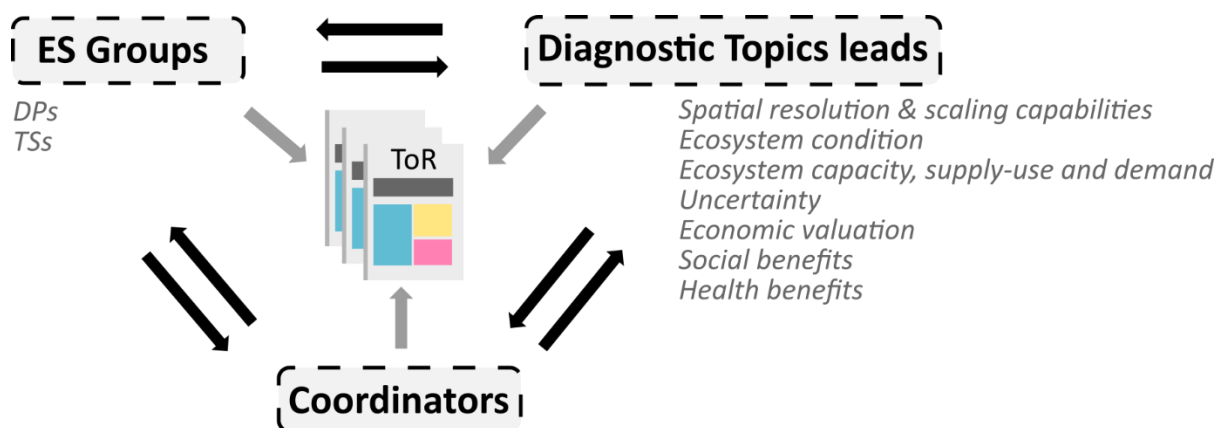


Figure 8 - Terms of Reference were developed through a testing and co-design process organised around Ecosystem Service Groups (ES Group) and Diagnostic Topics. DPs stands for Demonstration projects, TSs stands for Test Sites

In the following subsections we report on experiences with testing specific to each ES group.

4.2.2.1 Agriculture and Forestry related ecosystem services

Active representatives of the Agriculture and Forestry ES group were DP 02 (MRU, Lithuania), DP04 (VITO, Bosland forest, Belgium) and DP13 (SEAC, agricultural landscape, Italy), and Test Sites from Portugal (forest fires, CIBIO), Germany (crop pollination in Lower Saxony, LUH), Slovenia (forest in protected areas, ZRC-SAZY), Croatia (urban forest in Zagreb, CFRI), Estonia (coastal semi-natural grasslands, UEF), Spain (Forest ES, URJC) and Sweden (Urban forest, KTH). The Agriculture and Forestry ES Group met seven times from November 2024 to March 2025 to first discuss the general structure of D4.3 ToR templates, and then to provide detailed



comments on the three ToR template drafts. We received a table with specific questions to provide feedback on as a group, including the content and length of the introductory chapter, the structure of the template, and on the template questions, examples, descriptions and preformatted ToR text. The meetings were attended by 10-14 participants.

The meetings provided excellent opportunities for discussing the topic of ToR for ES assessments which was new to most of the group's participants, and for mutual learning. The main issues we provided feedback on were: (i) to improve the structure of the ToR templates by reducing the amount of text and providing a structure that helped navigate through the different parts of the templates; (ii) to simplify and ensure consistency of the language (consistently using the same concepts/terms); (iii) to improve the general structure of the ToR templates, avoiding repetition and ensuring harmonization between the Frame & Scope and the Methodology ToR templates; and (iv) revise/rephrase the questions. One particular characteristic of the Agriculture and Forestry ES DPs and TSs is that many of the ES assessments have been initiated for research purposes with a focus on particular ES elements, mainly the biophysical modelling, and have not been commissioned with a specific decision-making purpose. This was a considerable challenge for the group's participants at the same time that the exercise forced us to think as commissioners of an ES assessment and made us aware of the high importance of the Frame & Scope part of the assessment to ensure relevance and improve the likelihood of uptake.

No DPs and / or TSs in the group are currently addressing social and health benefits in their models, although they could be integrated into *e.g.* the assessments of forest fire risks and food safety, and monetary valuation has not been a priority. The ES group has prepared a hypothetical example filling out the ToR templates. It is a national level assessment of forest ES assessment in Spain. The example concerns a tender for an assessment designed to support the implementation of the Spanish National Strategy for Green Infrastructure by identifying forest areas that significantly contribute to achieve 'global climate regulation' objectives. It is provided in [Annex 8.3.1 Agriculture and Forestry related ecosystem services](#).

4.2.2.2 Hydrology and Water related ecosystem services

Active representatives of the Hydrology and water-related ecosystem services group were DP03 (UniTrento, Italy), DP04 (VITO, Belgium) and test sites TS03 (CZEG, Czech Republic), TS20 (PLUS, Austria), TS25 (CYI, Cyprus), and TS (UoH, Israel). The Hydrology ES group met four times from December 2024 to March 2025 to test the three D4.3 ToR templates. Almost all cases provided detailed assessments of their ES models for D4.2. These applications formed the basis for testing D4.3 ToR templates. The testing process consisted of SELINA researchers taking the "imaginary" position of a potential commissioner of ES assessments, and evaluating whether D4.3 ToR draft templates would be able to specify the work needed to obtain the models they were using.

Overall feedback was that the Scope & Frame template (version 1) provided insights about the inclusive design of their studies, with the length judged to be manageable, with some redundancy that could be simplified. Also, the clear distinction between sections and corresponding questions based on their relevance to the commissioners versus the contractors was identified as a much-needed feature in the template. The feedback for the Methodology ToR template was overall referring to the excessiveness of the length and being



too technical in terms of the expected knowledge of the commissioners (*e.g.*, ecosystem condition, health, uncertainty domains). Substantial reorganisation to a more hierarchical structure and reduction of the questions were recommended. Following the Methodology ToR template, the Evaluation Criteria ToR (version 1) was relatively easy to use, with limited needs for simplification.

The ES group also prepared a hypothetical example, filling out the templates and compiling the ToR text. The example concerns a tender for an **ES assessment evaluating the effects of restoration measures on the provision of hydrological ES**. The example was modelled on the experiences from the Salzach river floodplain Test Site (TS20) and is presented in [Annex 8.3.2 Hydrology and Water related ecosystem services](#).

4.2.2.3 Air quality and Climate related ecosystem services

The Air quality and Climate related-ES Group met three times from December 2024-March 2025 to test the three D4.3 ToR templates. We had participation from DTs leads on “Ecosystem condition variables in ecosystem services models” and “Ecosystem services capacity-potential, supply-demand” during some of the group meetings.

Almost all the cases had provided inputs for the assessments of their ES models for D4.2 and one case provided a detailed assessment of their ES model. These applications formed the basis for testing D4.3 ToR templates. Testing consisted of SELINA researchers, mainly from DP and TS, taking the “imaginary” position of a potential commissioner of ES models, and evaluating whether the ToR draft templates would be able to specify the work needed to obtain the models they were using. Templates were provided to the DPs and TSs leads who filled them in prior the group meetings. While filling in the templates, DPs and TSs leads focused on answering the questions as best as they could, but also reflecting on the templates themselves (*e.g.*, structure, completeness and clarity of questions, redundancies). During the meetings, each DP and TS lead shared their impressions and suggestions about the templates. The meetings allowed for in-depth discussions of strengths, unclarities and weaknesses. In those meetings, we also discussed possible points and ways of improvement.

Overall feedback for all three ToR templates was that a large majority of the questions were clear and relevant. The questions were not all easy to answer, forcing the respondent to think about their ES assessment from a different perspective than the one usually taken. Other feedback was that the ToR templates tended to be long and that some questions needed simplification, especially for the Methodology ToR template.

The ES group also prepared a hypothetical example, filling out the templates and compiling ToR text. The example focuses on **carbon sequestration in Sao Miguel Island, Azores, Portugal**. It is presented in [Annex 8.3.3 Air quality and Climate related ecosystem services](#).



4.2.2.4 Recreation and Amenities related ecosystem services

Active representatives of the recreation & amenities ES group were DP04 (VITO, Belgium), DP07(BEF, Latvia), DP10(EcoINN, Malta), DP03(UniTrento, Italy) and Test Sites from Norway(NINA), Croatia(CFRI), Poland(AMU), Slovenia(ZRC SAZU), Denmark(UCPH). The Recreation and Amenities ES Group met four times from December 2024-March 2025 to test the three D4.3 ToR templates. We had participation from DTs leads on Economic Valuation, Health and Social Benefits and Uncertainty during some of our group meetings. Almost all the cases had provided detailed assessments of their ES models for D4.2. These applications formed the basis for testing D4.3 ToR templates. Testing consisted of SELINA researchers taking the “imaginary” position of a potential commissioner of ES models, and evaluating whether D4.3 ToR draft templates would be able to specify the work needed to obtain the models they were using.

Overall feedback was that the Frame & Scope template provided insights about more inclusive design of their studies, with the length judged to be manageable, with some redundancy that could be simplified. Similarly, the Evaluation Criteria ToR template version 1 was relatively easy to use, with limited need for simplification. In the case of the Methodology ToR template, this was deemed to be excessive in length and too technical in terms of the knowledge expected of the commissioners. Substantial reorganisation to a more hierarchical structure with decision trees, and advanced material collected in appendices was recommended.

The ES group also prepared a hypothetical example, filling out the templates and compiling ToR text. The example concerns a tender for **a thematic recreation account for a municipality**. The example was modelled on experiences from the Oslo Test case and is presented in [Annex 8.3.4 Recreation and Amenities related ecosystem services](#).

4.2.2.5 Fishery, Aquaculture and Marine related ecosystem services

The Fishery, Aquaculture and Marine ES group working on fisheries continued its collaboration with the Demonstration Project (DP08) on Maritime and Coastal Zone Planning in Latvia. The meetings and individual communications involved scientific experts (practitioners from BEF Latvia and the Fisheries Research Institute BIOR) and policy makers (representatives from the Ministry of Environmental Protection and Regional Development, specifically the Spatial Planning Department). These discussions followed the established methodology for developing D4.3 ToR templates including a structured feedback form. Participants reviewed, commented, and provided feedback on the three D4.3 ToR templates. They also jointly completed an example using Latvian data and expertise in relation to fisheries data, ecosystem service assessments, and maritime spatial planning needs. The discussions were pragmatic in nature, supported by recent fish-related ecosystem and ecosystem service assessments conducted in 2023.

The Latvian Demonstration Project does not address economic, social and health dimensions in the fisheries-related model during the maritime or coastal spatial planning discussions. However, participants recognised this as a promising area for future work, suggesting



potential engagement of scientific and expert teams with relevant knowledge in fisheries economics, public health and nutrition.

The ES group prepared an example by filling out the templates and compiling the ToR text. The example illustrates a tender for the assessment of the wild fish provisioning ecosystem service. It is based on experiences from the commissioning work for **Latvian Maritime Spatial Planning** and is presented in [Annex 8.3.5 Fishery, Aquaculture and Marine related ecosystem services](#).

4.2.3 Overview of the guidance templates content

The guidance templates are displayed in [5 Guidance to commission ecosystem service assessments](#) and a detailed description of their structure can be found in [5.1 General information](#). In this section, we aim at providing a snapshot of how each template is organised.

Upon arrival on the template, the commissioners are presented with a list of the questions that would be relevant to answer to write a ToR tailored to their needs. Commissioners can choose which questions are the most appropriate to answer given their context and goals. In this list, each question is associated with a link that will guide the commissioners to the more detailed page of the question. On this page, commissioners answer the question while being given description of particular concepts. An information box also provides further explanations as to why these concepts should be included in their ES assessment. Additional links to more advanced content are also provided for more experienced or curious commissioners who wish to further refine their ToR with more advanced questions. Finally, after this information box, a ToR box gives preformatted ToR text that the commissioners can copy-paste and further modify to tailor their context (**Figure 9**).

The above description and

Figure 9 correspond to the Frame & Scope and Methodology guidance templates. Due to the dual goal of the valuation Criteria template (*i.e.*, writing the ToR Evaluation Criteria section and providing a direct support to score and rank proposals), its structure is different. This template presents a list of criteria rather than questions. Each of these criteria are associated with a question from the Frame & Scope or Methodology template. The commissioners can thus select the criteria that are essential to them in accordance with what has been answered in the Frame & Scope and Methodology templates. Once the proposals have been received from the contractors, commissioners can use the Evaluation Criteria template again and check that all the criteria they have selected as essential have been taken into account in the proposals they are evaluating. The template also provides a specific section to qualitatively evaluate and score the proposals, which will eventually help the commissioners in qualitatively ranking them. The structure of the Evaluation Criteria template is displayed in **Figure 19** in [5.1.3.4 Evaluation Criteria template](#).



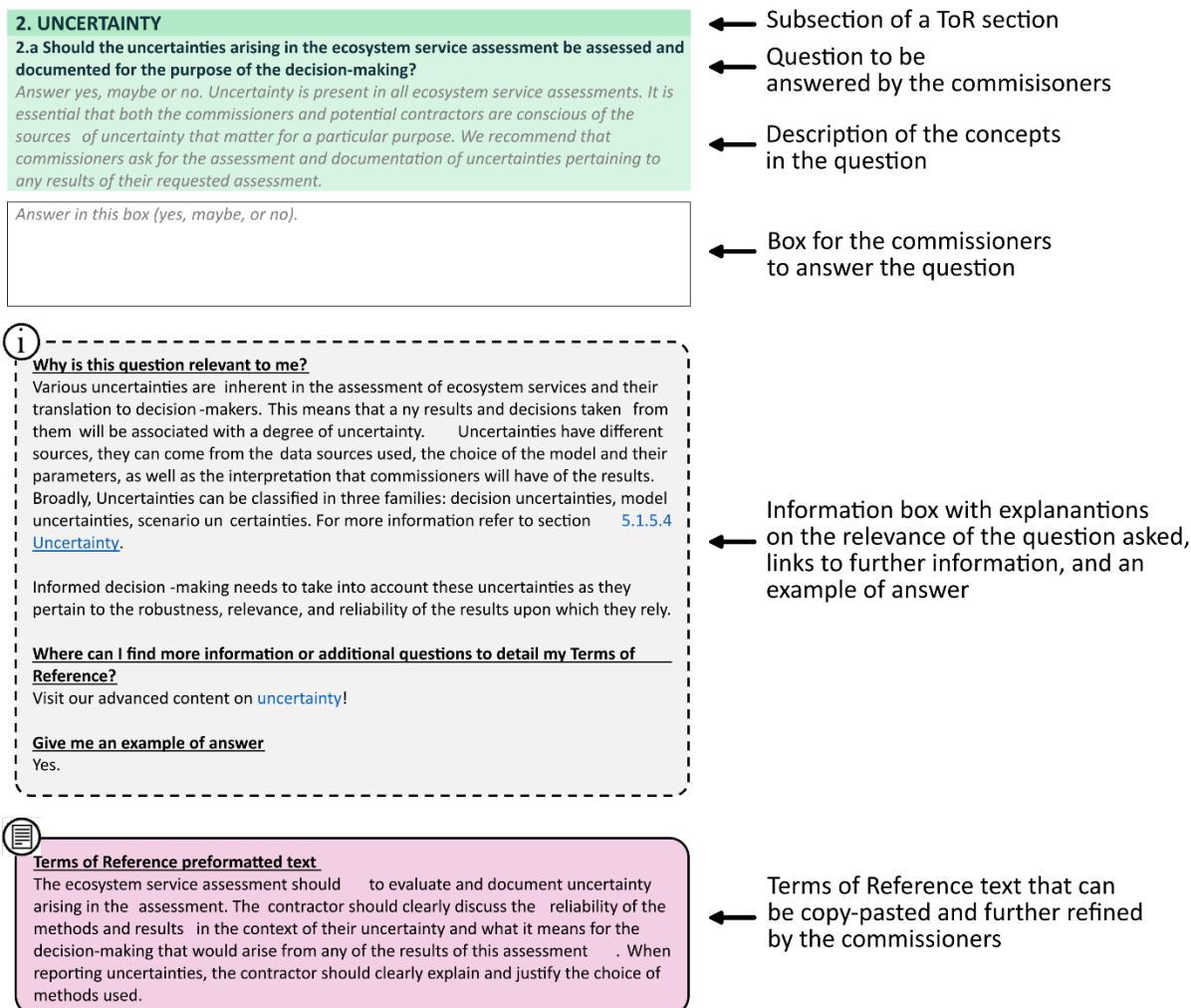


Figure 9 - Overview of the guidance templates content. *This figure is only valid for the Frame & Scope and Methodology templates. Refer to [5.1.3.4 Evaluation Criteria template](#) for a detailed description of the Evaluation Criteria template.*



4.3 Discussion and future work

4.3.1 D4.3 Summary

In this report we developed a series of three guidance templates aimed at supporting commissioners in the writing of their ToR to commission an ES assessment through a call for tender. We focused our guidance on three different sections of a ToR: Frame & Scope, Methodology and Evaluation Criteria. The guidance documents are presented in [5. Guidance to commission ecosystem service assessments](#). They were designed to be user-friendly and flexible, allowing for its use for different purposes and by commissioners with different levels of understanding of ES assessment.

Particular care has been put into making this guidance accessible by using commonly understood terms and language. The content of the guidance templates has been designed to both help the commissioners writing their ToR through the use of preformatted ToR text, but also raising their awareness on the specific aspects ES assessments entail. This was done by including descriptions, explanations and examples tailored to each question presented in the guidance templates (

Figure 9). To ensure the creation of guidance documents that respond to real-world needs, we put in place a transparent and inclusive co-design process within WP4, as well as beyond by including wider stakeholders and partners from Communities of Practice (WP2), Science-Policy Dialogues (WP10), and DPs and TSs from the public (WP8) and private (WP9) sectors.

We acknowledge that our guidance templates are still more tailored to the public rather than private sector. Further work will continue in our next deliverable D4.4 to refine our templates and adapt them to the private sector (refer to the following section).

4.3.2 Adaptations of our guidance to the private sector

4.3.2.1 Gaps of D4.3 Terms of Reference for the private sector

Together with WP9 we have scoped the relevance of a private sector ToR. The ToR can be effectively applied within the private sector to support organisations in their procurement processes - specifically in selecting the most suitable providers for conducting ecosystem service assessments and managing contractor performance. As the use case for the private sector ToR somewhat differs from the public ToR, the public ToR will be adapted so that the private sector ToR becomes accessible and usable for private sector procurement purposes specifically.

While private sector entities may face fewer regulatory pressures compared to public institutions, many are increasingly opting to undertake ES assessments for strategic reasons. As such, the ToR would support Corporate Performance & Accountability in relation to an ecosystem service assessment. This also brings the concept of (double) materiality into sharper focus. This concept encourages a shift from a solely financial perspective to a more comprehensive understanding of both the organization's impact on society and the environment, and how these impacts, in turn, affect the organisation's own financial performance. As interest in double materiality grows among investors and is increasingly embedded in reporting standards, private-sector entities are now more strongly incentivized



to examine their relationship with the natural environment. Nonetheless, there remain notable differences in how these entities approach such assessments compared to the ToR.

4.3.2.2 Towards a Terms of Reference for the private sector

The GfV (Capitals Coalition, 2024c) is a document that has been created for the private sector to build confidence in natural, social and human capital assessment results. Both the ToR for the public sector as well as the Governance for Valuation will serve as input for the Private Sector ToR. Currently, both documents are being finalized. Once these two outputs are finalized at the end of Q2 2025, these will be analysed to create a ToR that serves the private sector specifically. By ensuring alignment between the private sector ToR and the Governance for Valuation a feedback loop between procurement (through ToR) and the confidence and transparency in assessment results will be established to support corporate performance and accountability.

The focus of the work will be on adapting the public ToR language to language that is used within the private sector, as well as aligning the Frame & Scope content with private sector needs. Methodologically the public sector ToR and private sector ToR align. To ensure uptake of the documents and support robust ecosystem service assessments accessibility of the private sector ToR will be crucial. The accessibility and usefulness of the private sector ToR will be reviewed and tested with support of WP9 Demonstration Projects and the Private Sector Task Force (WP9.1). The Private Sector ToR will collaboratively be developed so that it can feature in both D4.4 the updated D9.2 Guidance material for the Private sector to support the scalability of private sector uptake of ecosystem services (D9.4). Some of the private ToR might apply to the public sector but this will be explored in D4.4.

4.3.3 FIEA, Terms of Reference, and Governance for Valuation – how do they fit together?

The GfV is one of the tools of the Capitals Coalition Beta Framework for Integrated Decision-Making contains (Capitals Coalition, 2024c). This document consists of three main components, as shown in **Figure 4** above:

1. **Transparency Requirements** seek to ensure transparency of how capitals information is generated. This focuses on linking the activities of an organisation to impacts / dependencies on / of capitals through the development of impact and dependency pathways. An important aspect here is the formulation of impact value factors and dependency risk factors. These form the core of the GfV document, which ultimately seeks to provide a structure to clearly understand how these values were generated, and if they are fit-for-purpose in specific contexts.
2. **Confidence Criteria** outline a series of decision trees to aid the decision maker in understanding if the capitals assessment they have been given is robust enough for the purposes of the decision they want to make.
3. **Value Notes** synthesise the information from the Transparency Reports and Confidence Criteria, condensing them into a short report which can present any pertinent information on how figures were calculated, how they should be



interpreted, and any caveats to bear in mind. The objective is to empower the decision-maker. These are analogous to notes on financial statements.

In the Transparency Report in the GfV, ecosystem services are assessed as part of “physical risk”, which are societal impacts caused by business, as well as “financial risk” to the business through dependencies of the business’ values chain on ecosystem service flows. Conceptually, a capitals approach starts from a perspective of risks to assets, whereas ecosystem services start from a perspective of impacts on flows. When “double materiality” of societal impacts and financial dependencies are considered together, the (private sector) capitals and (public sector) ecosystem services perspectives are completely complementary. This is reflected in parallels between public ecosystem accounting and private corporate accounting of ecosystem/natural assets.

As demonstrated in **Figure 7** above, D4.3 ToR templates are largely focussed on the “Design” step of the FIEA, guiding commissioners of ES assessments on what is fit for purpose when commissioning a project. In contrast, the GfV document sits more in the ‘Assess’ and ‘Disclose’ steps of the FIEA. Its primary utility is to provide decision-makers (commissioners) with a process whereby they can ascertain if the capitals (or ecosystem services) information they have been provided with is suitable for their intended use. It provides guidance on how to ensure transparency in the methodological choices made when conducting a capitals (natural, human, social and produced) assessment.

It is foreseen that elements of the current D4.3 ToR and GfV document could be adapted and combined to aid private sector commissioners in writing their ToR and in the quality assurance of their ES assessments. It is envisioned that the private sector ToR and Governance for Valuation documents would communicate with each other to support a continuous flow of information and feedback loop between the ‘Design’, ‘Assess’, and ‘Disclose’ sections. To ensure alignment across the documents, a key step will be to ensure that the terminology and framing (for example ‘asset’, ‘capitals’, ‘impacts’, ‘dependencies’, pathways, impact/dependency factors’) which the private sector are acquainted with will be reflected in any private-orientated ToR.

4.3.4 Co-design process – lessons learned

As described in section [4.1.4 Links with previous SELINA Work Package 4 deliverables](#), questions from D4.2 were rephrased to make draft ToR templates that would then be tested by ES groups. The most important feedback from testing of version 1 was the excessive length of the ToR templates, in particular Methodology. Templates were radically simplified, pushing advanced questions into advanced content designed per DT in appendices ([Annex 8.2 Advanced content](#)). Other important feedback emerging from a recent SELINA workshop in Azores in May 2025 concerned the lacking specification of use cases and targeting of specific types of users. This will be a priority topic in Task 4.4 and its corresponding Deliverable D4.4. The work will be done in collaboration with WP6 and WP10 as it will support both the implementation of the ToR templates in the CoG, and the implementation of the CoG itself (refer to the next section [4.3.5 Deliverable D4.4 - Testing the uptake by stakeholders with D4.3 Terms of Reference](#))



It is important to note that the co-design process was mainly between SELINA researchers. Stakeholders in the DPs and TSs participated from time to time in ES group meetings, but their participation in the ToR design process was not systematic. Systematic testing with stakeholders of the ToR templates will take place as part of the assessment of potential for uptake in D4.4. See further discussion in the next section.

4.3.5 Deliverable D4.4 - Testing the uptake by stakeholders with D4.3 Terms of Reference

4.3.5.1 General overview

In D4.4, we aim at deploying our ToR guidance to be tested by stakeholders represented in the DPS and TSs of WP4, volunteering stakeholders from the Communities of Practice in WP2, and volunteering DPs and TSs from WP8 and WP9. The “test users” of our ToR guidance would ideally be potential commissioners at different levels of governance (e.g., local, regional, national), who have different decision-making needs and use cases for an ES assessment. This would provide a more systematic testing of our ToR guidance templates to evaluate their usefulness in supporting commissioners’ needs. Defining the target users and uses of our ToR guidance remains to be explored in D4.4, in collaboration with WP6 and WP10 as this is of direct relevance to the design and implementation of the CoG as well.

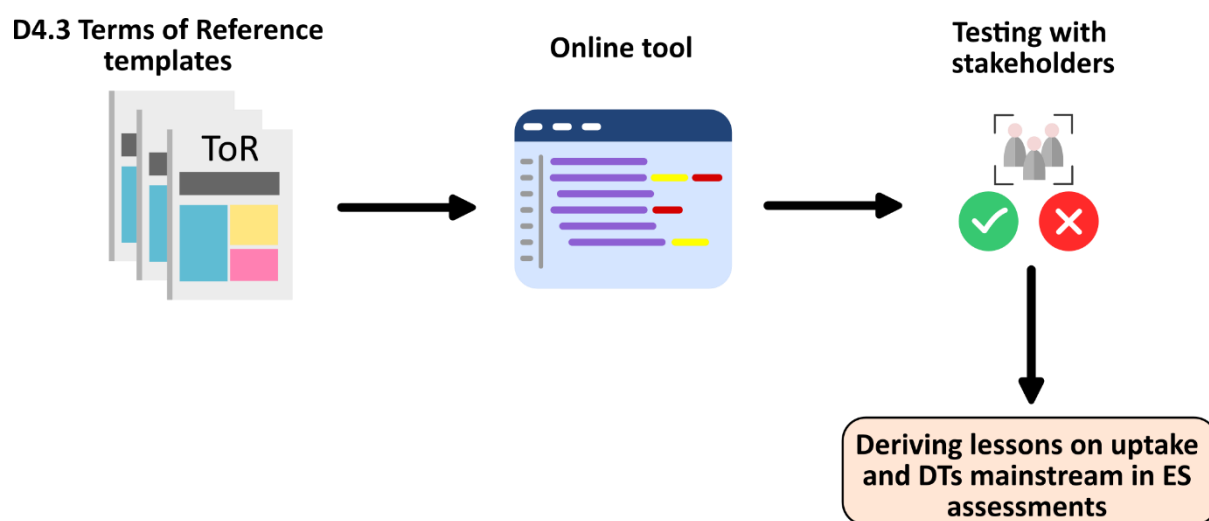


Figure 10 - Overview of the testing process of D4.3 guidance templates in Deliverable D4.4. *DTs stands for Diagnostic Topics, ES stands for Ecosystem Service, D4.3 stands for Deliverable “D4.3 Guidelines for enabling uptake in project and policy cycles”.*

Figure 10 above summarises how the testing of our ToR guidance will take place in D4.4. Testing will take place by implementing the ToR templates, and their associated documents in annex, in an online interface that will be tested by actual or potential commissioners from WP2, WP4, WP8, WP9 and WP10. What the final design of the interface will look like remains to be coordinated with WP10 as D4.4 will be implemented in the CoG. For the purpose of D4.4 testing, there are three possibilities:



1. **Simplest approach:** implement the ToR questions in an online survey-based structure, where commissioners would answer the questions of the ToR templates, and provide feedback on relevance and clarity of template questions.
2. **More ambitious approach:** a more advanced version requiring some programming would produce tailored ToR based on the commissioner's answers and the preformatted ToR text that was created for the templates (**Figure 11**).
3. **A CoG approach:** implement the ToR directly in a prototype design for the CoG. This would have the advantage of being able to directly test the user experience of the CoG through the testing of the ToR online tool. This approach however relies on the progress of WP10 design of the CoG web-based tool. The potential risk associated with this is delaying the analyses and reporting of stakeholder likelihood of uptake, due for D4.4. in June 2026.

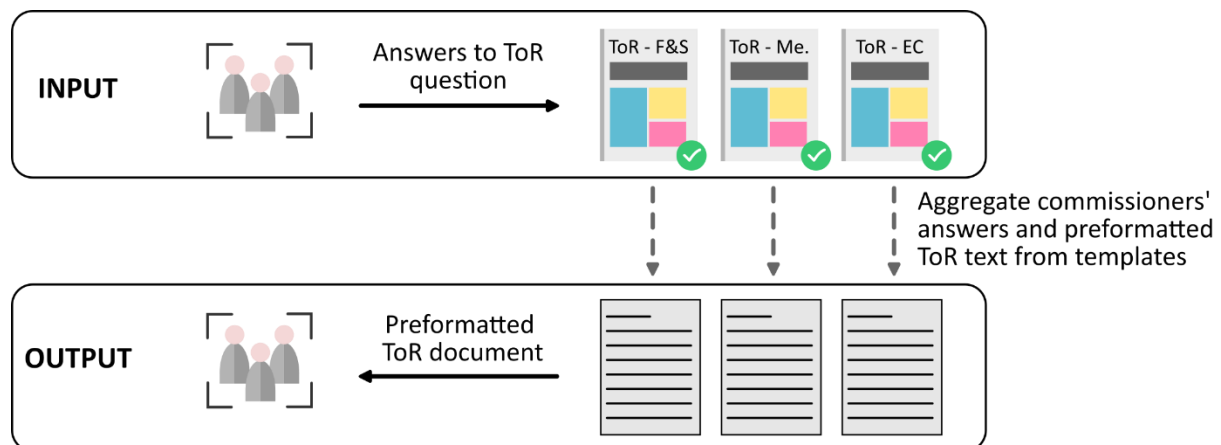


Figure 11 - Design workflow of D4.4 online tool. *ToR stands for Terms of Reference, ToR – F&S stands for the ToR Frame & Scope template, ToR – Me. stands for the ToR Methodology template, ToR – EC stands for the ToR Evaluation Criteria template.*

In D4.4, we will not be able to evaluate actual uptake in policy processes, but mainstreaming the ToR survey-based tool (*i.e.*, simplest approach above) will provide an indication of its usefulness. It will provide an indication of whether the relevance of the DTs is understood by commissioners, increasing their likelihood of being mainstreamed in the design of ES assessments. The testing of our ToR guidance in D4.4 will also facilitate the identification of other gaps in the writing of ToR and the commissioning process that would support the uptake of ES assessment in decision-making.

4.3.5.2 Defining Target users and uses

Why identify and define Target users and uses?

Our D4.3 ToR guidance has been developed to be general and flexible (refer to [4.1.2.1. Principles of a call for tender](#)). Internal workshops' discussions, between SELINA's DPs and partners with experience from ES assessment consulting, identified the need for additional recommendations that would specify the use of the templates depending on the level of resources available, the level of governance and the purpose of the ecosystem service



assessment. Such recommendations would allow us to identify the different types of commissioners, and their associated “minimum required ES assessment”. In the D4.4 online tool, this will translate into some scoping questions that would identify the “minimum required ES assessment” corresponding to the commissioners’ constraints (refer to [4.3.5.3 A tiered system to screen for types of ES assessments](#)). This would allow us to make guidance more realistic by helping the commissioners ask for types of ES assessment that are doable given their constraints.

Another reason to identify and define target users and uses is linked to the practical limitations of testing our ToR guidance in D4.4. Even if our testing is directly mainstreamed through the CoG in collaboration with WP10 (*i.e.*, A CoG approach in [4.3.5.1 General overview](#)), the resources are limited for the design of D4.4 ToR online tool. Testing and design of D4.4 ToR online tool needs to focus on a few specific use cases. In D4.4, WP4 will aim at identifying and defining a “minimum viable product” for the ToR online tool itself to meet a few “high uptake-likelihood” commissioners’ needs. This work will be done in collaboration with WP10, whose constraints for developing the CoG will require a similar approach. This collaboration will align with WP6 design of the FIEA.

As previously stated, respondents/test users of D4.4 will be recruited from SELINA’s DPs and TSs in WP4, WP8 and WP9, as well as from the WP2 Communities of Practice in SELINA partner countries. The recruitment of respondents/test users will be based on the “minimal viable product” and specific target users and uses that would have been identified and defined for D4.4 online tool.

How to identify and define target users and uses?

As the D4.4 online tool will eventually be embedded in the CoG, WP4, WP6 and WP10 will work collaboratively. In the context of D4.4 and setting aside the resources from the commissioners (*e.g.*, expertise and budget), two criteria have to be considered while scoping for target users and uses: the level of governance and the purpose for which the ES assessment is required.

An ES assessment uptake is likely to be constrained by the regulatory context, and so we cannot assume that our ToR guidance templates will generically apply across all governance levels. For example, land use policies and planning take place at national, regional, municipal, and property levels. This means that, ideally, D4.4 would be tested with potential public and private commissioners at these different levels of governance. An initial screening/scoping of the likelihood that specific regulatory context will require ES assessment, and create demand for our D4.3 ToR guidance would be a good starting point for D4.4.

Figure 12 outlines a potential framework for considering regulatory context in scoping the need for ES assessment. It can be designed as a table listing the governance levels and associated regulations. This table could be extended to include the purposes for ES assessment in each level of governance and regulations. Associated with each combination of governance level – regulation – purpose, this framework would also indicate the type of ES assessment required for the reporting including extent of ecosystem types, ecosystem condition, ecosystem services, and associated health-social-economic benefits. Task 4.4 could



use this framework to identify the need for using our D4.3 ToR guidance, as well as if it should be used entirely or only partially by referring to specific sections of it. This potential framework would notably align with Task 6.2 aimed at identifying the interrelationships between ecosystem condition and services in regulatory design.

Governance level	Regulatory examples	ToR demand	Ecosystem assessment types			Benefits (health, social, economic)
			Ecosystem type (extent)	Ecosystem condition	Ecosystem service (biophysical)	
UN Multilateral	CBD					
EU Commission	Nature Restoration Regulation	?				
	Ecosystem Accounting Regulation	?				
	CSRD	?				
National - member state	National Biodiversity Action Plan	?				
	Ecosystem Accounts	?				
Regional	Planning strategy	?				
	Regional plan	?				
Intermunicipal	Infrastructure plan	?				
Municipal	Planning strategy	?				
	Municipal zoning plan	?				
	Thematic plans (biodiv. recreation)	?				
	Area development plan	?				
Zone - neighbourhood	Regulation plan	?				
Property	Building permit	?				
				Mandatory		
				Voluntary		
				Out of scope/no data/not regulated		

Figure 12 - Draft conceptual approach to screening for ecosystem service assessment regulatory relevance *Note: the framework presented in the table is a work in progress. Classification of requirements in the figure are propositions subject to testing.*

Potential target users and uses – first screening

The generic use case for our ToR guidance templates are commissioners contracting outside of their organisation. The assumption is that there is insufficient in-house capacity to do ES assessments. Based on internal SELINA workshops' discussions and the potential framework presented in **Figure 12**, the proposed hypothesis to be tested in D4.4 is that our target users are predominantly decision-makers at sub-national governance level (e.g., at regional and municipal), especially those responsible for implementing new regulations. EU and national level policy targets are generally accompanied by ES assessment tools that have been standardised, offering limited scope for flexible design of ES assessment (upper lines of the table in **Figure 12**). At the sub-municipal property scale, a combination of (i) lack of regulatory demand for impact assessment, (ii) excessive methods costs relative to project size, (iii) lack of data with sufficient spatial resolution, and (iv) short time horizons/deadlines, may rule out ES assessment in practice. If these hypotheses are confirmed in testing, the implementation of our ToR guidance in D4.4 and in the CoG may have an optimal user scale. Our hypothesis is that this would be the regional and municipal strategic planning context, where novelty, intermediate resolution, but sufficient scale to cover fixed assessment costs, are most likely to increase the uptake of ES assessment.



Beyond these immediate target users and uses, others could potentially be foreseen. We could suppose that a private or public organisation with capable technical staff to do ES assessment could use some or all of the ToR guidance templates to structure an in-house project. For example, non-technical managers in larger organisations could use the Frame & Scope and Methodology ToR templates as interfaces to communicate with technical expertise in other departments, at least until assessment routines are standardised internally.

Another potential use of our ToR guidance templates could be education and training, with target users varying from professional teachers and trainers to, more simply, new employees in need of information. Our D4.3 guidance is well-suited for inexperienced commissioners with its generic structure that could serve as a structuring tool, and the extensive knowledge provided in terms of definitions, explanation, examples and annex. This could be a relevant source of knowledge for specific graduate or professional training on ES assessment. Another instance of users could be specialised consultants who could use our ToR guidance templates as a general resource for professional training of new hires, along with their internal ES assessment consulting service practices. Similarly, larger corporations may be interested in giving new employees working in sustainability departments basic training in ES assessment, including contracting, where our ToR guidance templates could be used to build a professional training course. Likewise in the public sector, use cases would focus on professionals who are new to the field and / or novel ES applications where little previous experience is available.

A large caveat in the use of our D4.3 ToR guidance templates for education is that its online web-page or survey-like implementation in D4.4 will not be designed to fully support this need. Indeed, the primary purpose of the D4.4 online tool is to facilitate the use of the D4.3 guidance templates by commissioners to increase the likelihood of uptake. It will need to be built into a training course design with its own pedagogy. Designing D4.4 to facilitate an educational purpose is out of scope for SELINAs Description of Action and will have to be adapted by users themselves. The educational purpose could also apply to the CoG, and although not in the Description of Action, it could serve as inspiration for follow-up projects to operationalise the CoG for specific user groups.

4.3.5.3 A tiered system to identify types of ES assessments

What is a tiered system to identify types of ES assessments and why do we need it?

While working on D4.3 with WP4 SELINA partners and volunteering DPs and TSs, a constant feedback was the request for a tiered approach to present the content in a gradual level of complexity. In the scientific literature on ES assessments, a tiered approach is the classification of ES models depending on the purpose of the ES assessment and some constraints such as the availability of data and resources. It is designed to provide guidance to contractors (*i.e.*, practitioners) in the choice of ES models. As part of the EU HORIZON ESMERALDA project, Grêt-Regamey et al. (2017) developed a tiered approach for ES assessment, presented as a simple decision-tree. In this approach, four successive questions allow contractors to navigate through three Tiers and choose the appropriate level of ES modelling complexity for their purpose (Grêt-Regamey et al., 2017):



1. “Are a deeper understanding and analysis of underlying socio-economic and / or geo-bio-physical processes needed?”
2. “Is the mapping purpose exclusively a rough overview of ES in space?”
3. “Do the planned actions require information on the system behaviour?”
4. “Are data in sufficient quality, quantity, scale and resolution available to conduct an ES assessment in this tier? Are there enough technical, human and financial resources available?”

One aim of Grêt-Regamey et al. (2017) tiered approach was to take a resource and time-saving decision during the framing and scoping of an ES assessment. In D4.3 and D4.4, we do not aim at supporting contractors or commissioners in making the right choice of ES models. Instead we aim at supporting the commissioners in writing a ToR that will be clear and precise enough so contractors can more easily understand the required level of complexity and select the appropriate ES models. Our D4.3 ToR guidance however does not provide any recommendations on what type of ES assessment (defined by the types of mapping and modelling methods) commissioners should ask for depending on their resources (*i.e.*, expertise, time and budget), level of governance, and purpose of the ES assessment. The current form of the D4.3 ToR templates allows the commissioners to select very exhaustive ES assessments even if they don’t have the budget or if it does not correspond to their purpose and / or level of governance. This represents a bias that we aim to address in D4.4.

To do this, we propose to develop a “tiered system” targeted at commissioners, that will classify the types of ES assessments and help them identify the “minimum required ES assessment” relevant to their constraints (*i.e.*, resources, level of governance, regulatory context and purpose for an ES assessment) while taking into account their general level of knowledge in ES assessments. In terms of the D4.4 online tool, this will be operationalised as scoping questions that would capture these constraints. An automated evaluation of the answers will identify the type of assessment required and guide the commissioners to the relevant questions and sections of the ToR templates.

How to design a tiered system to identify types of ES assessments?

Developing a “tiered system” requires identifying and defining the different types of ES assessments that commissioners could ask for. This relies on three main components:

1. The target users and uses – notably defined through their level of governance, regulatory context and purpose for an ES assessment
2. The types of ES models – notably defined through the type of ES, data availability, ecosystem condition, space and time, stakeholder engagement
3. Commissioners’ capabilities – notably defined through their level of knowledge/expertise, available time and budget.



Identifying and defining the target users and uses is already needed for the design of D4.4 online tool itself and will be carried out in the early stages of Task 4.4. Identifying the different types of ES models will be directly linked to the tiered approach developed by Grêt-Regamey et al. (2017) and most likely extend it to take into account further dimensions that are relevant in the SELINA project such as the inclusion of ecosystem condition in ES models and stakeholder engagement. Once this “tiered system” has been designed and types of ES assessments clearly allocated to tiers, we will be able to classify the questions and sections of our D4.3 ToR guidance templates according to these tiers. This will allow the commissioners to be further guided through the questions that will be relevant for them. **(Figure 1)**

The tiered approach developed by Grêt-Regamey et al. (2017), is a straightforward procedure with a very limited number of questions. More recently, the Ministry of Ecological Transition in Spain released a methodological guide to map Green Infrastructure in Spain. This guide is an example of a simple operationalisation of a tiered approach for mapping and assessing ES (Ministerio para la Transición Ecológica y el Reto Demográfico, 2024). Mirroring the simplicity of these existing systems will be essential for our “tiered system” in D4.4. Identifying foundation questions to be asked to the commissioners will be challenging as each of the three main components described above (*i.e.*, target users and uses, types of ES models, commissioners’ capabilities) encompass several aspects that will have to be covered. This “tiered system” will be tested in D4.4 to validate its design and determine if this would be useful to increase the likelihood of uptake.

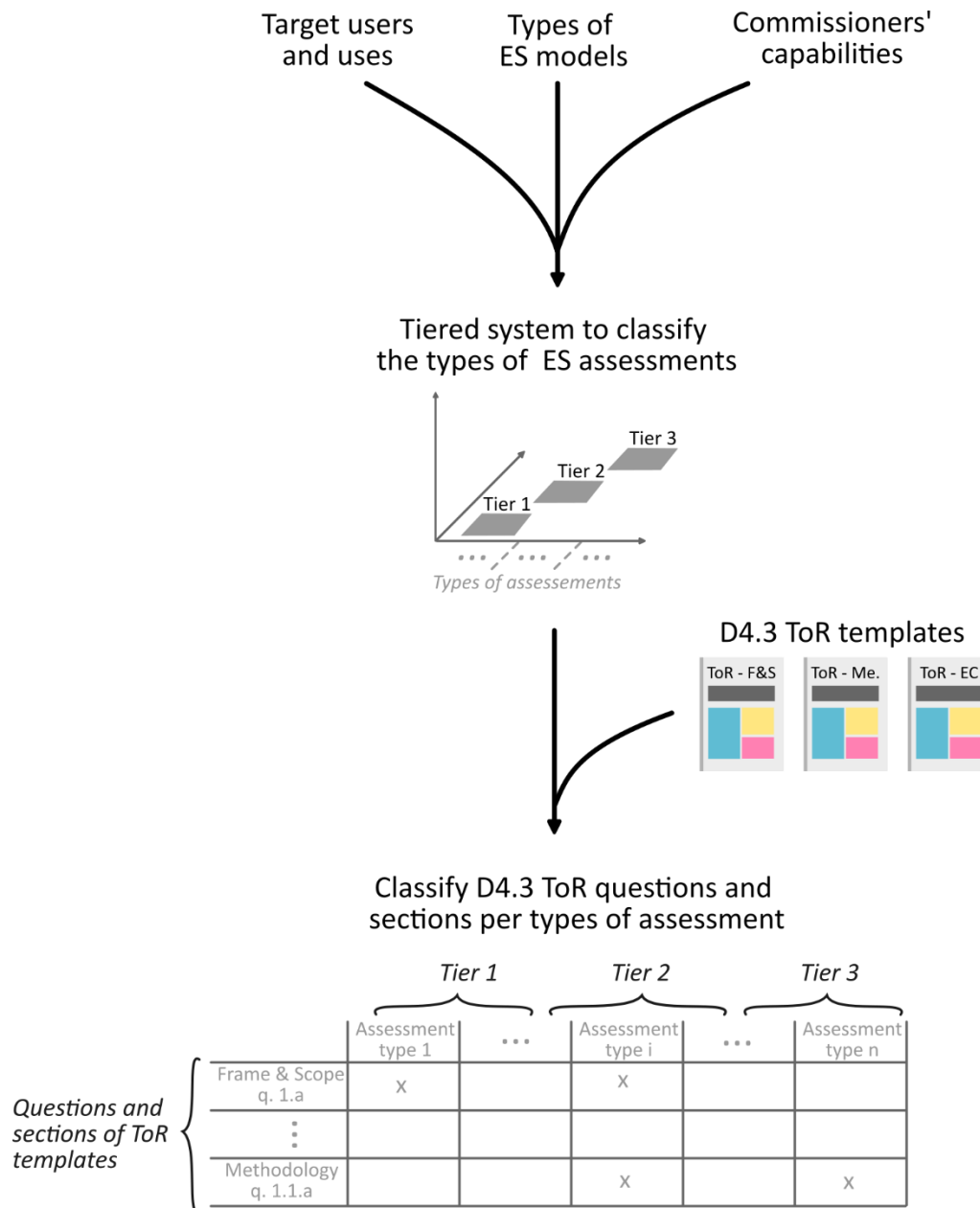
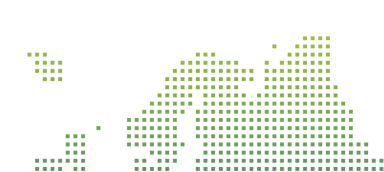


Figure 13 - Methodology to design a tiered system and classify the Terms of Reference templates' sections and questions. The 3D representation of the tiered system is for representation purposes. ES stands for ecosystem service, ToR stands for Terms of Reference, D4.3 stands for Deliverable “D4.3 Guidelines for enabling uptake in project and policy cycles”, F&S stands for Frame & Scope, Me. Stands for Methodology, and EC stands for Evaluation Criteria.

4.3.5.4 Integration of Deliverable D4.4 in the Compendium of Guidance

The CoG is still being developed. Although some concepts begin to be clear such as the CoG design mirroring the FIEA, agreement and clarity have yet to be reached on other aspects such as who the target users and uses are. This work will have to be collaboratively led between WP10, WP4 and WP6 as it will influence the design of D4.4 online tool which will



eventually be implemented in the CoG. Broadly, the target users of D4.4 are public and private commissioners of ecosystem service assessments. Our ToR guidance helps commissioners define what they should ask for in a tender to hire external contractors for an ecosystem service assessment. It does not directly support the contractors, assuming that they already have the methods knowledge or know where to find adequate methods guidance. We could consider three different implementations of the CoG that would imply three different perspectives on D4.4 online tool and its implementation in the CoG:

1. A CoG for decision-makers (*i.e.*, commissioners)

This is the view presented in [4.1.5 Place of the Terms of Reference in the SELINA](#). D4.4 will be a tool for the “Design ecosystem service assessment” substep of the FIEA. According to WP10, the CoG would ideally be an online and “clickable” version of the FIEA. This format would allow for the decision-makers to “click” on this “Design ecosystem service assessment” substep, which would lead them to a landing page with links to different resources including a link to the D4.4 online tool.

Although primarily aimed at the “Design ecosystem service assessment” substep of the FIEA, our ToR guidance templates and their extensive annexes could be applied to other sections of the FIEA ([4.1.5 Place of the Terms of Reference in the SELINA](#)). In practice, this means that other “clickable” substeps of the FIEA implemented in the CoG would lead to landing pages with links to the D4.4 online tool. As we however recognize that our guidance would not provide an optimal support for these other FIEA steps and substeps, we would imagine their landing pages to be divided into two sections: (i) Directly relevant guidance, and (ii) Other relevant guidance. Similarly, even in its own substep, our ToR guidance could be very well complemented by other external guidance such as the GfV (Capitals Coalition, 2024c).

In this option, the language used in both the CoG and D4.4 should be aligned and targeted at decision-makers. As noted before, even with plain English terms, language will be a barrier for non-English speakers operating in a non-English regulatory setting.

2. A CoG for practitioners (*i.e.*, contractors)

This view of the CoG would consider it as a place for practitioners to find more information on how to perform the different steps and substeps of the FIEA. For example in the “Design ecosystem service assessment” FIEA substep, WP4 has curated a selection of the 111 guidance documents in relevant languages as reviewed by Immerzeel et al. (2023). Another instance would be the EASE tool and ES Valuation Database (D6.2) providing practitioners with methods recommendations and best-practice case studies. Going further, this substep could also provide guidance on using prompts in Large Language Models (*e.g.*, ChatGPT, Claude), or search terms to access the evolving scientific literature on ES assessment. As for approach (a) above, links to useful external resources could also be provided.

In that perspective of the CoG, D4.4 online tool would rather be an interface that would complement the CoG by helping the decision-makers and practitioners interact with the FIEA. D4.4 online tool would allow the decision-makers to communicate



clearly what they need to be achieved in their ES assessment, which in turn will refer to some specific substeps of the FIEA that the practitioners could refer to for further guidance on how to implement the ES assessment requested by the decision-makers.

3. A CoG for decision-makers and practitioners (*i.e.*, commissioners and contractors)

This approach of the CoG would be a combination of both (1) and (2), where each substeps of the FIEA would link to a landing page where content for both the decision-makers and practitioners would be displayed.

In this perspective, it is difficult to clearly place our D4.4 online tool as it can't be both part of the CoG and complementing it at the same time. It is also noted that such a CoG could be challenging to design and navigate, as it would try to address two different types of users with very different needs.

Until now, discussion within SELINA seems to foresee the CoG as in approach (1). Regardless of the above options chosen for the CoG, careful consideration will have to be given to the specific target users and uses within each broad group of target audiences (*i.e.*, decision-makers and / or practitioners). Limited design resources will require the definition of a “minimum viable product” accounting for only a limited set of primary target users and use cases. Also, in all options above, we mentioned the need to signpost to external sources of knowledge within the CoG. Decisions on which external resources should be signposted to for each substep of the FIEA should probably be left to the WPs whose tools will be implemented in the CoG. However, collaborative discussions should take place to decide what is assumed to be the knowledge that users obtain through other platforms than the CoG. Finally, maintenance and regular updates are key for the CoG to be a preferred source of knowledge over time. Selecting external resources to be displayed in the CoG will have to respect the maintenance constraints of the CoG after the SELINA project is finished.

4.3.6 Are Large Language Models better than our guidance to create Terms of Reference?

In the modern world we live in, Large Language Models (LLM) such as ChatGPT or Claude are increasingly present in workplaces and in our day-to-day lives. The rapid adoption of generative Artificial Intelligence (AI) tools for the processing of data across multiple sectors has been touted as heralding a new era of scientific efficiency, with LLMs in particular being hailed as game-changing for collating, assessment and review of scientific data and preparation of manuscripts (Stokel-Walker and Van Noorden, 2023, Nejjar et al., 2025). Open-access software tools for LLMs have been widely tested for use in scientific writing and their use appears to be increasing rapidly (Liang et al., 2024; Van Noorden and Perkel, 2023). Made friendly and easy to use, it can be very tempting to ask LLMs like ChatGPT to draft a ToR if resources such as time, budget and expertise are lacking. Designing one or two prompts to write a ToR might also be less tedious than going through our D4.3 ToR guidance. But how would the ToR obtained from our guidance, whether it is D4.3 or D4.4, compare with the ToR that one would obtain by prompting Large Language



Models (LLMs) such as ChatGPT or Claude? Would LLMs do better? These questions are fundamental as it relates to the relevance and appeal of our guidance to commissioners and their use of it.

In D4.4, we could potentially explore the use of LLMs to generate ToRs and compare them with the ToRs obtained from our guidance based on semantic tests and a scoring system whose criteria would be based on experts' judgements. We could also design a catalogue of useful prompts based on the ToR templates, that would help commissioners generate ToRs based on the work that has been done in D4.3.

Another alternative would be to give some guidance on how to use the ToR questions to generate the prompts. Finally, we could also try to integrate LLMs in the D4.4 online tool to generate ToR text when our preformatted ToR text is missing as too context-dependent. For example in the Frame & Scope template, some preformatted ToR text have not been generated as they were highly context dependent, such as the purpose of the assessment, its decision-making and policy context. We could imagine using an LLMs to generate preformatted ToR text based on the answers that the commissioners gave on these questions.

Many concerns have however been raised about the use of LLM in science led by increasing concerns over the societal impacts of AI in general. Aside from the commentaries about existential threats which AI may pose to various groups, to job security in certain careers, or to society at large (Bender et al., 2021; Dammu et al., 2024; Barry and Stephenson, 2025), which are widely discussed in news and social media (Brauner et al., 2023; Lopatto, 2025; McMenamin, 2025), broader concerns have been raised about the ways in which LLMs are "trained" through (in part) the harvesting of information from across all areas of the internet and the inherent inability of LLMs to perform a critical review of their own outputs to ensure issues of bias and alignment with human values are addressed (Hoffman et al., 2024; Shen et al., 2025). Related to this is the fact that LLMs are inherently biased, and largely reflect the perspectives and political alignments of the companies and programmers which release them, since regular amendments to LLMs' coding are required to "realign" outputs to prevent or minimise the likelihood that certain results – whether deemed unethical by society at large, or just uncomfortable for the organisations behind the LLM model – are returned (Lopatto, 2025).

Several risks associated with the use of LLM in scientific research have been highlighted, including issues of accuracy, accountability, reliability, transparency and replicability (Schlagwein and Willcocks, 2023; Blau et al., 2024; Francis, 2025). In addition, there are important ethical considerations for the use of LLM for research purposes, including issues of environmental impact, and participatory and representative justice (Pozzi and De Proost, 2024). The energy footprints of LLMs have been a cause of concern (Jiang et al, 2024), not only in terms of the CO2 emissions associated with individual research activities employing LLMs, but also in respect of the lobbying efforts of major technology corporations to facilitate the successful planning and development of the energy-hungry data centres required to meet growing AI demand, and related issues of corporate power and influence on decision making (Corporate Europe Observatory, 2025).



Whilst LLMs have increasingly been tested in the arena of biodiversity ecosystems services science (*e.g.*, Luo et al., 2025), few researchers have accounted for issues of inherent bias or the ethical considerations involved (Doi et al., 2024). The extent to which D4.4 will explore the use of LLMs will strongly depend on the resources available as testing the guidance with stakeholders is the primary goal; however, efforts will be made to include a review of ethical considerations for the use of LLMs in ecosystem services assessments, linking with work under WP11.



4.4. Conclusion

In this D4.3 report, we developed a series of three guidance templates to support the commissioners in writing their Terms of Reference to commission ES assessments tailored to their needs. These guidance templates were developed and tested in a co-design process with all SELINA WP4 partners and volunteering DPS and TSs. At present, they are mainly targeted at public sector commissioners. Work to adapt them to private commissioners will be carried out in Task 4.4 for D4.4.

D4.4 will focus on translating D4.3 ToR templates into an online tool to be tested and deployed more broadly with stakeholders from DPs and TSs in WP8 and WP9 and Communities of Practice from WP2. Doing so will first require to (i) identify and define target users and uses, (ii) develop and design a tiered system to identify and define types of ES assessment, (iii) closely collaborate with WP6 and WP10 in charge of the respective developments of the FIEA and the CoG.

In D4.2, we were left with some outstanding questions that our journey in D4.3 can partially answer:

1. *How can sector-specific knowledge needs be addressed most effectively using Terms of Reference for ES model applications?*

After extensive discussions within WP4, and rounds of testing and feedback with DPs and TSs, it was decided that D4.3 would be designed for commissioners. Our ToR guidance templates do not advise on the selection and use of ES models themselves. Instead they help commissioners clearly identify and communicate their needs so the contractors can identify and select the relevant ES model(s). The Methodology template does contain some questions referring to broad modelling aspects such as the family of economic valuation methods or condition indicators. These have been simplified and are designed to both help the commissioners being more precise and raise their awareness.

The feedback from the testing did not indicate the need for any specifications by types of ES. D4.3 ToR templates were created to be general and flexible. We do recognise the need for further adaptations in the case of the private sector notably around the notions of dependencies on and impacts of ES in businesses. Further work will be carried out in D4.4 in collaboration with WP9.

2. *What can guidance on ES model applications best support the creation of common understanding of economic value, social benefits, and justice across stakeholders?*

We designed D4.3 ToR templates to answer two goals: (i) supporting commissioners in the writing of their ToR, and (ii) raising the awareness of commissioners in the important concepts underlying ES assessments. In the D4.3 guidance, the commissioners are provided with explanations of what economic valuation, social benefits and justice are, and why they are important for ES assessments. In that



regard, D4.3 tried to set a standard in the understanding of these concepts by commissioners, why and how they should be mainstreamed in ES assessments.

3. *How can ES model outputs and the identified links with diagnostic topics explicitly be connected to their implications for past, current and future policies in such a way that they are useful guidance for decision-makers?*

In D4.3, we integrated the DTs within the structure and the questions of the ToR templates. Each DT has a section prior to the template explaining in plain English what they are and why they are important. Then, in each DT question in the templates, the relevance of the questions is also explained. We also associate examples and links to advanced content where commissioners can find further information. Overall, the D4.3 was created to be user-friendly and flexible. Commissioners are guided and can select what is of relevance to them.

In the Frame & Scope template, we chose to specifically address the current and future policies by asking questions on the policy context and intended impacts. We recognise that we did not include any questions regarding past policies. For ES model outputs, we chose to refer to the expected formats of the outputs, as well as the intended impacts of these outputs. This should in turn inform contractors on the ES modelling approach that should be applied.

4. *How can ES model applications be more explicitly linked to private sector decision-making processes?*

We did not successfully manage to adapt our ToR guidance to the private sector within the scope of D4.3. The work has started together with WP9 will be further developed and integrated in D9.4 and D4.4. One of the approaches that could be taken is to use the GfV (Capitals Coalition, 2024c) to identify and formulate the missing questions in the current D4.3 ToR. The interest of this approach is the resulting alignment between the ToR and the Governance for Valuation, ensuring that the private sector will then be able to use both documents in perfect complementarity.

In D4.3, we are left with further questions:

- 1. *How to boost the uptake of D4.3 ToR guidance, and subsequently D4.4 online tool and the CoG, given that they have already been designed to increase the uptake?***
- 2. *How to ensure the durability and maintenance over time of D4.3, D4.4 and the CoG and their relevance and constant use by decision-makers?***
- 3. *How does the results from D4.3 guidance, and subsequently D4.4, compare with ToR prompted through ChatGPT?***

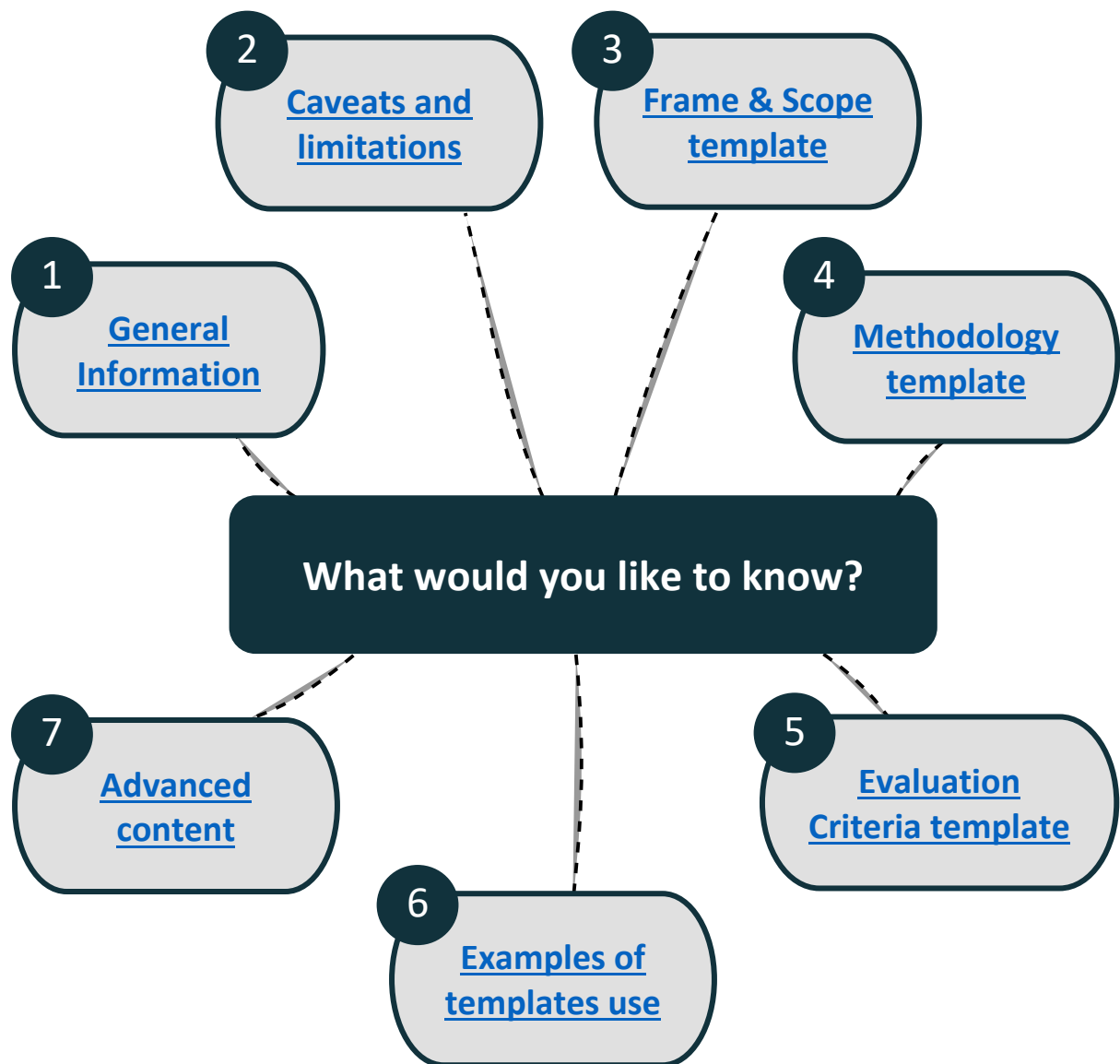


Question (3) has already been touched upon in [4.3.6. Are Large Language Models better than our guidance to create Terms of Reference?](#). Questions (1) and (2) go beyond the scope of D4.3 and D4.4 and apply more broadly to any outputs that will be produced throughout SELINA. Going back to what Brian Head (2015) noted, research findings seem to be more likely uptaken if they had been commissioned by decision-makers themselves. In the case of D4.3 and D4.4, we are facing a paradox in that regard. They have been designed to help with commissioning, and thus supporting the uptake. But these tools have not been directly commissioned by decision-makers in need of such guidance. We continue to face the challenge of making this guidance easy to find, accessible, understood, accepted and used by both commissioners and contractors.



Guidance to commission ecosystem service assessments







General information



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5.1.1 About the guidance

The overall guidance document contains a series of three templates developed by the [Horizon Europe SELINA project](#) (work package 4). They aim at supporting decision-makers in commissioning ecosystem service assessments tailored to their needs by helping them identify and request the design assessment corresponding to those needs. These templates also directly support the writing of a Terms of Reference underlying a call for tender. **This guidance does not provide exhaustive support in writing an entire Terms of Reference.** It focuses on the three sections that are most likely to be challenging for commissioners due to the potential requirements of expert knowledge:

- the **Frame & Scope** section aimed at describing the purpose(s) and reason(s) behind the need for commissioning an ecosystem service assessment;
- the **Methodology** section focused on detailing the technical characteristics and overall methodological process of the ecosystem service assessment;
- the **Evaluation Criteria** section whose goal is to precise the criteria according to which an ecosystem service assessment will be assessed by a commissioner.

The three templates are formatted as lists of questions that the commissioners can answer. Each question is associated to descriptions and examples to facilitate comprehension, as well as preformatted text to help build a Terms of Reference. This text can be directly copy-pasted and refined by the commissioners to better fit their context. In addition to the primary aim of helping commissioners in writing a Terms of Reference for a call for tender, these templates also aim at raising awareness on the specific concepts that should be taken into account when commissioning an ecosystem service assessment. Caveats attached to this guidance can be found in the section [5.2 Caveats and limitations](#).

Throughout this guidance document, **commissioners** refers to decision-makers or users commissioning an ecosystem service assessment through a call for tender with Terms of Reference. While, **potential contractors** refers to the applicants answering the call for tender and sending proposals to the commissioners. By **ecosystem services**, we refer to the contributions of ecosystems that support economic activities and other aspects of human well-being. In contrast, **benefits** refer to the specific goods and services that people and society ultimately use and enjoy². For example, ecosystem services include water filtration, urban cooling, and pollination of crops, while the associated benefits are the availability of clean drinking water, the reduction of heat-related illnesses, and food production.

This document is the reporting version for SELINA Deliverable D4.3. An online version of this guidance will soon be released by the SELINA project.

² [System of Environmental Economic Accounting – Ecosystem Accounting](#), United Nations, 2024.



5.1.2 Recommended workflow: which template and when?

For optimal support, the three templates provided in this guidance document should be used successively as shown in **Figure 14** below.

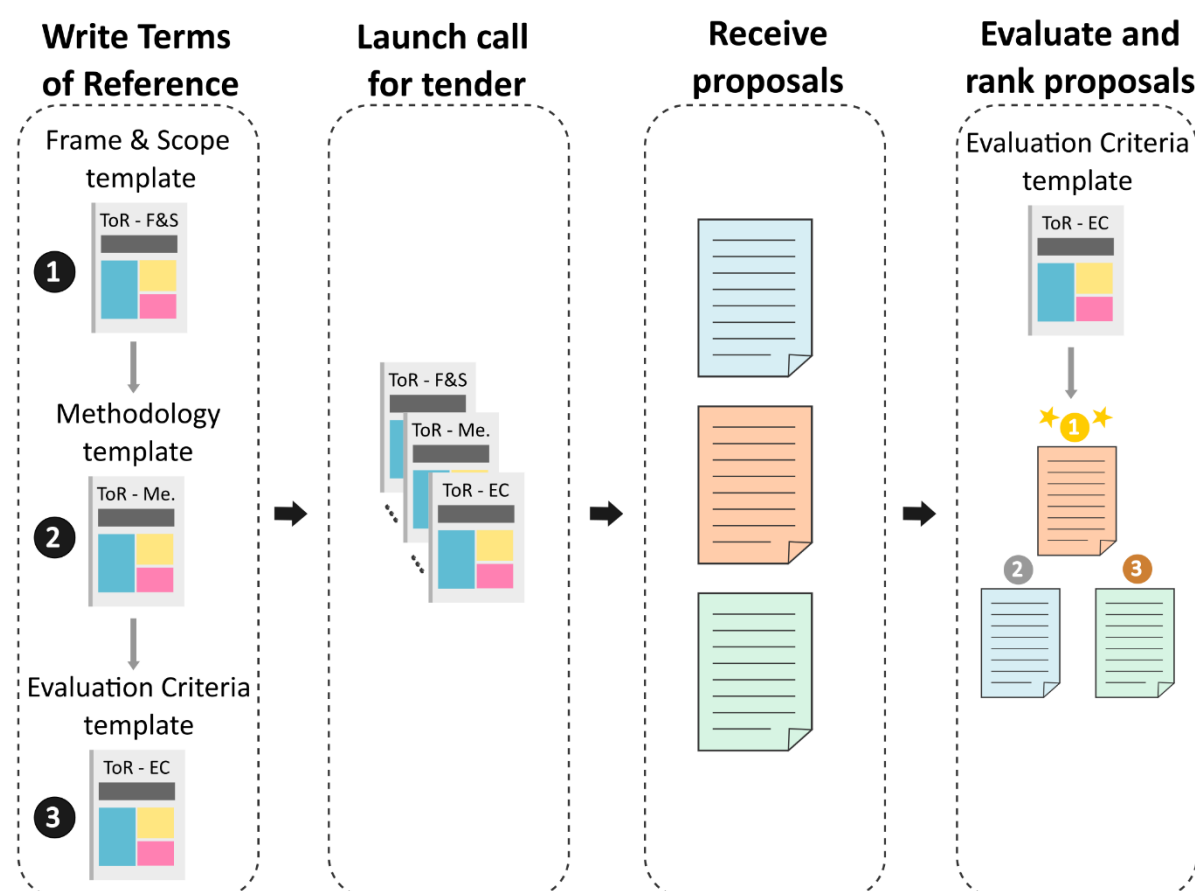


Figure 14 - Recommended workflow for the use of the Terms of Reference templates. *ToR* stands for Terms of Reference, *F&S* stands for Frame & Scope, *Me.* stands for Methodology, *EC* stands for Evaluation Criteria.

When writing their Terms of Reference for a call for tender, commissioners should start by using the Frame & Scope template to write the context and purpose of their ecosystem service assessment. After establishing the scope, commissioners can move on to the Methodology template, which will support them in writing the technical requirements they need for their assessment according to the framing and scoping they have done with the Frame & Scope templates. Finally, they can use the Evaluation Criteria template which will help them identify the scoping and methodological criteria that are essential to them in evaluating proposals from contractors. The commissioners can then finish the writing of their Terms of Reference by adding other sections of relevance. The evaluation criteria listed in the guidance are a starting point, we recommend the commissioners to amend them and would probably be amended to better fit their context and needs.

Once the Terms of Reference are completed, the commissioners can launch their call for tender and start collecting proposals from potential contractors. After the call deadline has



ended, proposals need to be reviewed and evaluated to identify the most suitable one(s) and follow-up on the potential contractor(s) for subsequent negotiations. To have some support in this evaluation phase of the proposals, commissioners can go back to the Evaluation Criteria template. This document gives a summary overview of what the commissioners need and what the proposals offer to address. Based on this, commissioners can give an appreciative score to each proposal and rank them to decide which ones should be further investigated.

As noted in [5.2 Caveats and limitations](#), the templates are not exhaustive. To improve the quality of their assessment and subsequent phase of evaluating the proposals received, further guidance can be found in [Annex 8.2 Advanced content](#).

As the three templates are linked, we recommend commissioners to follow the recommended workflow described above. **Using the templates independently from each other might not give an optimal guidance.** Experienced commissioners might not need to follow the entire content of all the templates. Commissioners might wish to use only some sections of the templates to enrich or complete pre-existing Terms of Reference. In that case, we recommend the commissioners to select the sections of the templates they are interested in. As explained in the following section [5.1.3 How to use the templates?](#), all templates have landing pages which allow for a modular, more specific use. Guidance on modular use will be further developed in another deliverable of SELINA work package 4.



5.1.3 How to use the templates?

5.1.3.1 Purpose of the templates

The templates provide guidance on the essential information that should be stated in the Frame & Scope, Methodology and Evaluation Criteria sections of the Terms of Reference of a call for tender when commissioning an ecosystem service assessment. They are designed to both help the commissioners in writing a call for tender by providing preformatted text for Terms of Reference, but also raise awareness on the specific concepts and reasoning that users should take into account when commissioning a study on ecosystem services. Specific aims of each template are described below.

- ***Frame & Scope template – detailed purpose***

The Frame & Scope templates support the writing of the Frame & Scope section of a Terms of Reference by identifying and describing four important types of information:

1. The context and purpose: *What is the decision-making context within which this assessment is required? Why is it needed? What has to be achieved?*
2. The intended impacts and outputs: *What are the intended uses, impacts, and output formats of the assessment within the decision-making context?*
3. The general methodological characteristics: *What are the main methodological characteristics of the assessment given the purpose and expected outcomes?*
4. The engagement of stakeholders during the ecosystem service assessment process: *Should they be involved? Which stakeholders are key to the assessment?*

- ***Methodology template – detailed purpose***

The Methodology templates support the writing of the Methodology section of a Terms of Reference by identifying and describing four important types of information:

1. The methodological characteristics of the outputs: *What should be measured?*
2. The uncertainty: *how should uncertainties linked to the ecosystem service assessment be measured?*
3. The validation of the scope, methodology and results of ecosystem service assessment: *What should be validated and how?*
4. The engagement of stakeholders during the ecosystem service assessment process: *When should stakeholders be involved and how?*



- **Evaluation Criteria template – detailed purpose**

The Evaluation Criteria template has two main goals:

1. Write the Evaluation Criteria section of a Terms of Reference by identifying the criteria that are essential to the commissioners in the scope and methodology they have designed with the previous templates.
2. Evaluate the proposals received from the potential contractors once the call has ended.

5.1.3.2 Frame & Scope template

Structure of the Frame & Scope section of a Terms of Reference

The guidance in the Frame & Scope templates recommends commissioners to structure their Frame & Scope section of a Terms of reference with four subsections as shown in **Figure 15** below.

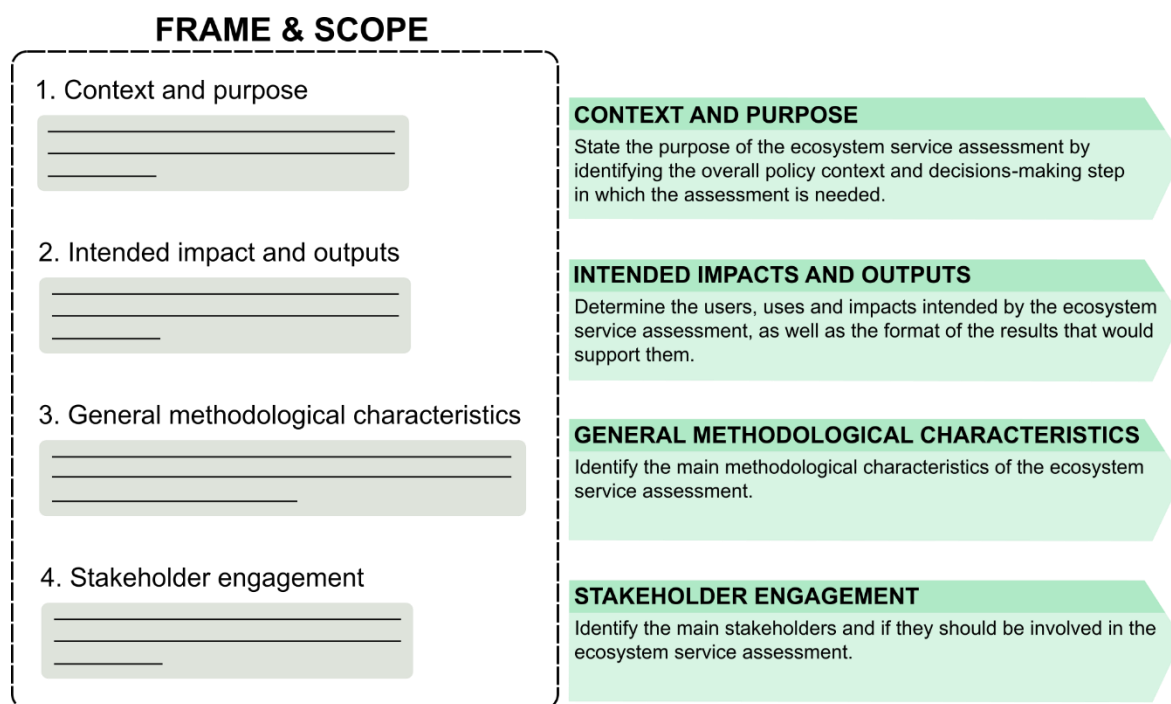
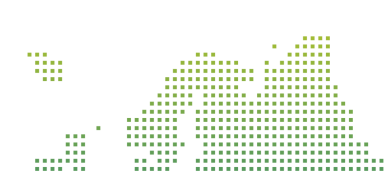


Figure 15 - Recommended structure of the Frame & Scope section of a Terms of Reference to commission an ecosystem service assessment

Writing the Frame & Scope section of a Terms of Reference

Upon arriving on the Frame & Scope, the commissioners will see a list of questions for each of the sections presented in **Figure 15**. Commissioners can choose the questions that they wish to answer before going to the detailed page of the question by following the “Link to the detailed question”. On this detailed page for each question, commissioners will have space



to answer the question itself, and will have access to both an information box including descriptions and examples, as well as a Terms of Reference box displaying a preformatted text that can directly be used and modified by the commissioners in their own Terms of Reference (**Figure 16**).

The more sections and questions the commissioners cover and answer, the more complete the ecosystem service assessment will be as it will integrate more concepts essential to its design (refer to [5.1.5 Important concepts underlying the design of ecosystem service assessment](#)). The Frame & Scope template is however not exhaustive and if the commissioners wish to add more details to their Terms of Reference, they should modify as needed with the additional support of the advanced content in [8.2 Advanced content](#).

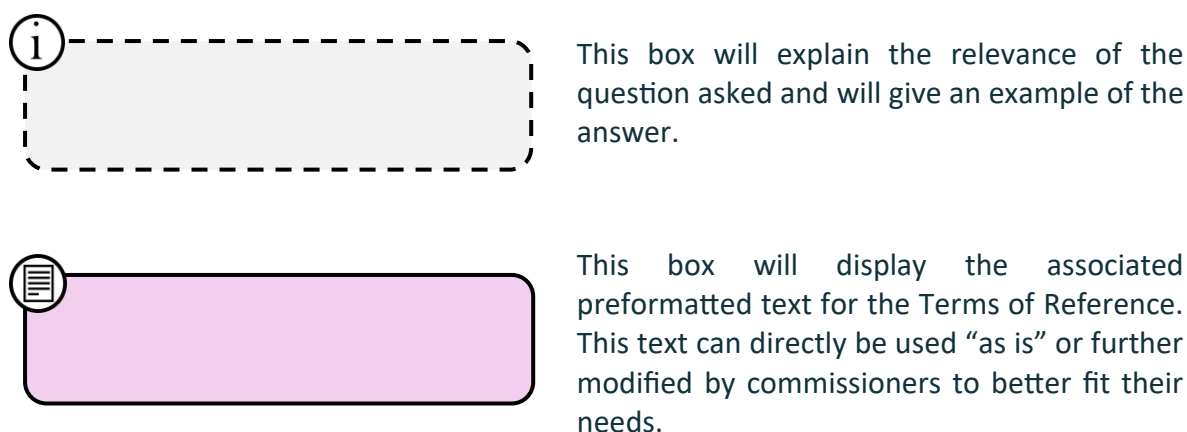


Figure 16 - Information associated to each question of all the templates

5.1.3.3 Methodology template

Structuring the Methodology section of a Terms of Reference

The guidance in the Methodology templates recommends commissioners to structure their Methodology section of a Terms of reference with four subsections as shown in **Figure 17** below.

Writing the Methodology section of a Terms of Reference

Upon arriving on the Methodology template, the commissioners will see a list of questions for each of the sections presented in **Figure 17**. Commissioners can choose the questions that they wish to answer before going to the detailed page of the question by following the “Link to the detailed question”. On the question-specific page, commissioners will have space to answer the question itself, and will have access to both an information box including descriptions and examples, as well as a Terms of Reference box displaying a preformatted text that can directly be used and modified by the commissioners in their own Terms of Reference (**Figure 16**).

The more sections and questions the commissioners cover and answer, the more complete the ecosystem service assessment will be as it will integrate more concepts essential to its



design (refer to [5.1.5 Important concepts underlying the design of ecosystem service assessment](#)). The Methodology template is however not exhaustive and if the commissioners wish to add more details to their Terms of Reference, they should modify as needed with the additional support of the advanced content in [Annex 8.2 Advanced content](#).

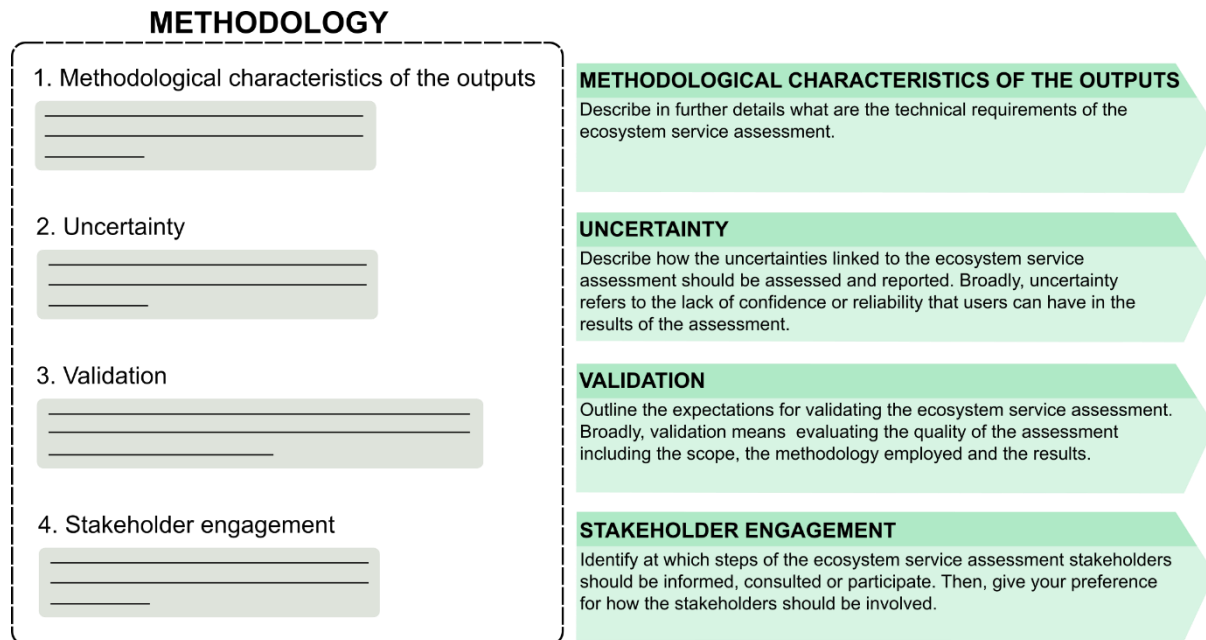


Figure 17 - Recommended structure of the Methodology section of a Terms of Reference to commission an ecosystem service assessment

5.1.3.4 [Evaluation Criteria template](#)

Structuring the Evaluation Criteria section of a Terms of Reference

The guidance in the Evaluation Criteria templates supports commissioners in structuring their Evaluation criteria section of a Terms of Reference with two subsections as shown in **Figure 18**. **Note that the guidance only provides support to identify evaluation criteria for the scope and the methodology.** There are other evaluation criteria that the commissioners should consider that this guidance document does not advise on such as the budget, or strategy and governance of the commissioners' institution.



EVALUATION CRITERIA	
1. Frame & Scope 	FRAME & SCOPE Identify the essential criteria that will be used to evaluate the frame and scope of the proposals recieved.
2. Methodology 	METHODOLOGY Identify the essential criteria that will be used to evaluate the methodology scope of the proposals recieved.
3. Any other relevant sections No guidance from SELINA	ANY OTHER RELEVANT SECTIONS Any other relevant sections with their associated evaluation criteria that the commissioners would like to include. No guidance from SELINA

Figure 18 - Recommended structure of the Evaluation Criteria section of a Terms of Reference to commission an ecosystem service assessment

Writing the Evaluation Criteria section of a Terms of Reference

The Evaluation Criteria template differs slightly from the two previous templates. Instead of a list of questions, the commissioners are given a list of evaluation criteria that matches the Frame & Scope and Methodology templates. The commissioners should choose which criteria are essential to them compared with those which could be subject to negotiations with the potential contractors. Commissioners can refer to both the previous templates and further information including descriptions and links to advanced content presented in the information box (**Figure 16**). After choosing the criteria, the commissioners can use the preformatted text displayed in the Terms of reference box to help write the Evaluation Criteria section of their own Terms of Reference (**Figure 16**).

Figure 19 below shows how to use the template form. Writing the Evaluation Criteria section corresponds to Steps 1 to 3.

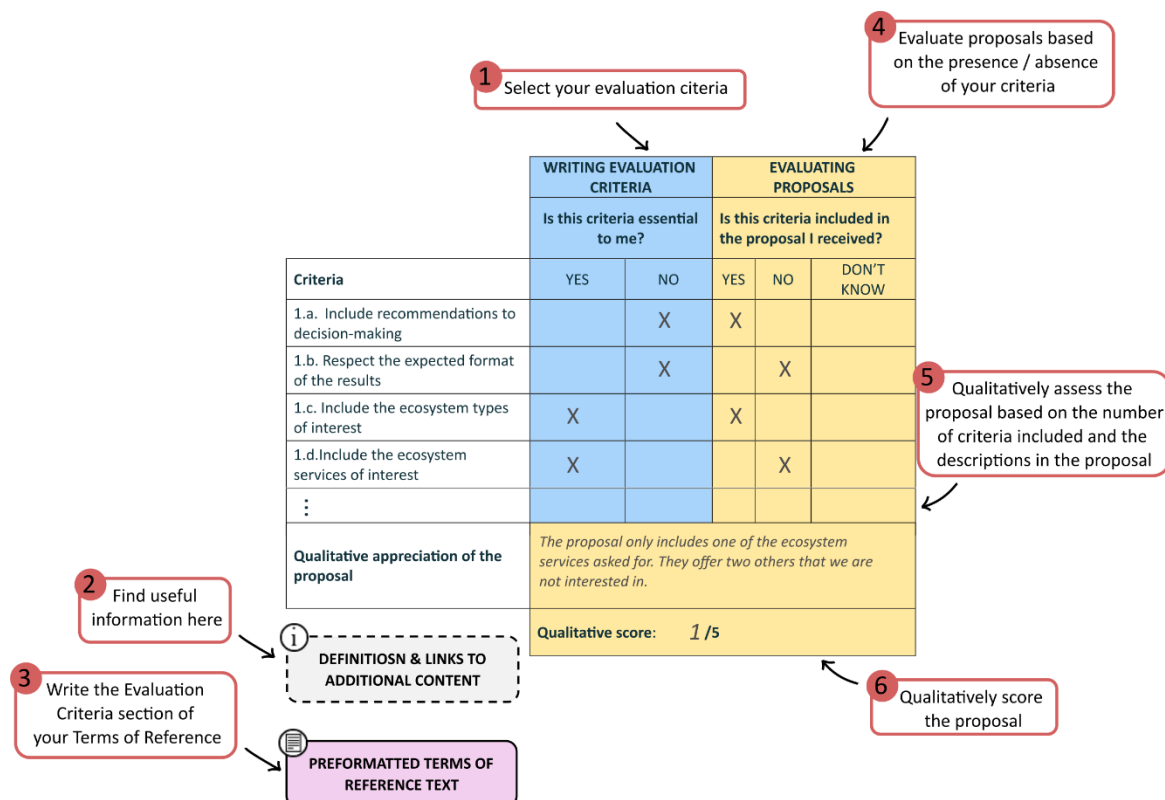


Figure 19 - Using the Evaluation Criteria template to write the Evaluation Criteria section of a Terms of Reference (Steps 1-3) and score and rank proposals (Steps 4-6)

Evaluating proposals with the Evaluation Criteria template

Once the call for tender has ended and the proposals have been received, commissioners can go back to the Evaluation Criteria template to qualitatively score and rank proposals. This phase corresponds to step 4 to 6 in

Figure 19. The scoring is based on:

- the number of criteria that the commissioners has identified as essential and that are included in the proposal received;
- the descriptions of the scope and methodology available in the proposal.

Commissioners can then add the scores given for all sections and rank the proposals. The scoring and ranking are qualitative. The commissioners can use them to decide which proposals should be given further consideration. Commissioners can refer to our advanced content in [Annex 8.2 Advanced content](#) to have further guidance on how to assess the quality of the scope and methodology of a proposal.

5.1.4 I need examples of use of the templates!

Examples are provided for each question present in the templates. These examples all refer to the same hypothetical case described in Box 1 below. The main purpose of these examples is to improve the clarity of the questions asked and therefore facilitating a thorough comprehension, by the commissioners, of the concepts embedded in each question.

In addition to these question-specific examples, we also provide a complete Terms of Reference for the Frame & Scope, Methodology, and Evaluation Criteria sections based on the hypothetical case presented in Box 1. These Terms of Reference sections have been directly drafted from the three templates provided in this guidance document.

Another suite of examples is also presented in [Annex 8.3 Terms of Reference – Additional examples](#) and covers the commissioning of one case study assessment for the following five ecosystem service specific topics:

- [Agriculture and Forestry related ecosystem services](#)
- [Hydrology and Water related ecosystem services](#)
- [Air quality and Climate related ecosystem services](#)
- [Recreation and Amenities related ecosystem services](#)
- [Fishery, aquaculture and marine related ecosystem services](#)

Each of these examples contains the three templates filled out for each ecosystem service specific case study. The examples illustrate the flexibility of our guidance and what can be produced based on them.

Box 1- Hypothetical example case

The National Park Mainland is a 5,000 ha large nature area in the east of Belgium. It connects three municipalities and consists mainly of forests, heathland, grasslands, inland dunes and brook valleys. It maintains a rich and rare biodiversity and also offers large recreational opportunities for all ages.

In 2023 it became a National Park. For this nomination, the nature area needed a long-term Masterplan and an Operational plan for the next six years. To assess the progress towards the goals outlined in the Masterplan, an ecosystem assessment was set up, mapping stakeholders, land use, ecosystem condition, and ecosystem services.

In the templates, we answer the questions as if a tender for carrying out this ecosystem assessment was sent out by the managing authority, namely the Agency of Nature and Forest in Flanders. We particularly focus on the ecosystem service assessment. The overall request is to assess a bundle of ecosystem services and to also take into account trade-offs between them.





5.1.5 Important concepts underlying the design of ecosystem service assessment

5.1.5.1 Economic valuation, social and health

Definitions

The economic value of ecosystem services is a measure of the human welfare derived from their use or appreciation. Economic value is one way to quantify and communicate the importance of ecosystem services to decision makers, and can best be used in combination with other forms of information to provide a complete picture of how human welfare depends on natural capital. Economic value is conventionally measured in monetary units but can also be measured in other quantitative units (*e.g.*, time) or in qualitative terms.

The social valuation of ecosystem services considers the social benefits provided by ecosystems, and how such benefits are distributed among various groups in society, emphasising issues of equity, well-being (including safety, security and health), and social cohesion. It highlights how access to and control over natural resources influence (and is influenced by) quality of life, cultural identity, social relationships and community resilience. Social valuation provides essential insights for the design of methodology by ensuring that assessments reflect diverse perspectives and do not reinforce existing inequalities.

Health valuation of ecosystem services considers how ecosystems influence health status, and how the condition of ecosystems, including the presence, absence or sustainability of certain biophysical structure or functions, may give rise to health benefits or health risks. It can provide valuable insights into the impact of ecosystem degradation, conservation and restoration on the health of communities. Health valuation can inform all major areas of public health planning and practice, as well as aspects of veterinary health and plant health; health is increasingly considered from a One Health perspective, accounting for the systemic interlinkages between the health of humans, of other biota and of ecosystems. Health valuation has close correlations to social benefit valuation, particularly with regard to how benefits are distributed between and within groups and communities, and can help identify and address trade-offs and disparities. In addition to assessing health benefits and risks in general terms (*e.g.* “urban greenspace may provide opportunities for outdoor exercise”, or “loss of coastal dunes may increase storm surge risk for coastal communities”), health valuation can also be used to determine the role of ecosystems as drivers of health outcomes, meaning the specific impacts of exposure on health in real terms (*e.g.* “air quality improvements from urban forestry reduce cases of severe asthma in a given city by a specific amount per year”).

Relevance

The particular utility of economic value is that it conveys the importance of ecosystem services directly in terms of human welfare and uses a common unit of account (*i.e.* money) so that values can be directly compared across ecosystem services, or across other goods and services in the economy, and can be included in decision support frameworks such as Cost-Benefit Analysis.

The social benefit perspective is crucial for methodology design as it ensures that assessments of ecosystem services account for different considerations, including equity, cultural significance, and community well-being. Integrating social dimensions helps identify who



benefits from ecosystem services and who may be vulnerable to their loss, supporting more just and inclusive policy and decision-making processes.

Health is a core component of well-being, featuring heavily in individual and community assessments of well-being and having a dominant influence on other measures such as quality of life, life satisfaction, livelihood security and perspectives on future life opportunities. In an era of increasing concerns over emerging and re-emerging infectious diseases and associated pandemic risks, antimicrobial resistance, nutrition insecurity, mental well-being and the impacts of disasters, health valuation is increasingly important for understanding the health impacts of climate change, land use change, pollution and invasive species. From the perspective of governance, and for private sector interests, the health sector is a major contributor to economies and a major recipient of government funding, and therefore also represents a key sector for mainstreaming ecosystem service assessments into national planning processes and policy development.

5.1.5.2 Capacity and Condition of ecosystems

Definitions

Ecosystem condition is the quality of an ecosystem measured in terms of its abiotic characteristics (*i.e.*, non-living physical and chemical factors such as pH, temperature, salinity) and biotic characteristics (*i.e.*, living organisms such as animals and plants, and their interactions such as predation). Ecosystem condition indicators can help track changes over time. The selection of ecosystem condition variables depends on the context (including data availability) and purpose of the assessment, with different considerations being relevant for natural and anthropogenic ecosystems³.

Natural capital is a related concept and often used to define the ecosystem properties (structure and functions) that support ecosystem services. Agricultural land, forests, watersheds, fisheries, fresh water sources, river estuaries and the atmosphere are capital assets that are self-regenerative, but suffer from depletion or deterioration when they are over-used⁴. It is therefore implied that, for levels of ecosystem service use to be sustainable, natural capital (*i.e.*, the structures and functions of the ecosystem and its condition) must be maintained. The concept is useful for sustainability assessments since it enables us to understand biodiversity loss and ecosystem degradation as the depletion of natural capital.

Ecosystem service capacity, or ecosystem service potential, describes the ability of an ecosystem to generate an ecosystem service under current ecosystem condition, management and uses, without negatively affecting the future supply of the same or other ecosystem services from that ecosystem³. Ecosystem service capacity is related to the concept of natural capital, it measures the amount of ecosystem service that can be provided or used in a sustainable way in the area of interest in the assessment. Ecosystem service capacity should be assessed over a sufficiently long period of time because while ecosystem

³ [System of Environmental Economic Accounting – Ecosystem Accounting](#), United Nations, 2024.

⁴ [Nature's role in sustaining economic development](#), Dasgupta, Philosophical Transactions of the Royal Society B, 2010.



service can increase with use intensity, if the ecosystem service capacity is eroded, gains in ecosystem service will only be short-term.

Ecosystem service supply is the actual provision of ecosystem service in biophysical units. In an ecosystem accounting framework⁵, tables recording the supply of ecosystem services per ecosystem types can be derived. They are useful to have an overview of the supply of ecosystem services over the ecosystems present in an area of interest. Ecosystem service supply can further be measured in terms of other values such as economic values, welfare values etc.

Ecosystem service potential supply is the provision of a service by a particular ecosystem, measured in biophysical units, irrespective of its actual use. It can be determined for a specified period of time (such as a year) in the present, past or future⁶.

Ecosystem service use is the amount, in biophysical units, of ecosystem service that is actually mobilised in a specific area and time by different users or economic sectors. As for the supply, in an ecosystem accounting framework⁵, tables recording the use of each ecosystem services per type of beneficiaries (*i.e.*, users) can be derived. In ecosystem accounting, the ecosystem service supply must equal the total use. Ecosystem service use can be further measured in terms of other values such as economic values, welfare values etc.

Ecosystem service demand is the need for specific ecosystem services by society, particular stakeholder groups or individuals. Ecosystem services represent interactions between people and ecosystems, hence, ecosystem service supply depends both on the ecosystem's properties and on human needs, values, preferences, assets, and institutions⁷ as well as access⁸. Ecosystem service demand depends on several factors such as culturally-dependent desires and needs, availability of alternatives, or means to fulfill these needs. It also covers preferences for specific attributes of a service and relates to risk awareness⁶. If the need can be measured, ecosystem service demand can be compared with the levels of ecosystem service supply and use, and used to assess possible ecosystem service deficits or underserved areas. An assessment of ecosystem service demand can also help understand changes in levels of ecosystem service use.

Relevance

Ecosystem services is a concept often used to help explain human reliance on nature and frame the decisions we make in terms of the ongoing value of nature to human wellbeing⁹. This is done by establishing causal relationships between ecosystem properties, the flow of benefits and human well-being. Making these relationships explicit, provides the grounds for understanding questions about sustainable use of nature and sustainability in a wider sense.

⁵ [System of Environmental Economic Accounting – Ecosystem Accounting](#), United Nations, 2024.

⁶ [Mapping of Ecosystem Services](#), Burkhard and Maes, Pensoft, 2017.

⁷ [Towards a Threat Assessment Framework for Ecosystem Services](#), Maron et al., Trends in Ecology and Evolution, 2017.

⁸ [Ecosystem services supply and demand assessment: Why social-ecological dynamics matter](#), Mehring et al., Ecosystem Services, 2018.

⁹ [Science for the sustainable use of ecosystem services](#), Bennett and Chaplin-Kramer, F1000 Research, 2016.



The assessment of ecosystem condition is relevant because it helps assess if natural capital and the ecosystem service capacity is maintained or degraded with the use of ecosystem services. It can also help establish the outcomes of ecosystem restoration actions. Healthy ecosystems have the ability to sustain their typical composition, structure, functioning, and capacity for self-organisation over time, within their natural range of variability. Ecosystem resilience, *i.e.* the capacity to recover from disturbances and adapt to environmental change¹⁰, is associated with the notion of good ecological condition. Assessing ecosystem condition helps decision-makers make informed decisions to maintain or restore ecosystems, thereby also securing the long-term support of ecosystem services.

The concept of ecosystem service capacity is related to ecosystem condition, in the sense that it refers to the extent to which the ecosystem can support ecosystem services. Information on the capacity of ecosystems to provide ecosystem services is relevant to identify areas with high or low potential to support services under different environmental conditions.

When linked to information about levels of ecosystem service use and / or demand, ecosystem service capacity helps identify areas under (un)sustainable land management and target suitable strategies for alternative management. Assessing ecosystem services supply and use can help indicate spatial mismatches where demand exceeds supply and guide targeted interventions, especially to address social and economic disparities in access to ecosystem services.

5.1.5.3 Spatial and temporal scales

Definitions

The spatial and temporal characteristics of an ecosystem service assessment refer to the dimensions of space and time, respectively, that impact the framing and scoping and the methodology of the assessment, as well as the interpretation of the results. **Figure 20** below summarises all the important concepts associated with space in time in the context of an ecosystem service assessment.

The (spatial) extent of the ecosystem assessment refers to the geographical location and the overall size or two-dimensional extension of the area of interest.

The spatial resolution (or spatial grain) is defined as the smallest observable unit or the size of the spatial units for which data are observed or predicted. It often refers to the (raw) input data that is needed or used for the assessment. In remote sensing for example, the spatial resolution refers to the size of the area on the ground that's represented by a single pixel in an image¹¹.

The spatial scale differs from spatial resolution. It addresses the relationship between the area of interest and the level of detail that is required or available (local, regional, national,

¹⁰ [System of Environmental Economic Accounting – Ecosystem Accounting](#), United Nations, 2024.

¹¹ [Mapping of land cover with open-source software and ultra-high-resolution imagery acquired with unmanned aerial vehicles](#), Horning et al., Remote Sensing in Ecology and Conservation, 2020.

Spatial and temporal characteristics of ecosystem assessments

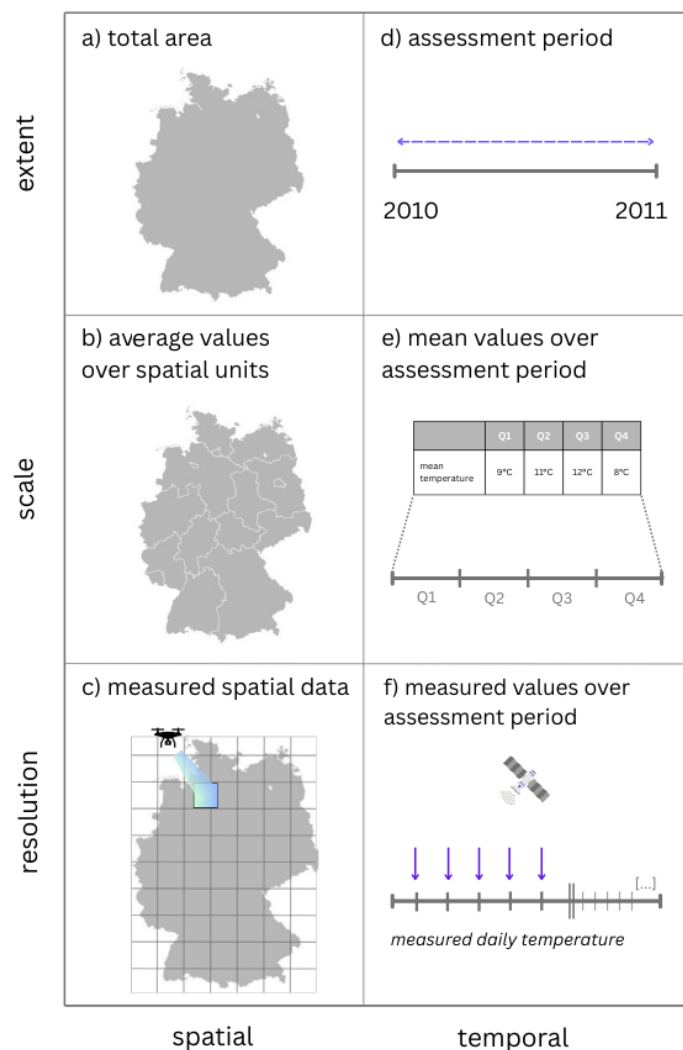


Figure 20 - Important spatial and temporal characteristics of ecosystem service assessments.

The temporal characteristics pertain to the timing and duration of the assessment, *i.a.* how time factors impact the assessment process. First of all, this includes the overall duration or time period covered by the assessment, termed as **temporal extent**.

Then, the temporal scale needs to be set and refers to the level of temporal detail to be considered for (the results of) the ecosystem service assessment, *e.g.* ranging from short-term (*e.g.*, daily or weekly) to long-term (*e.g.*, annual or decadal) analyses.

The smallest time increment considered in the assessment is described as the temporal resolution. It generally refers to the available resolution of (measured) input data. If the temporal resolution of the input data is finer than the desired temporal scale, temporal aggregation is required.

Optionally, the frequency of an assessment can be indicated, for example if regular repetitions of the same ecosystem assessment approach are expected.

Relevance

Ecosystem assessments can be conducted at various spatial and temporal scales with different spatial and temporal resolutions. Choosing the appropriate spatial and temporal scale is important to ensure that the analysis captures the relevant processes and patterns of interest. To ensure that the complexity remains appropriate for the available resources and meets the objectives of the assessment, it is important to clearly define and delimit some aspects when framing and scoping and conducting the assessment.

5.1.5.4 Uncertainty

Definitions

Uncertainty assessment provides information on the degree of confidence we can have in the results. Ecosystem service assessments involve the use of different data sources and methods to inform decisions. Each of these entail uncertainties due to gaps in our knowledge and inherent variability. Recognising and assessing uncertainties is essential to ensure the results are reliable and suitable for decision-making.

There are three main sources of uncertainty that are relevant to ecosystem service assessments: scenario uncertainty, model uncertainty, and decision uncertainty¹²:

Decision uncertainty: the ultimate goal of an ecosystem service assessment is to support evidence-based decision-making. However, uncertainty arises in how the results are transferred to users, such as decision-makers. Reducing decision uncertainty involves aligning the assessment with the specific policy context of the ecosystem service assessment, including relevant spatial and temporal scales. Achieving this alignment also depends on how well the other sources of uncertainty, scenario development and ecosystem services modelling, are addressed.

Scenario uncertainty: scenarios are used to explore how ecosystem services might change under different future conditions. By nature, the future is uncertain and so are scenarios as there is only limited knowledge to define them. Scenarios are typically built using narratives,

¹² [Uncertainties in ecosystem services assessments and their implications for decision support – A semi-systematic literature review](#), Walther et al., Ecosystem Services, 2025.



which reflect values, assumptions and interests. Consequently, scenarios inherently reflect a limited range of views of the world and its potential futures. The formulation of these narratives themselves is also subject to the interpretation of the contractors who translate them into quantitative metrics and models to perform the work, leading to another layer of uncertainties. To improve the credibility of the results, multiple scenarios that reflect different perspectives can be requested. Involving stakeholders in developing these scenarios can also help ensure that a wider range of views is included, making the results more applicable.

Model uncertainty: ecosystem services are often represented using various types of models, such as biophysical, socio-economic, or integrative models¹³. Yet all models are simplifications of real-world processes. Hence, models are limited by inaccurate or incomplete model structure, as well as data limitations. While improved data quality and more advanced modelling techniques can help reduce some of these uncertainties, others are unavoidable (due to lack of knowledge, and inherent variability). We recommend that commissioners request an uncertainty assessment and clear documentation of uncertainties.

Relevance

Uncertainty is an inherent part of ecosystem service assessments and decision-making. While it cannot be fully eliminated, explicitly assessing and documenting uncertainty supports better risk assessment, helping decision-makers understand the limitations of the evidence. This approach has the potential to produce more applicable results by enhancing credibility, legitimacy, and relevance^{14,15}.

5.1.5.5 Interlinkages between important concepts

All the concepts presented above are important to know because they are key design features of integrated ecosystem assessments in general. In particular, biophysical ecosystem service assessments are strengthened by adequately considering (i) spatial resolution and scaling, (ii) ecosystem condition, (iii) capacity, potential, supply-use of ecosystem services (iv) and uncertainty analysis and documentation. The integration of plural values in ecosystem assessments is strengthened by considering economic, social and health benefits¹⁶. **Figure 21** illustrates that there are linkages between all these assessment design features.

¹³ [The methodological assessment report on scenarios and models of biodiversity and ecosystem services](#), Ferrier et al., Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 2016.

¹⁴ [Chapter 4. Value expression in decision-making](#), Barton et al., Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 2022.

¹⁵ [Uncertainties in ecosystem services assessments and their implications for decision support – A semi-systematic literature review](#), Walther et al., Ecosystem Services, 2025.

¹⁶ [Increasing uptake of ecosystem service assessments: best practice check-lists for practitioners in Europe](#), Barton et al., One Ecosystem, 2024.



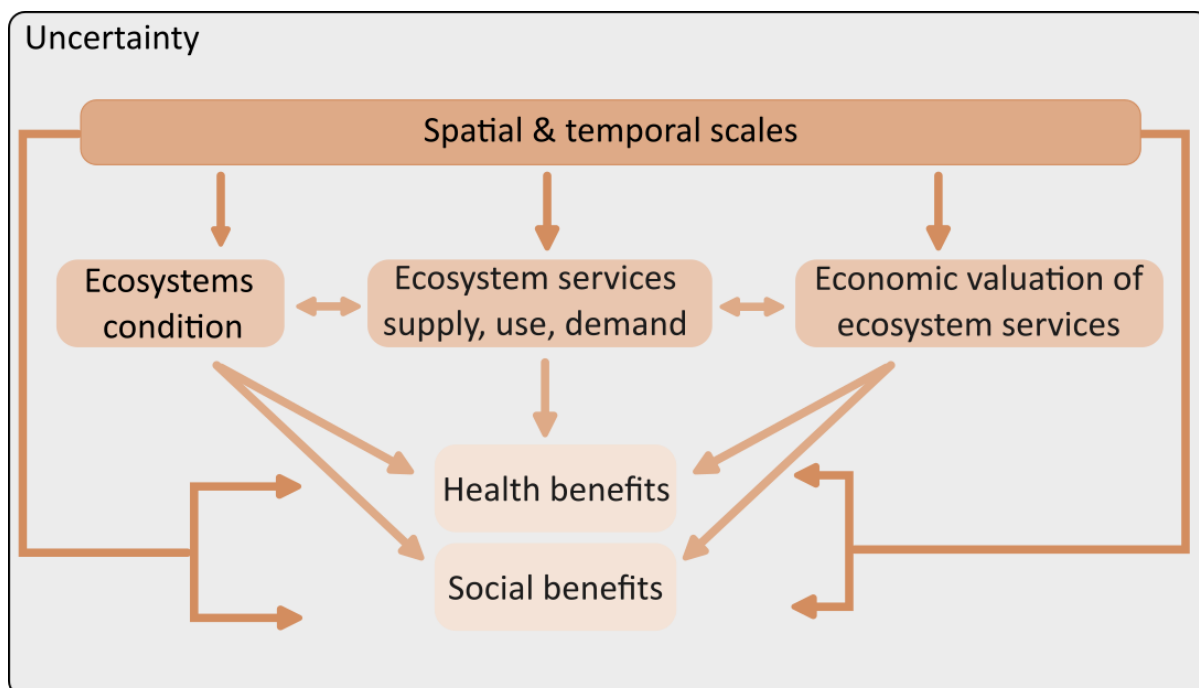


Figure 21 – Interlinkages between main ecosystem service assessments design features.

The Terms of Reference templates displayed in this document guide commissioners to consider all these assessment design features. These concepts are not stand-alone features. Decisions on certain design features have implications for others. Managing these interdependencies in the design of ecosystem service assessments require some iterations between Terms of Reference templates and their associated questions to ensure consistency in the final Terms of Reference. The Terms of Reference templates hyperlinks allow commissioners to move back and forth between questions and concepts, facilitating reflections and adjustments.

Some examples of these interlinkages between key design features are explained below. For further discussion, commissioners can refer to Barton et al. 2024¹⁷, and Immerzeel et al. 2024¹⁸, as well as the advanced content in [Annex 8.2](#).

Uncertainty - This links to all ecosystem service assessment design aspects. Any metrics used in the ecosystem service assessment will describe spatial and temporal variability, and have measurement and modelling error. How scenarios are defined, assessed and how they are communicated to decision-makers requires further uncertainty documentation. Documenting uncertainty in all steps of the ES assessment and communicating uncertainty contributes to the robustness and reliability of the study results and can increase uptake of ecosystem service findings in policy¹⁹.

¹⁷ [Increasing uptake of ecosystem service assessments: best practice check-lists for practitioners in Europe](#), Barton et al., One Ecosystem, 2024.

¹⁸ SELINA D4.2. Diagnostic of ES model decision-support capabilities, Immerzeel et al., EU Horizon SELINA, 2024.

¹⁹ [Uncertainties in Ecosystem Services Assessments and Their Implications for Decision Support – A Semi-Systematic Literature Review](#), Walther et al. Ecosystem Services 2025



Spatial and temporal scales - All metrics for extent, condition, services and benefits in an ecosystem service assessment have a spatial and temporal scale and resolution. High spatial resolution allows for more detailed and precise mapping of ecosystem services, which is essential for localised planning and management. Because information is costly, assessment design is budget constrained and one must choose scales and resolutions that are adequate for the purpose.

Ecosystem condition - Considering ecosystem condition in ecosystem service assessments provides a more holistic and accurate understanding of good ecological status as the capacity of ecosystems to deliver services. Ecosystem condition can be a proxy indicator for ecosystem services when data and methods are missing for the latter. Similarly, health and social impact can often be explained directly by ecosystem condition variables (*e.g.*, water and air quality). Ecosystem management seeks to conserve and restore extent and condition, so ecosystem service assessment models addressing condition are more useful for design and monitoring of management measures.

Ecosystem services supply, use, demand - Better distinction and measurement of these concepts will improve understanding and management of the mismatches between what ecosystems can sustainably supply (capacity and potential) and what is required or desired by human populations (current use and future demand). Being able to identify supply and demand functions for ecosystem services is important for economic welfare valuation methods, and identifying current and historic use is key to ecosystem accounting.

Economic valuation of ecosystem services - Economic valuation methods that are compatible with both ecosystem service and condition metrics are expected to be more valid and reliable in value transfer for multiple decision support applications. A number of valuation methods consider health and social benefits. The choice of economic valuation method should not be made without knowing the biophysical metrics measuring change in services, condition and ecosystem extent.

Health benefits - These outcomes help extend ecosystem service assessments' relevance for human welfare and mobilises wider policy support for values of nature. As stated above, the methods chosen will depend on the metrics available for ecosystem condition and services use, and choices made regarding their spatial scale and resolution in order to link models.

Social benefits - These outcomes make ecosystem service assessments more relevant for local communities and, by addressing justice issues such as unequal access to services, can facilitate more inclusive and legitimate assessment processes. Similarly, the methods chosen will depend on the metrics available for ecosystem condition and services use, and choices made regarding their spatial scale and resolution in order to link models.



Caveats and limitations



5.2.1 What to do/not to do with the guidance

The series of templates aim at providing guidance and support on how to write some sections of a Terms of reference to commission ecosystem service assessments with the relevant design so the subsequent results meet the commissioners' needs. They do not provide guidance on:

- how to commission an integrated ecosystem assessment;
- how to compile, assess, interpret and disseminate the results of an ecosystem service assessment;
- how to implement the results in decision-making;
- how to set up a budget and timelines;
- how to ask for an ecosystem service assessment within the budget and timelines set by the commissioner. A tiered system considering these constraints will be further developed in an upcoming SELINA Deliverable;
- alignment with specific standards requested by international and national reporting. We recommend in this case to follow the standards specified by the reporting.

The templates are a good starting point for commissioners to improve the clarity of their expectations, hence enhancing their communication with contractors and increasing their chances of obtaining assessment results that are fit-for-purpose and respond to their decision-making needs. Commissioners can decide to go further and use our advanced content in [Annex 8.2 Advanced content](#). These appendices give more information and provide lists of additional questions the commissioners could answer to be more precise in their Terms of Reference and improve the quality of their assessment.

These guidance templates are generic and flexible. They can accommodate a variety of contexts and purposes for which an ecosystem service assessment may be needed. They have also been designed to support commissioners with different levels of knowledge regarding these types of assessment. The relevance and importance of the questions presented in the templates might vary depending on the purpose of the assessment, the ecosystem types and services of interest, as well as the policy context.

5.2.2 Considering important concepts

The templates and supporting information provided in the main document do not capture all the nuances that underline the choices of the different concepts that can be included in an ecosystem service assessment (presented in [5.1.5 Important concepts underlying the design of ecosystem service assessment](#)). For further information on how to integrate them in an assessment, we recommend the commissioners to visit our advanced content in [Annex 8.2 Advanced content](#).



5.2.3 Target users and uses

These guidance templates are generic and flexible. They can adapt to a variety of contexts and purposes underlying the needs for an ecosystem service assessment. They also support commissioners with different levels of knowledge. First-time commissioners might find some template questions difficult to answer. For example, it is assumed that commissioners already have some information on the area and ecosystem services of interest. In the event of lack of knowledge, we recommend giving a brief and broad description of what is of interest to help the contractor targeting the commissioners' needs. The relevance and importance of the questions presented in the templates might vary depending on the purpose of the assessment, the ecosystem types and services of interest, as well as the policy context.

To guarantee speed and simplicity, commissioners should first check in their organisation for internal expertise, whether to conduct the ecosystem service assessment itself, or to write the Terms of Reference. The guidance templates can be used by internal experts when writing their Terms of Reference, ensuring that all essential aspects have been included in their Terms of Reference. If commissioners decide to hire contractors to write their Terms of Reference, the templates could also be used as a support by these contractors, either to complement their own internal Terms of Reference standard templates, or as "safeguards" and checklist of the essential sections and concepts to go through.

Additional guidance will be necessary to support commissioners identifying the "minimum required assessment" depending on their purpose and context for requesting an ecosystem service assessment and constraints. Such guidance would help the commissioners with selecting the questions that are relevant to them in each template. This will be further developed in an upcoming SELINA Deliverable.

5.2.4 Adaptations to the private sector

The ToR guidance presented in this document is not fully adapted to the private sector. An upcoming SELINA Deliverable will work on further improving the guidance templates for the private sector. If private commissioners still wish to use these guidance, below are a number of points that our guidance does not cover or covers only partially:

- **Impacts and Dependencies:** drawing from experiences in SELINA, a key difference between public and private sectors lies in how ecosystems, their services and the benefits derived from them are framed. In the private sector, ecosystem service assessments often center on impact and dependency pathways, which form the core of most natural capital evaluations. These pathways trace how specific business activities (or impact drivers) lead to changes in natural capital, which in turn influence human well-being or affect the organisation's own dependencies and performance. The guidance templates do not cover these aspects, which means that private commissioners should seek for external guidance on this such as the [Framework for Integrated Decision-making](#) (2024) developed Capitals Coalition.
- **Stakeholders' views:** closely tied to the impact and dependency pathways are value factors, which are elements that reflect the relative importance, usefulness, or relevance of changes in natural capital to stakeholders, or the degree to which an organisation's performance is exposed or vulnerable to such changes. As private



sector entities come under increasing pressure from investors, regulators, and reporting frameworks, there is now a stronger emphasis on the transparent formulation of value factors. This includes more deliberate efforts to engage stakeholders, incorporate the perspectives of affected communities, and ensure the credibility of data sourcing and validation processes. The guidance templates cover quite thoroughly the involvement of stakeholders and are developed to facilitate the inclusion of social benefits and dimensions of justice in ecosystem service assessments. This might however not be exhaustive enough for the private sector.

- **Organisational and value-chain boundaries:** defining the boundaries of an ES assessment carries particular importance in the private sector. Clear articulation of both organisational and value-chain boundaries is essential to delineate the scope of analysis. Additionally, impact boundaries must be established to distinguish between the organisation's material areas of influence and those deemed outside the scope of the assessment. This boundary-setting is fundamental to ensuring relevance, comparability, and accountability in private-sector ecosystem service assessments. The guidance templates do not cover these aspects, which means that private commissioners should seek for external guidance on this such as the [Framework for Integrated Decision-making](#) (2024) developed Capitals Coalition.
- **“Minimum viable product”:** the notion of a “minimum viable product” is central for private-sector entities. A “minimal viable product” is defined as the product that achieves the basic level of successful usability, as a starting point for further developments and refinements of this product. The characteristics of the “minimum viable product” will define the minimum requirements for an ecosystem service assessment. Although it was noted above that an upcoming SELINA Deliverable will support commissioners on identifying the minimum requirements of an ecosystem service assessment depending on their needs and constraints, we recommend private commissioners to first define their “minimaum viable product” to have a set of minimum requirements for their assessment and then, go through the templates with these in mind to ensure an optimal guidance. The guidance templates currently do not support the identification and definition of a “minimum viable product”.



Frame & Scope template



We recommend to read the [5.1 General Information](#) prior to using the template

Below is a list of the questions included in the Frame & Scope template. **Commissioners can use this list to select the questions that are relevant to write the Frame & Scope section of a Terms of Reference.**

Each question is associated with a link to a more detailed page which will provide a box to answer the question, descriptions, examples and the preformatted Terms of Reference text that the commissioners can choose to copy-paste and modify to write the Frame & Scope section of a Terms of Reference to commission ecosystem service assessment.

1. CONTEXT AND PURPOSE

Define the context and aim of the ecosystem service assessment. For this, the commissioners can answer the following questions:

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the detailed question	YES / NO
1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the detailed question	YES / NO
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the detailed question	YES / NO
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the detailed question	YES / NO
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the detailed question	YES / NO

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2. INTENDED IMPACTS AND OUTPUTS

Identify and define the intended uses and impacts of the ecosystem service assessment, as well as the format(s) of the deliverables that would support such uses and impacts.

*We recommend for a stakeholder analysis to be conducted prior to filling this section as it will help with: (i) identifying the key stakeholders that are most likely to be interested in the outputs, and / or should be involved in the process; (ii) defining the relationships between stakeholders. **Alternatively, the commissioners can specifically request for such analysis to be conducted by the potential contractor (see 4. STAKEHOLDER ENGAGEMENT section).***

The commissioners can answer the following questions:

2.1. Intended users and uses		This question is relevant
2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the detailed question	YES / NO
2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the detailed question	YES / NO
2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the detailed question	YES / NO
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?	Link to the detailed question	YES / NO
2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional local)?	Link to the detailed question	YES / NO
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the detailed question	YES / NO
2.3. Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the detailed question	YES / NO

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

Define the technical scope of the ecosystem service assessment that is required given the purpose and intended uses and impacts. It is not intended to be exhaustive as a separate Terms of Reference template has been developed to help commissioners identify more in detail what methodology is required for their objective(s). It can be useful to invite relevant stakeholders to scope for the needs of the general methodological characteristics.

If the commissioners feel they do not have sufficient knowledge of which ecosystems / services should be considered, even a general summary of the key habitat or landscape characteristics of the area to be covered by the assessment can be useful to include in the Terms of Reference. In such cases, it also may be helpful to explicitly invite potential contractors to provide some initial thoughts on these questions in their application to the call for tender.

Commissioners can answer the following questions:

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the detailed question	YES / NO
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the detailed question	YES / NO
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the detailed question	YES / NO
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the detailed question	YES / NO
3.3. Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the detailed question	YES / NO
3.4. Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the detailed question	YES / NO
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the detailed question	YES / NO
3.4.c. What aspects of ecosystem services should be measured?	Link to the detailed question	YES / NO
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the detailed question	YES / NO

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3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the detailed question	YES / NO
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the detailed question	YES / NO
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the detailed question	YES / NO
3.5. Scenarios		This question is relevant
3.5.a. Are future scenarios required in the ecosystem service assessment?	Link to the detailed question	YES / NO

4. STAKEHOLDER ENGAGEMENT

Identify and define the desired uses and impacts of the ecosystem service assessment, as well as the format(s) of the deliverables that would support such uses and impacts. Stakeholders are any group, organisation or individual who are interested in and / or might be affected by ecosystem services and any change made to their flows.

Although commissioners might have already carried out an initial stakeholder analysis, we recommend that the commissioners ask potential contractors to conduct a supplementary stakeholder analysis to identify any additional stakeholders that should be involved. For this, the commissioners can answer the following questions:

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the detailed template	YES / NO
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the detailed template	YES / NO
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the detailed template	YES / NO

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Frame & Scope template - detailed questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

Answer in this box.



Why is this question relevant to me?

Identifying where and why an ecosystem service assessment is needed is the essential first step. It might be that the assessment is needed as part of a decision-process. Depending on where the commissioners are in the decision-making process, the purpose of the ecosystem service assessment will be different: is it to inform a decision? Is it to plan a decision? Is it to monitor the result of a decision?

The overall purpose for conducting an ecosystem service assessment influences the objectives of the assessment, the outputs and its overall process of conducting an assessment including stakeholder engagement. See the decision-making steps for public and private sectors in [Annex 8.1 Typology of purposes](#).

Give me an example answer

The ecosystem assessment is needed for a combination of strategic and operational purposes. It is both demonstrating the importance of a National Park label for nature and society and monitoring that the decisions taken are contributing to the goals set in the Masterplan of the National Park Mainland.



Terms of Reference preformatted text

This is context-dependent, no general text for Terms of Reference is available.



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1. CONTEXT AND PURPOSE

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

Answer in this box.



Why is this question relevant to me?

The primary objective of an ecosystem service assessment will condition the key outputs and methodological needs.

Give me an example answer

The primary objective of the ecosystem assessment is to report on the progress towards the goals of the National Park Mainland. Ecosystem services are also an important part to communicate and value the impact of the National Park label.



Terms of Reference preformatted text

The primary objective of the ecosystem service assessment is [*describe your objective*].



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1. CONTEXT AND PURPOSE

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

Answer in this box.



Why is this question relevant to me?

Once the decision-making step and the primary objective have been identified, it is important to identify the policies that should be considered during this assessment. This ensures that the assessment and its outputs are relevant, actionable and aligned with the current policies.

Give me an example answer

Two policies are of relevance in our context:

- The nature area is selected as National Park with subsidies from the Flemish government. 6-yearly reporting of the status to the National Park Bureau is obliged. It is important that the assessment looks at criteria that needs to be in the Status report.
- Flemish biodiversity plan.



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1. CONTEXT AND PURPOSE

1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. These characteristics may include age distribution, cultural and ethnic composition, income levels, education, livelihood types etc.

Answer in this box.



Why is this question relevant to me?

The ecosystem service assessment may consider the social and demographic context to ensure that it reflects the needs and realities of the people and communities interacting with the ecosystems. Doing so can reveal social or economic challenges, highlight vulnerable or priority groups, and identify population trends that influence the relevance and use of the assessment's outputs. This information further supports tailored communication, inclusive engagement, and more effective, equitable reporting.

Give me an example answer

Recreational development and industrialisation led to prosperity in the region. The social and demographic context of the project is quite broad. The National Park Mainland lays in the perimeter of three municipalities with a wide range of age groups, economic status and ethnic composition. Furthermore, the area attracts visitors from all over the country.



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1. CONTEXT AND PURPOSE

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yesno, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

The need for recommendations influences a number of aspects in an ecosystem service assessment around the engagement of stakeholders.

Give me an example answer

Maybe. The purpose of the assessment is reporting but based on the results of the assessment, recommendations could be derived for the development of the next Operational plan.



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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

Answer in this box.



Why is this question relevant to me?

The expected primary uses of the assessment will condition the types and format of the outputs needed.

Give me an example answer

The results will be primarily used to report to the National Park Bureau on the progress and development of the National Park Mainland. In addition, the results will be used to show the importance of the National Park label for local economy and well-being of the surrounding population.



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The results of this assessment will be primarily used by the commissioner to/for *[list the expected uses that the commissioner will have from the outputs generated by the assessment]*.

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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By “secondary user(s)” we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

Answer in this box.



Why is this question relevant to me?

It is important to not restrict to the users to the commissioner only as the results of the assessment could be useful for other parties. Identifying these secondary users allows to have stronger insights on the impacts of assessment and what types and format of outputs are needed.

Give me an example answer

Other users of the results could be members of the municipalities surrounding National Park Mainland, nature organisations and other National Parks in Belgium.



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Results should also be made available and usable by [*list the secondary users*]. It is anticipated that these parties will primarily use the direct outputs of the assessment as [*include the answer to question 2.1.c presented on the next page*].

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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

Answer in this box.



Why is this question relevant to me?

The expected secondary uses of the assessment will condition the types and format of the outputs needed.

Give me an example answer

Secondary users could potentially use the results to:

- communicate that nature not only has biodiversity benefits but also social and economic benefits.
- put these socio-economic benefits on the map to support municipal budgets

The approach and methodology may be used by other National Parks in Belgium.



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Results should also be made available and usable by [*include answer to question 2.1.b on the previous page*]. It is anticipated that these parties will primarily use the direct outputs of the assessment as [*list the uses expected from the secondary users*].



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2. INTENDED IMPACTS AND OUTPUTS

2.2. Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Answer in this box.



Why is this question relevant to me?

Considering the intended impacts while asking for an ecosystem service assessment is part of making the results of the assessment actionable.

Give me an example answer

The approach and results of the ecosystem assessment will help the National Park Mainland to show its progress towards the goals of the Masterplan and report this to the National Park Bureau in order to receive financial support.

The results of the assessments will inform policy decisions on conservation measures.



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Outputs of the ecosystem service assessment are intended to directly impact [*list the primary impacts identified*].

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2. INTENDED IMPACTS AND OUTPUTS

2.2. Intended impacts

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Answer in this box.



Why is this question relevant to me?

Considering the impacts on policies at various spatial scales when requesting an ecosystem assessment is part of adopting a broader transformative approach. This perspective aids in identifying leverage points that the results may have on society and governance systems at local, regional, national, and global levels.

Give me an example answer

The results will inform the national government on the progress the National Park Mainland and also may also generates input to the European obligations of the Nature Restoration Law.

The results of the ecosystem assessment will underline the importance of nature into the socio-economic fabric of the municipalities and will inform local budget and policy decisions on conservation measures.



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The outputs of the ecosystem service assessment are also intended to bring insights to [list the policies or policy-makers that the outputs will directly impact] by [describe the intended impact on the policies].



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2. INTENDED IMPACTS AND OUTPUTS

2.2. Intended impacts

2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts that the results of the assessment are expected to have if they are used by stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Answer in this box.



Why is this question relevant to me?

The ecosystem service assessment might have impacts beyond the expected scope of the decision-making within which the assessment has been commissioned. Identifying and understanding these supplementary impacts are essential to have the full area of influence of the assessment. It will also serve to the completion of a risk assessment and management plan.

Give me an example answer

The ecosystem service assessment will enhance the positive attitude towards the National Park label; as not all stakeholders are persuaded that it will have a positive impact in the region.



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Beyond the direct impacts mentioned above, the outcomes of this assessment should also act on/influence/affect [*list who or what will be affected by the outputs of the assessment*] through/by [*describe the expected impact*].

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2. EXPECTED IMPACTS AND OUTPUTS

2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should choosing this format?	Results should be presented like this
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / NO / MAYBE / DON'T KNOW
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / NO / MAYBE / DON'T KNOW
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / NO / MAYBE / DON'T KNOW
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / NO / MAYBE / DON'T KNOW
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / NO / MAYBE / DON'T KNOW
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / NO / MAYBE / DON'T KNOW
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / NO / MAYBE / DON'T KNOW
Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / MAYBE / DON'T KNOW
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

 i**Why is this question relevant to me?**

The formats of the deliverables impact the methodology that will be applied in the ecosystem service assessment including data inputs and analyses. The choice of the format will also strongly affect the expected impacts described previously as they condition the accessibility, usability, and actionability of the results.

Give me an example answer

The ecosystem service assessment will be delivered in the following formats:

- An executive summary informing policy makers;
- A technical report so that the approach can be replicated in the future and by other National Parks;
- Tables to easily summarise the results of the assessment;
- A lay man fact sheet/infographic to use in the communication towards citizens and other stakeholder groups.

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The specific deliverables required in this assessment are: *[list the formats selected above]*

- An executive summary of *[if not applicable to all results, precise the results for which this format applies]* designed for *[precise the target audience if relevant]*
- Technical report covering *[if not applicable to all results, describe the results for which this format applies]* designed for *[precise the target audience if relevant]*
- Presentation and / or briefing *[if not applicable to all results, precise the results for which this format applies]* designed for *[precise the target audience if relevant]*
- A (series) of training material designed for *[precise the target audience]*. This training would have to be run *[if relevant, precise the number of times per year/month]*
- A tool designed at *[goal of the tool]*. The format of the tool should be aligned with its intended uses
- Maps of *[if specific maps are required, describe what the maps should display]*
- Tables of *[if specific tables are required, describe what the maps should display]*

- A short videoclip of [*if not applicable to all results, precise the results for which this format applies*] designed for [*precise the target audience if relevant*]
- Scientific publications
- [*describe any other required formats*]

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Answer in this box.



Why is this question relevant to me?

An ecosystem service assessment aims at evaluating the current status of ecosystem service(s) in a specific ecosystem types and the change(s) in provision of this service over space and time. To do so, the ecosystem types providing the ecosystem services of interest should be identified and defined. A number of standard classifications exists. If the purpose of the assessment is restricted to national uses and impacts, national classifications can be preferred. International classifications can also be used such as [European Nature Information System](#), [International Union for Conservation of Nature Global Ecosystem Typology](#) or the [System of Environmental Economic Accounting – Ecosystem Accounting ecosystem type reference classification](#).

If the commissioners are not clear on which ecosystem types should be focused on, a brief description of the area of interest is sufficient. Alternatively, it might also be considered to refer to experts to identify and define them, or leave the call of tender open for suggestions from potential contractors.

Give me an example answer

Ecosystem types are all types found within National Park Mainland:

- Forests
- Grasslands
- Heathland
- Inland wetlands
- Sparsely vegetated areas/land dunes

For the condition assessment only forests will be assessed.

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Ecosystem types of interest in this ecosystem service assessment:

- *[list the ecosystem types of interest]*

Their definitions can be found [*link to the classification system used or other official guidance*].

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the contributions of ecosystems that support economic activities and other aspects of human well-being, such as urban cooling, flood protection, pollination, timber and food provision etc.

Answer in this box.



Why is this question relevant to me?

An ecosystem service assessment aims at evaluating the current status of ecosystem service(s) in a specific ecosystem types and the change(s) in provision of this service over space and time. To do so, the ecosystem services of interest should be identified and defined. As for ecosystem types, a number of standard classifications exist. Such as [Classification of Ecosystem Services \(CICES\)](#), [the System of Environmental Economic Accounting – Ecosystem Accounting \(SEEA-EA\)](#), [the National Ecosystem Services Classification System \(NESCO Plus\)](#), [The Economics of Ecosystems and Biodiversity \(TEEB\)](#), [the Millenium Ecosystem Assessment \(MEA\)](#), or [the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services \(IPBES\)](#). If the commissioners wish to use their own definition, it is recommended to underline the reasons behind this change from more official definitions. The differences between the official and in-house definition should be clearly highlighted.

If the commissioners are not clear on which ecosystem services should be focused on or how to define them, it might be considered to refer to experts. Alternatively, the call of tender can be left open for suggestions from potential contractors on that aspect.

Give me an example answer

Inherent to the ecosystem service approach it is best to assess the total bundle of ecosystem services relevant for National Park Mainland. The relevance will be defined together with different stakeholders in the area.



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The ecosystem services that should be evaluated in this assessment are:

- [list the ecosystem services of interest]

Their definition can be found [link to the classification system used, other official guidance, or commissioners' own definition].

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

Answer in this box.

1

Why is this question relevant to me?

These are basic information of an ecosystems service assessment. The geographical location and spatial extent of the assessment will influence the data to be used and the overall methodological approaches.

When defining the geographical location and the spatial extent within which the assessment will be carried out, it is important to be aware of possible misalignments between the geographical areas and spatial extent at which the ecosystem services are provided and the ones at which people benefit from them. Benefits from ecosystem services can sometimes occur outside of the geographical area and spatial extent at which the ecosystem services are provided. For example, a forest located in the upper part of a mountain provides the soil retention service. The benefit from this service is the reduction in land-sliding. The beneficiaries of this service are the residents living outside of the forest, at the bottom of the mountain.

If the assessment is carried out at several spatial scales, this can support the establishment of a decision-making or management that will vary with scales to ensure its suitability and relevance.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [spatial and temporal characteristics](#)!

Give me an example answer

The assessment takes place on the geographical location and local scale of the National Park Mainland. If possible regional scale for ecosystems such as flood protection.



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The ecosystem service assessment is to be conducted in [geographical location, if relevant add the geographical coordinates] at [spatial extent(s)] level.

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	YES / NO / MAYBE / DON'T KNOW
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped into deciduous and coniferous forests. This is useful to understand the supply of ecosystem services across natural boundaries (e.g., carbon sequestration in a forest ecosystem depends among others on the species composition). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	YES / NO / MAYBE / DON'T KNOW If YES, precise the ecological scale:
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative units (e.g., municipality, county), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	YES / NO / MAYBE / DON'T KNOW If YES, precise the administrative scale:





Why is this question relevant to me?

The spatial distribution of ecosystem services supply and use, but also the benefits from ecosystem services are highly variable, hence this is a crucial aspect to consider in decision-making. Identifying discrepancies in space is important to better manage inequalities (e.g., in distribution of or access to ecosystem services), but also manage synergies, interdependencies and trade-offs between different ecosystem services and / or their associated benefits.

As for the definition of the geographical location and spatial extent, when defining the spatial scale(s) at which the assessment will be carried out, it is important to be aware of possible misalignments between the spatial scales at which the ecosystem services are provided and the ones at which people benefit from them. Benefits from ecosystem services can sometimes occur at spatial scales at which the ecosystem services are provided.

Sometimes, a multi-scale approach may be necessary to address different aspects of ecosystem supply and use. For example, ecological and administrative spatial scales can be used in conjunction if the decision-making context is directed at specific ecosystem types within certain administrative boundaries.

For decision-making purposes or computation reasons, a fully spatially explicit assessment may not be relevant. If the decision-making only requires county or municipal values to be informed or decided on, aggregating the results of the assessment to these units is sufficient. Also, fully spatially explicit analyses can be resource-intensive in terms of data acquisition, processing, and analysis. Using aggregated data where high resolution is unnecessary can save time and resources while still providing useful insights.

Considering the (appropriate) level of spatial representation ensures that an ecosystem service assessment is both precise and relevant to the contexts and scales at which management and policy decisions are made. The disaggregation through the spatial scales chosen should be restricted to the geographical location and spatial extent chosen.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [spatial and temporal characteristics](#)!

Give me an example answer

The assessment needs to be as spatially explicit as possible within the context of the available data. If not possible, at the least aggregation per biotope is needed.



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Within the geographical and spatial extent of this ecosystem service assessment, the results should be presented as [*fully spatially explicit; aggregated at precise the ecological or administrative scale(s) of relevance*]

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

Answer in this box.



Why is this question relevant to me?

As ecosystem services (supply, use, and demand) and their benefits vary across time, vary across time, it is important to clearly indicate the period of time the ecosystem service assessment needs to cover (e.g., 2020-2025). In a second step, it is also necessary to specify the temporal scale in which the results should be reported such as annual average, quarterly or monthly averages. An overall example would be an assessment conducted for the time period 2020-2025 with results broken down by quarters.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [spatial and temporal characteristics](#)!

Give me an example answer

The assessment should be conducted over the years 2024-2030. Results should be reported for each year within this time period.



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The ecosystem service assessment should be conducted for [*indicate the period of time*]. The results should be reported [*temporal scale*].

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes no, maybe, or don't know. Valuing, or quantifying, ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Biophysical valuation enables us to assess the physical/material contribution of ecosystems to human well-being as well as helps to identify how ecosystem characteristics affect the level of ecosystem services. Biophysical ecosystem service assessments can also enable us to evaluate whether the levels of use of ecosystem services correspond with those of the ecosystem's capacity to supply services.

Give me an example answer

Yes, ecosystem services need to be measured in biophysical terms.



Terms of Reference preformatted text

The ecosystem service assessment should measure ecosystem service in biophysical terms.



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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. Economic value is a measure of the contribution of the ecosystem service(s) to human wellbeing. It is generally measured in monetary units to facilitate direct comparison and aggregation with the values of other goods and services (e.g., for inclusion in decision support frameworks such as cost-benefit analysis). It is recommended to first value service in biophysical terms before valuing them in monetary terms.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Economic value in monetary terms facilitates a more direct link to the economy and provides a measure of the importance of ecosystem services to human wellbeing.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [economic valuation](#)!

Give me an example answer

Yes, where possible the economic value of ecosystem services should be quantified in monetary units.



Terms of Reference preformatted text

The ecosystem service assessment should measure the economic value of ecosystem service in monetary terms.

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.c. What aspects of ecosystem services should be measured?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (<i>i.e.</i> , what quantity is being supplied?). It can be further valued in terms of other values such as their economic value in monetary units (<i>i.e.</i> , how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (<i>i.e.</i> , what quantity is being used?). It can be further valued in terms of other values such as their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i> , what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / MAYBE / DON'T KNOW



Why is this question relevant to me?

An ecosystem service assessment aims at evaluating the current status of ecosystem service(s) in a specific ecosystem types and the change(s) in supply, use and / or demand of this service over space and time. To do so, the *supply* (*i.e.*, provision) of the ecosystem services of interest should be quantified whether it is in biophysical and / or economic values. The *supply* is the basic first information that should be reported in an ecosystem service assessment to be relevant for decision-making.

However, focusing only on the *supply* does not inform on who is consuming the ecosystem services, neither on how the quantity of services is being used by the consumers / users. We recommend the *supply* to be assessed and reported together with the *use* to understand the full flow of ecosystem services: how much is being



produced? And who is using and how much is being used? Identifying who is using / benefitting from the ecosystem services and how much of the provision of these services is being consumed by users / beneficiaries is central to any decision-making. This allows to identify who will be impacted by a change in provision of the services and how they will be affected.

Finally, assessing the demand for ecosystem services helps estimating whether the provision of services is sufficient to meet their societal demand. For instance, are there enough pollinators to fulfil the needs of pollination dependent crops?

It is important to note that the demand does not equal the use. In the example above, we can imagine that some farmers need crop-pollination to produce food but don't have the necessary ecosystem types providing this service around their crops. This means that these farmers need pollination but don't have access to this service and use it. Inversely, some other farmers may have their crops surrounded by ecosystem types providing the pollination service but only grow crops that are non-pollinator dependent. This means that these farmers could use the pollination service but they don't need it.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

Supply and use should be measured. The demand is not necessarily requested but could be interesting to know for certain ecosystem services such as pollination and recreation in order to detect deficits.



Terms of Reference preformatted text

The ecosystem service assessment should measure the [*supply, use, demand*] of the ecosystem service(s) of interest.

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits are improvements in people's quality of life. Equity goals focus on guaranteeing that these are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified using metrics such as availability and access to ecosystem services, reduction in social vulnerabilities, social inclusion, etc.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Including social and equity metrics ensures that the assessment addresses inequalities, particularly for vulnerable or underserved populations.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [social benefits](#)!

Give me an example answer

Yes, if information is available on social benefits, such as nature contact and nature connectedness (*i.e.*, the way people connect to nature and social cohesion), need to be taken into account.



Terms of Reference preformatted text

The ecosystem service assessment should measure the social value of ecosystem services using relevant metrics.

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.e. Should the ecosystem services be valued in terms of their relevance to health?

If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?

Answer yes, no, maybe, or don't know. Ecosystem services are crucial to health, including the health dimension in an ecosystem service assessment allows to take into account the wider impacts of changes in ecosystem services on the society and the environment. The health scope will inform the selection of assessment methodology, stakeholder engagement and reporting. The One Health approach is an approach that recognises the interconnection between people, animals, plants and their shared environment.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

This ecosystem service assessment may consider the importance of ecosystem services to:

- health benefits, health risks and / or health outcomes,
- relationships between ecosystems, their services and specific priority health issues,
- delivery of health services or planning of health interventions,
- economic importance to private sector health entities,
- the benefits of the assessment to health sciences, etc.

It is important to identify the specific dimensions of health to be included, and consider whether established approaches such as One Health may be useful; this will determine the kinds of data, metrics, indicators and stakeholders to be incorporated into the assessment process. Interlinkages between human health and the health of other biota and of ecosystems are well established and form the basis of the One Health approach; an assessment considering any one compartment in isolation may not provide a sufficiently robust output for some intended uses or users, so this question requires careful consideration

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [health benefits](#)!

Give me an example answer

Yes. Impacts on human health should be taken into account qualitatively and where possible quantitatively. Ecosystem health is embedded in the ecosystem condition assessment requested in this tender.





Terms of Reference preformatted text

The ecosystem service assessment should measure the value of ecosystem services in terms of their relevance to health using relevant metrics. By health we more specifically refer to [*human health, animal health, plant health, One Health approach*].

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use, management and conservation measures.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Since the UN Convention of Biological Diversity was opened for signature in 1992, the conservation and sustainable use of biodiversity and the benefits it provides has been the central focus of nature policy in Europe and beyond. Looking at sustainability of supply and use of ecosystem services allows for long-term planning, putting in place adaptation and mitigation strategies.

Conservation and sustainable use are critical as they link to ecosystem condition, ecosystem capacity and ecosystem service supply, which are relevant to all services.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

Yes, it would be relevant to assess the sustainable use of the ecosystem service especially for wood production and recreation. Important to avoid too much impact on the condition of the forest.



Terms of Reference preformatted text

The ecosystem service assessment should evaluate the sustainable [*use, supply, or both*] of these service(s), to [*if possible, precise why sustainability is important for the decision-making within which the assessment fits*].



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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.4. Valuation of ecosystem services

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Ecosystem condition is the state of health of ecosystems and directly influences the *supply* of ecosystem services as it determines whether or not ecosystems can effectively provide services. Indeed an ecosystem in poor condition might result in poor provision of ecosystem services such as a fewer number of services provided, or small provision of the services. While an ecosystem in good condition may lead to a higher level provision of ecosystem services.

It is important to take into account ecosystem condition together with ecosystem services to have a more complete picture and identify the potential risks in the provision of the ecosystem services and where they could occur.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

Yes, the assessment should include an evaluation of ecosystem condition, specifically for the forests.



Terms of Reference preformatted text

The ecosystem service assessment should include an evaluation of the condition of the ecosystem(s) providing the ecosystem service(s) of interests.



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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Answer yes, no, maybe, or don't know. Identify if there is a need to conduct the assessment while taking into account scenarios reflecting a change in policy, climate or other environmental conditions, change in governance etc. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Future scenarios can be important to request if the overall purpose of the ecosystem service assessment is to inform. Broadly, scenarios help assessing ecosystem services and their associated benefits in different conditions such as policy context, climate change, land uses, land management etc. Looking at scenarios in ecosystem service assessment can also help with identifying different trade-offs between scenarios but also how trade-offs between ecosystem services and /or their benefits change over the scenarios considered.

Scenarios are a way of dealing with uncertainties about the future. They also allow to identify risk and facilitate long-term planning and adaptation.

Where can I find more questions to be more detailed in my Terms of Reference?

Visit our advanced content on [uncertainty](#)!

Give me an example answer

Yes, the assessment takes land use changes due to the implementation of the operational plan into account. This way the impact of the restoration can be measured and the actions of the plan revised if necessary.



Terms of Reference preformatted text

The ecosystem service assessment should include a scenario analysis to [*describe reason(s) why a scenario analysis should be conducted*].

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, groups, organisations/institutions) who are interested in or are expected to have an impact on the process of the ecosystem service assessment and / or its results.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Although commissioners might know which stakeholders should be involved in the ecosystem service assessment, conducting a stakeholder analysis will help with identifying other stakeholders that haven't been identified before, especially when it comes to minority and / or vulnerable social groups.

The results of a stakeholder analysis should be reviewed throughout the assessment process to take into account potential new stakeholders emerging from the results of the assessment itself.

Give me an example answer

Yes, it is interesting to do a stakeholder analysis to identify the key stakeholders.



Terms of Reference preformatted text

Prior to starting the assessment, the applicant will be asked to conduct a detailed stakeholder analysis to identify the key stakeholders that will be involved in the development of the project.

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4. STAKEHOLDER ENGAGEMENT

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder engagement means that key parties will be consulted during the development of the assessment and the evaluation of the results and deliverables.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. Involving key stakeholders is essential to have an inclusive and integration ecosystem service assessment. There are several other reasons including:

- For **quality insurance and knowledge integration**. Some stakeholders are data holders and their input can be very relevant for selecting the appropriate data to be used. Also, when it comes to local assessments, local stakeholders usually have good local ecological knowledge as well as a general knowledge of the area and societal contexts.
- For **legitimacy**. Involvement creates a sense of ownership of the assessment process and results. This might encourage the use of the results outside of the context of this assessment.
- For **realistic implementation**. Involving a range of relevant stakeholders means involving a range of complementary expertise and perspectives. This can help ensuring that the assessment fits within the correct governance structure and processes, but also leads to control for its feasibility notably by identifying the relevant barriers and levers.

Give me an example answer

Yes, stakeholders are expected to be involved, especially in identifying the relevant ecosystem services in National Park Mainland.



Terms of Reference preformatted text

Stakeholders are expected to be involved throughout the ecosystem service assessment. Key stakeholders who could be involved are [*include the answer to [question 4.c](#) presented on the next page*].

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4. STAKEHOLDER ENGAGEMENT

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?

Identify the stakeholders who should be consulted during the development of the assessment. This can be based on an earlier stakeholder analysis or primary considerations that are important from the commissioners' perspective.

Answer in this box.



Why is this question relevant to me?

Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. Stakeholders have different expertise and perspectives. It is useful to think about what the commissioners need and how stakeholders are expected to be impacted by the assessment and / or use the results of the assessment. This makes the assessment process more inclusive and ensures for quality, legitimacy and feasibility.

Give me an example answer

It is expected that the three municipalities on which the National Park Mainland lays , Nature organisations and farmers should be involved. It will enhance the integration of local knowledge and legitimacy of the results. Other scientists doing research in National Park Mainland should also be involved in order to exchange data and validate results of the assessment.



Terms of Reference preformatted text

Stakeholders are expected to be involved throughout the ecosystem service assessment. Key stakeholders who could be involved are [*list the key stakeholders who should be involved according to the commissioners' perspective and / or result from a previously conducted stakeholder analysis*].

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Methodology template





We recommend to read the [5.1 General Information](#) prior to using the template

Below is a list of the questions included in the Methodology template. **Commissioners can use this list to select the questions that are relevant to them to write the Methodology section of a Terms of Reference.**

Each question is associated with a link to a more detailed page which will provide a box to answer the question, descriptions, examples and the preformatted Terms of Reference text that the commissioners can choose to copy-paste and modify to write the Methodology section of a Terms of Reference to commission ecosystem service assessment.

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Describe in further details what are the technical requirements of the ecosystem service assessment. For this, commissioners can select the sections that apply to them below, and answer their corresponding questions. Including all of the sections below will result in a more exhaustive assessment than if only a few of them are included. The choice of including any of the sections below is based on the overall purpose and context of the assessment, as well as the resources available (e.g. time, budget) to the commissioners.

The commissioners can identify the sections of relevance below before moving on to the list of questions.

In my ecosystem service assessment, do I need:							
1 Economic valuation?	2 Sustainability and /or ecosystem condition?	3 Social aspects?	4 Health aspects?				
Yes	Yes	Yes	Yes	No	No	No	No
Answer Section 1.1	Answer Section 1.2	Answer Section 1.3	Answer Section 1.4	Skip Section 1.1	Skip Section 1.2	Skip Section 1.3	Skip Section 1.4
5 To investigate several ecosystem services and benefits?	6 To investigate variation across space and time?	7 Scenarios?					
Yes	Yes	Yes	No	No	No	No	No
Answer Section 1.5	Answer Section 1.6	Answer Section 1.7	Skip Section 1.5	Skip Section 1.6	Skip Section 1.7	Skip Section 1.7	Skip Section 1.7

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation		This question is relevant
1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?	Link to the detailed question	YES / NO
1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?	Link to the detailed question	YES / NO
1.2. Sustainability and ecosystem condition		This question is relevant
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the detailed question	YES / NO
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the detailed question	YES / NO
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the detailed question	YES / NO
1.3. Social characteristics		This question is relevant
1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?	Link to the detailed question	YES / NO
1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?	Link to the detailed question	YES / NO
1.4. Health characteristics		This question is relevant
1.4.a. What aspects of health are you interested in?	Link to the detailed question	YES / NO
1.4.b. Should the results of the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services?	Link to the detailed question	YES / NO
1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the detailed question	YES / NO



1.5. Relationships between ecosystem services		This question is relevant
1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?	Link to the detailed question	YES / NO
1.6. Spatial and temporal characteristics		This question is relevant
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the detailed question	YES / NO
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?	Link to the detailed question	YES / NO
1.7. Scenarios characteristics		This question is relevant
1.7.a. What scenarios should be taken into account in the ecosystem service assessments?	Link to the detailed question	YES / NO

2. UNCERTAINTY

Describe how the uncertainties linked to the ecosystem service assessment should be assessed and reported. Uncertainty refers to the degree of confidence we can have in the results of an assessment. It includes both natural variability and gaps in knowledge or data. Quantifying uncertainties is important as these can have implications for decision-making. For this, the commissioners can answer the following questions:

		This question is relevant
2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the detailed question	YES / NO
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the detailed question	YES / NO

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3. VALIDATION

Outline the expectations for validating the ecosystem service assessment. Broadly, validation means evaluating the quality of the assessment including the scope, the methodology employed and the results. For this, the commissioners can answer the following questions:

		This question is relevant
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the detailed question	YES / NO
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the detailed question	YES / NO

4. STAKEHOLDER ENGAGEMENT

Identify at which steps of the ecosystem service assessment stakeholders should be informed, consulted or participate. Then, give your preference for how the stakeholders should be involved. Stakeholders are any group, organisation or individual who are interested in and / or might be affected by ecosystem services and any change made to their flows. For this, the commissioners can answer the following questions:

		This question is relevant
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the detailed question	YES / NO
4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?	Link to the detailed question	YES / NO

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Methodology template - detailed questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?

Select what applies. Choosing the type of primary valuation methods is voluntary, if the commissioners don't have sufficient knowledge.

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g., flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ecosystem services can be obtained from markets or surveys of businesses and households. This approach is only applicable to ecosystem services that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ecosystem services as the cost of replacing it with a human-made service. It is only applicable to ecosystem services that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ecosystem services that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW



Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	YES / NO / MAYBE / DON'T KNOW
Net factor income	The net factor income method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	YES / NO / MAYBE / DON'T KNOW
Production function	The production function method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	YES / NO / MAYBE / DON'T KNOW
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	YES / NO / MAYBE / DON'T KNOW
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	YES / NO / MAYBE / DON'T KNOW
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ecosystem services through public surveys. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ecosystem services by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW



Why is this question relevant to me?

Economic valuation methods include a wide range of approaches for estimating the contribution of ecosystem services to human well-being. This question is relevant if the commissioners wish to specify which economic valuation methods should be applied in the ecosystem service assessment. The choice of which valuation method(s) should be applied is dependent on the ecosystem services to be valued (some methods are directly relevant to specific services), data and resource availability, and the required level of certainty and site-specificity of the results.

A first important choice is between “primary valuation methods” and “value transfer methods”. The former set of methods produce new or original information generally using primary data for the study area whereas the latter set of methods use existing information from valuation studies conducted elsewhere and make adjustments to reflect the characteristics of the study site.



i

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [economic valuation](#)!

Give me an example answer

Considering our knowledge of economic valuation and the foreseen budgets, we would use value transfer methods, adjusted to the characteristics of the study site.



Terms of Reference preformatted text

[if value transfer methods are chosen]

The study should design and apply value transfer methods to estimate the economic value of each identified ecosystem service. Transferred values should be adjusted to reflect the characteristics of the study site in terms of ecosystem extent, condition, population of beneficiaries and income level. This could involve the use of available databases of ecosystem service values and / or the use of published value transfer functions.

[if primary valuation methods are chosen]

The ecosystem service assessment should design and apply [*relevant primary valuation methods, OR add the primary valuation methods chosen if any*] to estimate the economic value of the ecosystem service(s) of interest, including the collection of required data through surveys of beneficiaries in the study area (if any).

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and if commissioners have the knowledge, they can specify the type of economic indicator of interest.

The economic importance of ecosystem services can be quantified through indicators such as the contribution to economic development, sectors of the economy, or employment. These indicators can be useful for communicating the importance of ecosystem services to decision makers and the general public.

Answer in this box (yes, no, maybe, or don't know). If yes, specify.



Why is this question relevant to me?

This question is relevant if commissioners want the ecosystem service assessment to quantify indicators of economic importance. Potentially relevant indicators include the contribution of ecosystem services to economic development, specific sectors of the economy, or local employment. These indicators can be useful for communicating the importance of ecosystem services to decision makers and the general public.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [economic valuation](#)!

Give me an example answer

Yes. Measures of the contribution of the ecosystem services to the economic importance should be compiled, particularly indicators for recreation sector and local employment.



Terms of Reference preformatted text

The ecosystem service assessment should measure the contribution of the ecosystem service(s) of interest to the economic development of the area of interest. [*Particular economic indicators of interest are..., OR In their proposal, the contractor should clearly describe and justify the economic indicators that will be used*].



1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service(s) supply and use may vary depending on changes in condition of the ecosystem that provides the service. Ecosystem service(s) supply is the provision of service(s) by the ecosystem(s). Ecosystem service(s) use is the utilisation of service(s) by those who benefit from them.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Ecosystem condition assessments are based on the evaluation of the levels of ecosystem properties. The properties of the ecosystem will, in turn, determine the levels of ecosystem services supply and use. Degraded ecosystems may have lost their capacity to supply ecosystem services. Maintaining ecosystems in good condition is central to sustainability. This question is relevant if we wish to assess, for example, the consequences of protecting ecosystems from current levels of use, or of ecosystem restoration actions in terms of ecosystem services supply and use.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

Maybe. As we ask for a forest ecosystem condition it would be nice to link the forest condition to the supply of ecosystem services, depending on the variables used in the biophysical assessment.



Terms of Reference preformatted text

The ecosystem service assessment should include analyses to highlight and understand the influence of ecosystem condition on the [supply, use] of the ecosystem service(s) of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used.



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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.2. Sustainability and ecosystem condition

1.2.b. Should the ecosystem service assessment evaluate and define sustainable levels for the use and / or supply of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Protecting and preserving the biodiversity that underpins ecosystem services helps maintain ecosystems resilience and ensures long-term service provision. Evaluating and defining the need for protection of ecosystems and their restoration along with levels of use ensure that ecosystem services are not overused, helping to maintain the ability of ecosystems to provide ecosystem services for future generations. It supports informed decision-making for long-term ecosystem health and resilience.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

Yes, especially the sustainable use of wood needs to be analysed.



Terms of Reference preformatted text

The ecosystem service assessment should define the sustainable levels for [*supply, use*] of the ecosystem service(s) of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used to identify and define these levels.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.2. Sustainability and ecosystem condition

1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Dimension of ecosystem condition	Description	This dimension should be measured in the assessment
Index of general ecosystem condition	This kind of index is an overarching measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem. It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the	YES / NO / MAYBE / DON'T KNOW



	salinity and temperature of water. If affected, they can have an impact on the supply of ecosystem services. Abiotic physical indicators include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution..	YES / NO / MAYBE / DON'T KNOW
Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	YES / NO / MAYBE / DON'T KNOW



Why is this question relevant to me?

Ecosystem condition indicators represent properties of an ecosystem. They allow to evaluate which aspects of an ecosystem are in good or bad condition. As there are different families of condition indicators measuring different aspects of an ecosystem condition, it is important to measure several types of condition properties to have a holistic overview of the condition of an ecosystem. On the other hand, measuring specific ecosystem properties (e.g. population recruitment, occurrence of functional groups, chemical properties), can help establish cause-effect relationships between ecosystem properties and levels of ecosystem service supply, thus enabling quantitative assessments of ecosystem services change.

To summarise several indicators, they can be assembled in so-called indices. These indices are composite measures representing the overall state or condition of an ecosystem. Indices are particularly useful when the purpose is to assess how the general ecosystem condition state relates to the levels of supply of ecosystem service(s).



Indicators and indices can be compared to values in a reference state of condition. Such comparisons help provide a general overview of how the properties of an ecosystem have evolved compared to a known reference state, thus indicating an increase or a decrease. These comparisons are useful to, for example, assess the general need for ecosystem restoration or to measure the effect of restoration actions.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [sustainability and condition](#)!

Give me an example answer

The evaluation of ecosystem condition in this assessment should encompass the following aspects: biotic and abiotic indicators, fragmentation and combine this in a general index.



Terms of Reference preformatted text

The evaluation of ecosystem condition in this assessment should encompass the following aspects [*choose what is relevant from the list below*]:

- An index of general ecosystem condition covering at least [*biotic condition indicator(s) for species composition, biotic condition indicator(s) for the structure of an ecosystem, biotic condition indicator(s) for the functions of an ecosystem, abiotic condition indicator(s) for the physical state of an ecosystem, abiotic condition indicator(s) for the chemical state of an ecosystem, condition indicator(s) for the landscape-level characteristics of an ecosystem*].
- Biotic condition indicators for [*species composition, ecosystem structure, ecosystem functions*]
- Abiotic condition indicator(s) for the [*physical, chemical characteristics of the ecosystem*]
- Landscape characteristics indicator(s)

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. Understanding who benefits from the ecosystem services guarantees that inequities are identified and addressed. This approach highlights who benefits, who is excluded, and how interventions can improve well-being and equity. Examples of social groups are: gender, age, race, ethnicity, (dis)ability, income status, etc.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Identifying social groups most reliant on ecosystem services highlights the populations at greatest risk from any reduction in access or supply. Understanding access barriers provides actionable insights for addressing inequities and ensuring that specific groups are not excluded from the benefits of ecosystem services.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [social benefits](#)!

Give me an example answer

No. The focus lays on the supply of ecosystem services rather than demand.



Terms of Reference preformatted text

The ecosystem service assessment should measure the distribution of the ecosystem service(s) of interest by social groups or variables (e.g. income, age, gender). Dependency(ies) on and / or access(es) to ecosystem services should be clearly reported using measurable indicators (e.g., demand, proximity, frequency use, and availability) to identify which groups face the greatest barriers or are most dependent on specific ecosystem services. In their proposal, the contractor will clearly describe and justify the methodology (including indicators and metrics) that will be used.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.3. Social characteristics

1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. This allows to investigate whether the ecosystem service assessment will document how different social groups perceive, value, and prioritize ecosystem services.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Attitudes, perceptions, and values provide insights into how ecosystem services are viewed and prioritized. This helps align the assessment with the needs/ expectations of (relevant) stakeholders/actors. This is of particular relevance if the assessment aims at delivering recommendations.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [social benefits](#)!

Give me an example answer

Yes, stakeholders will be involved in the selection of relevant ecosystem services.



Terms of Reference preformatted text

The ecosystem service assessment should report the attitudes, perceptions, and values of social groups toward the ecosystem service(s) of interest. The results should lead to deliver actionable insights based on stakeholder preference. In their proposal, the contractor will clearly describe and justify the methodology that will be used.



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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits include goods or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., supplied by salutogenic environments, or provided by medicinal resources) in an ecosystem service assessment can identify important resources for maintaining or enhancing health. For example, access to high quality green areas in cities can help to reduce stress and encourage physical activity among urban residents.	YES / NO / MAYBE / DON'T KNOW
Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., of exposure to pathogens or natural hazards) in an ecosystem service assessment can greatly enhance health promotion efforts and related prevention and preparedness efforts. For example, changes in ecosystem structure and function can alter the ecology of infectious diseases, leading to increased risk of disease emergence in wild or domesticated species, and humans. Another example is how loss of coastal ecosystem condition can increase exposure of coastal communities to risk of coastal flooding, storm surges and tsunamis, with significant, social and economic implications.	YES / NO / MAYBE / DON'T KNOW
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., the incidence or prevalence of positive or negative health status at varying population scales, and / or across time) in an ecosystem service assessment can help to quantify the social, cultural and economic aspects of ecosystem condition and ecosystem change. While health risks and benefits refer generally to the ways in which ecosystem types and /or services may impact or improve health, health outcomes refer more specifically to the measurable health effects associated with access to (or changes to) ecosystem services. For example, an assessment of health outcomes arising from an increase in high quality green and blue urban environments might quantify reductions in mental health visits to primary care services in a specific population across multiple years. Another example would be a determination of the	YES / NO / MAYBE / DON'T KNOW



	rise or fall in incidence of water-borne disease in a specific community within a specific period after changes to aquatic ecosystems used for potable water supply.	



Why is this question relevant to me?

Assessments considering health benefits, risks, and / or outcomes can identify the likelihood and consequences of impacts associated with specific development or management strategies. However, the criteria by which ecosystem-health relationships are to be assessed will inform the selection of assessment methodology, stakeholder engagement and reporting, and the utility of the assessment outputs.

For example, a generalised assessment of health benefits or risks might focus on qualitative methods such as community self-reporting as well as a general understanding of the relationships between health and specific ecosystem services, and the opinions of health care providers and civil society organisations, whilst an assessment of health outcomes may require more detailed use of epidemiological methods and engagement with medical scientists or health economists. General assessments of benefits or risks may be most useful in broad communications of the linkages between ecosystems and health, for public engagement or wider mainstreaming efforts, and to provide a general health context for decision makers. Detailed assessments of health outcomes can help quantify costs and risks in social, cultural, and / or economic terms, inform health strategies and action plans and design of targeted interventions, or support the development of a more robust evidence base for the link between ecosystems and well-being and the implications of environmental change.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [health benefits](#)!

Give me an example answer

Yes, the three aspects of health should be considered if possible and if data are available. Health benefits of interest are more specifically the potential for reduction of stress and improvement of mental health associated with access to the natural area of National Park Mainland.



Terms of Reference preformatted text

The ecosystem service assessment should consider the health dimension. In particular it should include an evaluation of health [*benefits, risks, outcomes*].



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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.4. Health characteristics

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services?

Answer yes, no, maybe, or don't know. Investigate whether the ecosystem service assessment will document how different social groups perceive, value, and prioritize ecosystem services. These perceptions may include cultural significance, recreational use, or economic reliance.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

The relationships between ecosystems and health can be highly dependent upon prevailing social and cultural contexts, traditions, worldviews or experiences. Understanding diverse perceptions ensures that the assessment results better account for community values and cultural priorities, and can add important detail to the assessment of health risks, benefits or outcomes. It is also key to ensuring that assessments of health-relevant ecosystem services address issues of health equity, and can also help avoid or resolve conflicts by revealing broader contexts and balancing competing interests.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [health benefits](#)!

Give me an example answer

Yes, the consideration of the health benefits of National Park Mainland should consider the ability of different age groups to access the areas as well as their specific preferences in terms of the location, routes of access to, and overall design of green areas.



Terms of Reference preformatted text

The ecosystem service assessment should capture social groups' attitudes, perceptions, and values toward specific ecosystem services of relevance to health, focusing on their social, cultural, and economic importance.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.4. Health characteristics

1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. This determines whether the ecosystem service assessment will consider general relationships between environmental compartments (e.g. air, water, soil, urban environments, rural landscapes etc.) and health, or aim to provide a more detailed understanding of the impact of defined ecosystems types and / or their services on specific health issues.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

This seeks to clarify the extent to which an assessment should explore the relationships between ecosystems, their services and health, which in turn will inform stakeholder engagement and the selection of assessment methods. It asks commissioners to decide whether an assessment should identify general, non-specific connections between the natural environment and health (e.g., “managed forests provide recreational opportunities which can support good mental and physical well-being”) or aim to explore more detailed cause-effect relationships between specific ecosystems and health (e.g., “mixed native woodland ecosystems are preferred by a majority of outdoor enthusiasts for their diversity of flora and fauna, which visitors describe as being important for relaxation and inspiration and therefore more attractive for physical activity such as hiking and cycling”).

The decision will usually be informed by the policy, social and cultural context of the assessment, and depend upon the intended audiences for the results. Detailed assessments may be important for public health planners to identify ecological drivers of health status, to inform health policies and markets, or to strengthen the evidence base for nature-based solutions. However, a more general assessment may be preferred if the aim is to provide signposts for future research and policy, or to help mainstream ecosystem service approaches into the health sector at a higher level.

The choice will influence the methodological approach, notably the type and scope of data and the appropriate metrics and indicators to use, and guide engagement with stakeholders and other experts.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [health benefits](#)!

Give me an example answer

Yes, the assessment will seek to provide evidence for the specific ecosystems or ecosystem services which may influence the health of the local community.

**Terms of Reference preformatted text**

Linkages between [*health risks, benefits, outcomes*] and the ecosystem services and / or types focused on in the ecosystem service assessment should be identified. The strength, direction and / or sustainability of these linkages should also be clearly highlighted and described.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.5 Relationships between ecosystem services

1.5.a Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. Interrelationships between ecosystem services, between benefits, or between ecosystem services and their benefits means that the services and / or benefits are related and affect each other. There are a number of ways ecosystems services and / or benefits can be related such as interdependencies, synergies, trade-offs...

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

There are a number of ways by which ecosystem services and /or their benefits can be linked to each other. Some examples are:

- **Interdependency**: this means that ecosystem services and / or their benefits rely on other ecosystem services and / or benefits. For example, the provision of pollinator-dependent food depends on the pollination service, which in turn depends on habitat provision services (*i.e.*, habitats providing nesting and flower resources). An example of interdependency between a benefit and an ecosystem service would be the mental and physical health benefit supplied by green spaces which depend on the recreation service these areas can provide.
- **Trade-offs**: this means that improving one service and / or a benefit might reduce one or several service(s) and / or benefit(s), because they are responding to the same driver of change, or because they are causal related. For example, draining wetlands for agriculture increases the provision of food but decreases flood mitigation, water filtration and retention, and carbon storage services. An example of trade-offs between ecosystem services and benefits would be the increase of recreational access to a natural area which might impact its cultural or spiritual significance to local communities, which in turn can have negative implications for social and mental health.
- **Synergies**: this means that enhancing one ecosystem service will enhance (an)other ecosystem service(s). For example, coral reefs provide habitat maintenance for native biodiversity and nursery services to fisheries at the same time that their conservation provides coastal protection. Likewise for benefits, synergies mean that receiving one benefit will strengthen another benefit. For example, urban green spaces supply urban cooling which provides health benefits by reducing heat-related illnesses, this in turn also provides a social benefit by improving social well-being.

These relationships between ecosystem services and between the benefits they



provide are crucial to take into account for decision-making. They are necessary to understand when assessing sustainability, as well as for identifying and analysing situations where maximizing certain benefits may inadvertently diminish others.

Recognising trade-offs between services helps understanding, in a holistic way, the possible impacts of a certain intervention aiming at one service on other services. Such evaluations also help balance competing priorities, ensuring equitable access to benefits.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [sustainability and condition](#), as well a [social benefits](#) and [health benefits](#)!

Give me an example answer

Yes. We would like to have an insight in the synergies and trade-offs between ecosystem services.



Terms of Reference preformatted text

The ecosystem service assessment should identify and quantify the strength of potential interrelationships between the [*ecosystem service(s) of interest, benefits provided by ecosystem services, ecosystem services and the benefits they provide*]. In their proposal, the contractor will clearly describe and justify the methodology that will be used to identify and quantify these trade-offs.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Ecosystem services are the ecological process by which benefits are provided. For example water filtration, urban cooling, and pollination of crops are ecosystem services, while the associated benefits are the availability of clean drinking water, the reduction of heat-related illnesses, and food production.

Ecosystem services are not evenly distributed across geographic areas and spatial scales. This means that their supply, use, demand but also associated benefits vary across both geographic areas and spatial scales. Studying the spatial variation of the ecosystem services supply support decision-making by identifying where the services are available to beneficiaries and where they are not. Overlapping this with the spatial distribution of use and demand also allows to highlight whether the demand for ecosystem services meet the actual need for them. This also allows to reveal trends in supply and access, supporting strategic decisions on sustainable supply and use of the services. From a social benefits perspective, this is particularly relevant as it helps identifying underserved locations and prioritize interventions where they have the greatest impact.

Regarding health benefits, accounting for the spatial variation is crucial as these benefits can occur outside of the spatial scale and geographical area in which the ecosystem types and their service are. For example, the restoration of wetlands enhances the capacity to retain water and mitigate floodings, which in turn reduces incidence of waterborne diseases and disaster fatalities in downstream communities due to avoided floodings.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [spatial and temporal characteristics](#), as well a [social benefits](#) and [health benefits](#)!

Give me an example answer

Yes. The assessment should look for the supply of ecosystem services only to the geographical scale of the National Park Mainland. For the benefits such as recreation and climate mitigation, it will go beyond this scale as the area attracts visitors from outside the geographical scale of the National Park Mainland. Also, the effects of climate mitigation are not necessary visible on the local scale.



Terms of Reference preformatted text

The assessment should evaluate the spatial variations in the levels of [*supply, use, demand*] of the ecosystem service(s) of interest [*and their associated benefits*] over the spatial extent and scales considered in this assessment. Results should highlight the trends and identify key drivers of change. [*if relevant, add the following sentence*] These variations will have to be specifically put in relation with sustainable [*supply, use*]. In their proposal, the contractor will clearly describe and justify the methodology that will be used.

[*if relevant, add the following sentence*] The assessment should also provide recommendations for maintaining or enhancing the [*supply, use*] of the ecosystem service(s) of interest [*and their associated benefits*] without negatively affecting the ecosystem condition.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.6. Spatial and temporal characteristics

1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

The supply, use and demand of ecosystem services are not constant over time. Depending on the selected ecosystem services, it may be reasonable to consider temporal fluctuations in the assessment.

For example, the pollination service in European countries is only supplied over late spring to the beginning of fall. This means that pollinator-dependent crops for food production will be strongly dependent on seasonality. In some regions, due to a combination of climatic factors, there can be a mismatch between the flowering period and the time interval when pollinators are active. Assessing the activity patterns of pollinator species along the season will determine temporal variation of pollination services for different crops. Studying this temporal variation of the ecosystem services supports decision-making by identifying when the services are available to beneficiaries and when they are not. This also allows to reveal trends in supply and access, supporting strategic decisions on sustainable supply and use of the services.

From a social benefits perspective, it is particularly relevant to consider changes over time as it ensures that strategies are designed to sustain or enhance social benefits in the long term. Likewise, monitoring changes in health benefits over time helps decision-makers understand the long-term impacts of ecosystem service management on societal well-being and adjust strategies accordingly.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [spatial and temporal characteristics](#), as well as [social benefits](#) and [health benefits](#)!

Give me an example answer

Yes, the intention of the assessment is to see how the actions taken in the National Park Mainland help in reaching the goals of the Masterplan. The assessment should evaluate the temporal variations in the level of supply of the ecosystem services and related benefits over the time period and temporal scale considered in the assessment.



Terms of Reference preformatted text

The assessment should evaluate the temporal variations in the levels of [*supply, use, demand*] of the ecosystem service(s) of interest [*and their associated benefits*] over the time period and temporal scale(s) considered in this assessment. Results should highlight trends and identify key drivers of change. In their proposal, the contractor will clearly describe and justify the methodology that will be used.

[*if relevant, add the following sentence*] The assessment should also provide recommendations for maintaining or enhancing the [*supply, use*] of the ecosystem service(s) of interest [*and their associated benefits*] without negatively affecting the ecosystem condition. [*if relevant, add the following sentence*] These variations will have to be specifically put in relation with sustainable [*supply, use*].

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.7. Scenarios

1.7.a. What scenarios should be taken into account in the ecosystem service assessments?

Identify the previously chosen metrics for which a scenario analysis is required. List and describe the scenarios that should be taken into account. Even a broad description of goals for which the scenarios are required is sufficient. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Answer in this box.



Why is this question relevant to me?

Future scenarios can be important to request if the overall purpose of the ecosystem service assessment is to inform, guide or to request for recommendations. They are a way of dealing with uncertainty about the future. Scenarios allow to identify risk and facilitate long-term planning and adaptation.

There are different types of scenarios such as:

- land use and land cover change including restoration, deforestation management plans, etc.;
- climate change including different level of global warming, changes in rainfall and drought patterns, etc.
- changes in policy and governance including environmental policies and incentives, etc.;
- disaster risk reduction and resilience including adaptative planning to extreme events, development of green infrastructure and nature-based solutions, etc;
- etc.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#)!

Give me an example answer

The assessment needs to consider land use and land cover changes and development of nature based solutions.



Terms of Reference preformatted text

The ecosystem service assessment should include a scenario analysis to [*reason(s) why a scenario analysis should be conducted*]. Scenarios that should be considered are:

- [*brief description of scenario 1*]
- [*brief description of scenario 2*]
- [...]

In their proposal, the contractor will clearly describe and justify the scenarios and methodology that will be used.

2. UNCERTAINTY

2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Various uncertainties are inherent in the assessment of ecosystem services and their translation to decision-makers. This means that any results and decisions taken from them will be associated with a degree of uncertainty. Uncertainties have different sources, they can come from the data sources used, the choice of the model and their parameters, as well as the interpretation that commissioners will have of the results. Broadly, Uncertainties can be classified in three families: decision uncertainties, model uncertainties, scenario uncertainties. For more information refer to section [5.1.5.4 Uncertainty](#).

Informed decision-making needs to take into account these uncertainties as they pertain to the robustness, relevance, and reliability of the results upon which they rely.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#)!

Give me an example answer

Yes.



Terms of Reference preformatted text

The ecosystem service assessment should to evaluate and document uncertainty arising in the assessment. The contractor should clearly discuss the reliability of the methods and results in the context of their uncertainty and what it means for the decision-making that would arise from any of the results of this assessment. When reporting uncertainties, the contractor should clearly explain and justify the choice of methods used.

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2. UNCERTAINTY

2.b. What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Why should I choose this format?	I would like this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW



**Why is this question relevant to me?**

Documenting uncertainty can be costly, but neglecting it may lead to even greater costs in the long term, potentially resulting in unintended consequences and unfavourable outcomes. Sources of uncertainties are numerous, potential contractors need to be aware of the expectations of the commissioners and what the results will be used for to choose the best assessment and reporting of uncertainties.

Being aware of the minimum documentation requirements to support a decision, and having a conscious approach to whether there are uncertainty thresholds that may stop a decision, is part of rational decision-making.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#)!

Give me an example answer

Uncertainty can be reported in the format of a Participatory documentation based on expert judgement. We aim for a qualitative assessment of uncertainties. Assumptions taken in the modelling need to be clearly reported.

**Terms of Reference preformatted text**

The ecosystem service assessment should to evaluate and document uncertainty arising in the assessment. The contractor should clearly discuss the reliability of the methods and results in the context of their uncertainty and what it means for the decision-making that would arise from any of the results of this assessment. When reporting uncertainties, the contractor should clearly explain and justify the choice of methods used.

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3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / NO / MAYBE / DON'T KNOW
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	YES / NO / MAYBE / DON'T KNOW



Why is this question relevant to me?

Validating the methodology helps avoiding biases, ensures transparency, and confirms that appropriate methods are used to meet the commissioners' goals.

Validating results ensures that the conclusions drawn are based on accurate, representative data. This step is essential to avoid misleading commissioners and other potential stakeholders with incorrect information that could lead to improper decision-making.

Validation improves credibility, transparency and accountability in an ecosystem service assessment. It ensures that the assessment is accurate, trustworthy, and applicable to real-world decision-making. By validating an ecosystem service assessment at different steps, we also ensure comparability with previous work done, and can identify important caveats and limitations that commissioners and potential other stakeholders should be aware of when using the results of the assessment.



Involving third parties in the validation process can be more costly as it implies using more resources such as time and organisation of meetings and events. It is important for the contractor to know how the commissioners would prefer the validation to be carried out to prepare the workplan accordingly and select relevant stakeholders if required.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty!](#)

Give me an example answer

Validation of the results will be done internally and externally. Internally by comparing the results with available literature and externally through a workshop with different stakeholders.



Terms of Reference preformatted text

The ecosystem service assessment should validate the methodology and results of the ecosystem service assessment. The validation process should involve the commissioners. It should be carried out [*internally to its organisation; externally and involve third parties such as stakeholders; both internally to the contractor's organisation, and involved third parties such as stakeholders*]. The potential contractor should clearly describe the validation process that they expect to put in place during the assessment.

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3. VALIDATION

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data are baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. Commissioners might want to list some key datasets or figures they would like the results to be comparable with. Alternatively, stakeholders can be consulted to identify these references.

Answer in this box (yes, no, maybe, or don't know).



Why is this question relevant to me?

Comparing results to other published data can give an estimation of the quality of the results. If they are expected to be close to some already published figures but are very different, it is an indication that the methodological approach chosen might have some flaws or can significantly improve the approach taken in previously published reports.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#)!

Give me an example answer

The results of the assessment can be compared with specific studies done on certain ecosystem services in parts of National Park Mainland.



Terms of Reference preformatted text

The validation process of the ecosystem service assessment should notably include a comparison of the results with other key published data including *[if relevant, list the key data and figures]*. The potential differences should be discussed and explained.

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4. STAKEHOLDER ENGAGEMENT

4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any group, organisation or individual who are interested in and / or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	<u>Consult/participate:</u> stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. <u>Inform:</u> provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	<u>Consult/participate:</u> stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. <u>Inform:</u> provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	<u>Consult/participate:</u> stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). <u>Inform:</u> provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	<u>Consult/participate:</u> stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the inclusion of local knowledge in the assessment.	YES / NO / MAYBE / DON'T KNOW



	<u>Inform:</u> provide updates and transparency on the progress of the assessment.	
Interpretation of the results	<u>Consult/participate:</u> stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. <u>Inform:</u> provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Communication and dissemination of the results	<u>Consult/participate:</u> stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW



Why is this question relevant to me?

Stakeholder involvement provides legitimacy to the assessment process, it also ensures that results are communicated properly and that everyone impacted by the assessment is being included. Finally, it facilitates continuous feedback on methods, results and data used, which participates in the validation of the assessment.

Involving stakeholders can however be costly and it is important to do it strategically and identify the steps at which their involvement is necessary to choose the most adapted format of engagement.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#) and [social benefits](#)

Give me an example answer

Stakeholders participate in the validation of the results and communication of the results.



Terms of Reference preformatted text

A clear strategy should be put in place to inform, consult and facilitate stakeholders' participation at different stages of the assessment including *[list the steps of the assessment in which stakeholders should be informed, consulted or participate]*.



4. STAKEHOLDER ENGAGEMENT

4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / MAYBE / DON'T KNOW
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / MAYBE / DON'T KNOW
Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	YES / NO / MAYBE / DON'T KNOW
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / NO / MAYBE / DON'T KNOW
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	YES / NO / MAYBE / DON'T KNOW
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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Why is this question relevant to me?

Stakeholder involvement provides legitimacy to the assessment process, it also ensures that results are communicated properly and that everyone impacted by the assessment is being included. Finally, it facilitates continuous feedback on methods, results and data used, which participates in the validation of the assessment.

Involving stakeholders can however be costly and it is important to do it strategically and choose the most adapted format of engagement.

Where can I find more information or additional questions to detail my Terms of Reference?

Visit our advanced content on [uncertainty](#) and [social benefits](#)!

Give me an example answer

Stakeholders will be involved through advisory boards, expert groups, focus groups, or steering committees. Workshops should also be organised around the validation process. Public consultation is also a possibility on ecosystem services and other benefits that cannot be quantified.



Terms of Reference preformatted text

Stakeholder engagement should preferably include *[format(s) of stakeholder involvement chosen]* to *[reason(s) for which the format(s) has(have) been chosen]*



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Evaluation Criteria template



We recommend to read the [5.1 General Information](#) prior to using the template

This template is different from the two previous ones for Frame & Scope and Methodology. Its aim is twofold:

- i. **Support the writing of the Evaluation Criteria section of a Terms of Reference** by identifying scoping and methodological criteria that are essential to commissioners. For this, commissioners should use the blue column entitled “**WRITING EVALUATION CRITERIA**”. At the end of subsection listing criteria, boxes with further information and preformatted Terms of Reference text are provided to facilitate the writing of the Evaluation Criteria section of a Terms of Reference.
- ii. **Support the evaluation of proposals received** by commissioners once the call for tender has been closed. For this, commissioners should use the yellow column entitled “**EVALUATING PROPOSALS**”, as well as the last two rows of each table of evaluation.

The guidance presented in this template is solely focused on the evaluation of the scope and methodology of a proposal, it does not provide any guidance on how to evaluate a proposal in its entirety. Refer to [5.1 General Information](#) for a detailed description of use and limitations of this template.

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1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making					
1.b. Correspondence with the requested format of the results					
1.c. Include the ecosystem types of interest					
1.d. Include the ecosystem services of interest					
1.e. Include the correct the spatial extent(s)					
1.f. Include the correct time period and temporal scale for the results					
1.g. Include the correct spatial scales for the results					
1.h. Quantify ecosystem services in biophysical terms					
1.i. Quantify ecosystem services in terms of their economic value in monetary terms					
1.k. Quantify ecosystem service supply , use , demand					
1.l. Include an evaluation of sustainable use and / or supply					
1.m. Include social aspects					



	YES	NO	YES	NO	DON'T KNOW
1.n. Include health aspects					
1.o. Include an evaluation of ecosystem condition					
1.p. Include a stakeholder analysis					
Qualitative appreciation of the proposal					
Qualitative score:			/5		



Where can I find more information to add more criteria and / or evaluate proposals?

Visit our [advanced content](#)!

What are the associated Frame & Scope template sections?

Criteria	Frame & Scope section
1.a.	1. Context and Purpose
1.b.	2.3 Formats of the deliverables
1c.-1.d.	3.1 Ecosystem type(s) and service(s)
1.e.	3.2 Spatial characteristics
1.f.-1.g.	3.3 Temporal characteristics
1.h.-1.o.	3.4 Valuation of ecosystem services

What do these terms mean?

Spatial extent: refers to the geographical location and overall size of the area in which the ecosystem service assessment should be conducted. For more information refer to the Frame & Scope section above.

Time period: the interval of time that the assessment should cover, for example 2020-2024. For more information refer to the Frame & Scope section above.

Temporal scale: the unit of time in which the results should be compiled such as annual average, quarterly average, monthly average. For more information refer to the Frame & Scope section above.



Spatial scale: the spatial level at which the results should be compiled. In this guidance, three options were offered: fully spatially explicit, ecological scales (*e.g.*, deciduous *versus* coniferous forests), and administrative scales (*e.g.*, regions, counties, municipalities). For more information refer to the Frame & Scope section above.

Ecosystem service supply: The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (*i.e.*, what quantity is being supplied?). It can be valued in terms of their economic value in monetary units (*i.e.*, how much does this supply represent in the economy?). For more information refer to the Frame & Scope section above.

Ecosystem service use: The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (*i.e.*, what quantity is being used?). It can be valued in terms of their economic value in monetary units (*i.e.*, how much does this use represent in the economy?). For more information refer to the Frame & Scope section above.

Ecosystem service demand: The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (*i.e.*, what quantity of an ecosystem service is needed?). It can be valued in terms of their economic value in monetary units (*i.e.*, how much does this need represent in the economy?). For more information refer to the Frame & Scope section above.

Sustainable use and supply: Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. For more information refer to the Frame & Scope section above.



Terms of Reference preformatted text

The proposals sent by the applicants will be evaluated according to their alignment with the frame & scope defined in the call, as well as the methodological approach(es) chosen to include the criteria of importance. Particular care should be given to:

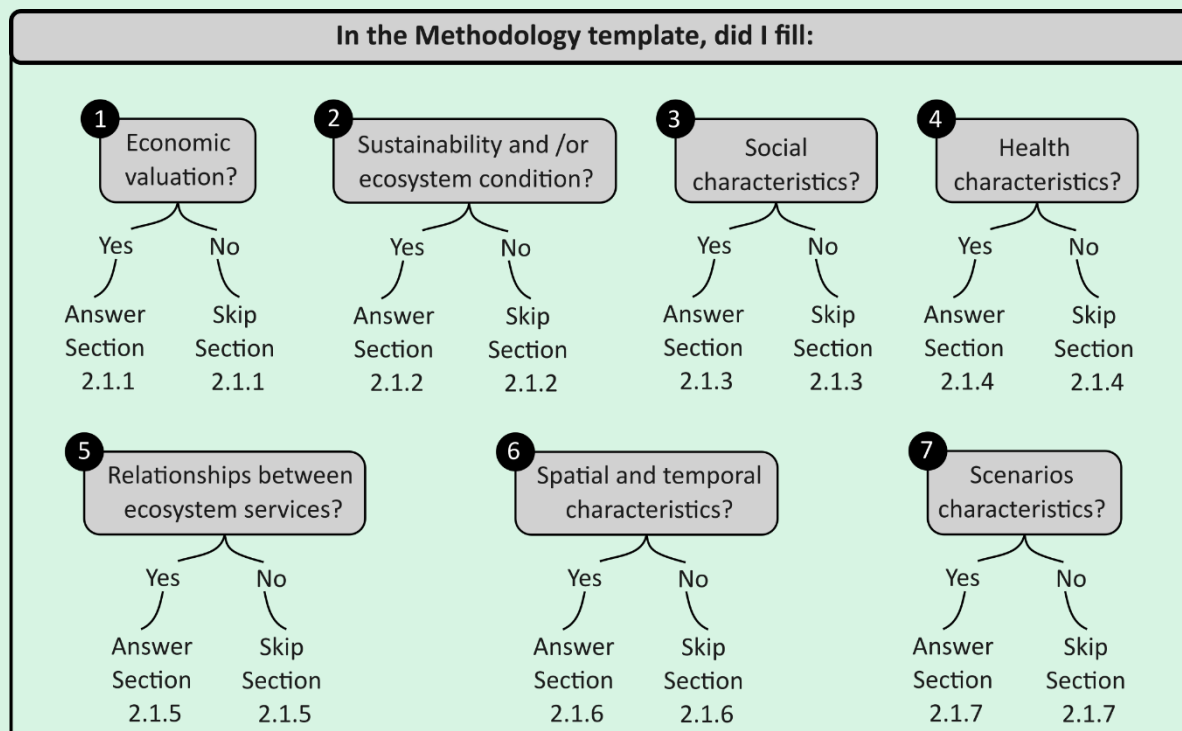
- [add the key components of the scope that are of high importance].

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2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation methods that will be used					
2.1.1.b. Quantify indicators of the contribution of ecosystem service(s) to economic development					
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of ecosystem condition on ecosystem service supply					
2.1.2.b. Define and evaluate sustainable levels for the use and / or supply of ecosystem services					



Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition					
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem service assessment by social groups to identify beneficiaries					
2.1.3.b. Assess and report the attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks					
2.1.4.b. Measure of health benefits					
2.1.4.c. Measure of health outcomes					
2.1.4.d. Assess and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services					
2.1.4.e. Establish health links with specific ecosystem types and / or ecosystem services					
2.1.5 Relationships between ecosystem services					
2.1.4.a. Identify potential interrelationships between ecosystem services and the benefits they provide					
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits					
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits					



Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.7. Scenarios					
2.1.7.a. Include relevant scenarios					
Qualitative appreciation of the proposal					
Qualitative score:			/5		



Where can I find more information to add more criteria and / or evaluate proposals?

Visit our [advanced content](#)!

What are the associated Methodology template sections?

Criteria	Methodology section
2.1.1.a -2.1.1.b	1.1 Economic valuation
2.1.2.a -2.1.2.c	1.2 Sustainability and ecosystem condition
2.1.3.a – 2.1.3.b	1.3 Social characteristics
2.1.4.a – 2.1.3.e	1.4 Health characteristics
2.1.5.a	1.5 Relationships between ecosystem services
2.1.6.a – 2.1.6.b	1.6 Spatial and temporal characteristics
2.1.7.a	1.7 Scenarios characteristics

What do these terms mean?

Ecosystem condition: the quality of an ecosystem. For more information refer to the Methodology section above.

Sustainable levels: refers to the maximum consumption and provision of ecosystem services above which the ecosystem condition and ability to deliver services for future generations is maintained. For more information refer to the Methodology section above.

Health risks: refers to potential threats to good health, including drivers of disease emergence. For more information refer to the Methodology section above.

Health benefits: benefits includes goods or services which promote good health or offer avenues for positive health interventions. For more information refer to the Methodology section above.



Health outcomes: refers to the status of health as a result of an intervention or exposure to one or more conditions. For more information refer to the Methodology section above.

Interrelationships: refer to how different services or benefits influence each other. This influence can be either positively (synergies), negatively (trade-offs), or through dependence (interdependencies). For more information refer to the Methodology section above.

Scenarios: in modelling, future scenarios represent a range of potential futures that one would like to predict. For more information refer to the Methodology section above.



Terms of Reference preformatted text

The proposals sent by the applicants will be evaluated according to their alignment with the methodological characteristics defined in the call. The proposed methodological approach(es) to measure the methodological characteristics defined above including modelling methods, metrics and indicators should be clearly described and justify. Of particular importance are the following methodological characteristics:

- *[if relevant, key components of the methodological characteristics that are of high importance];*
- [...]

2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment					
2.2.b. Include a clear reporting format for uncertainties					
Qualitative appreciation of the proposal					
Qualitative score:			/5		



Where can I find more information to add more criteria and / or evaluate proposals?

Visit our [advanced content](#)!

What are the associated Methodology template sections?

Criteria	Methodology section
2.2.a. -2.2.b.	2. Uncertainty

What do these terms mean?

Uncertainty: Uncertainty refers to the degree of confidence we can have in the results of an assessment. It includes both natural variability and gaps in knowledge or data. Quantifying uncertainties is important as these can have implications for decision-making. For more information refer to the Methodology section above.



Terms of Reference preformatted text

The proposals sent by the applicants will be evaluated according to the following criteria:

- the approach taken to document and report uncertainties in relation to decision-making, modelling and scenarios if applicable.

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment					
2.3.b. Involvement of stakeholders in the validation process of the ecosystem service assessment					
2.3.c. Validation of the results of the ecosystem service assessment includes comparison with published reference data					
Qualitative appreciation of the proposal					
Qualitative score:			/5		



1

Where can I find more information to add more criteria and / or evaluate proposals?

Visit our [advanced content](#)!

What are the associated Methodology template sections?

Criteria	Methodology section
2. 3.a. -2.3.c.	3. Validation

What do these terms mean?

Validation: means evaluating the quality of the assessment including the scope, the methodology employed and the results. For more information refer to the Methodology section above.

Stakeholders: Any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders.

Published reference data: baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. For more information refer to the Methodology section above.

1

Terms of Reference preformatted text

The proposals sent by the applicants will be evaluated according to the following criteria:

- the approach taken to validate the methodology and results of the ecosystems service assessment.

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment					
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment					
Qualitative appreciation of the proposal					
	Qualitative score: /5				



Where can I find more information to add more criteria and / or evaluate proposals?

Visit our [advanced content](#)!

What are the associated Methodology template sections?

Criteria	Methodology section
2.4.a.-2.4.b.	4. Stakeholder engagement



Stakeholders: Any group, organisation or individual who are interested in and / or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders.



Terms of Reference preformatted text

The proposals sent by the applicants will be evaluated according to the following criteria:

- the approach taken and timeline to inform, consult and involve stakeholders throughout the ecosystem service assessment. The applicants will identify the foreseen ways of engaging with the stakeholders throughout the assessment. The applicants might also refer to specifically relevant stakeholders in alignment with the scope of the assessment.



Terms of Reference – Example based on the templates



The example of Terms of Reference text for the Frame & Scope, Methodology, and Evaluation Criteria below are based on the hypothetical case example presented in [5.1.4 I need example of use of the templates!](#) It shows how the answers from the templates and the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference. More examples are available in [Annex 8.3](#).

5.6.1 Frame & Scope

1. CONTEXT AND PURPOSE

The National Park Mainland is a 5,000 ha large nature area in the east of Belgium. It connects three municipalities and consists mainly of forests, heathland, grasslands, inland dunes and brook valleys. It maintains a rich and rare biodiversity and also offers large recreational opportunities for all ages. In 2023 it became a National Park. A long-term Masterplan and an Operational plan for the next 6 years were developed.

The primary objective is to measure the progress towards the goals of the Masterplan and report this to the National Park Bureau. In addition, it also demonstrates the importance of the National Park label for nature restoration and the local community.

Relevant policies to be considered in this assessment include the criteria set to assess the National Parks set by the National Park Bureau and the EU Nature Restoration Regulation with particular attention to the Flemish Nature restoration plan (expected 2026).

2. INTENDED IMPACTS AND OUTPUTS

The results of this assessment will be primarily used by the commissioner: i) to monitor and evaluate the success of restoration of ecosystems in National Park Mainland, ii) to report the benefits of these measures to The National Park Bureau, stakeholders, and the public.

Results will also be made available and usable for partners within the National Park Mainland strategic board. It is anticipated that these parties will primarily use the direct outputs of the assessment as a communication tool showing the value of nature for society and underpin the restoration measures taken. The approach and methodology may be used by other National Parks.

Although recommendations for further governance of the National Park are not explicitly requested, outputs of the ecosystem service assessment are expected to directly impact the operational Plan of National Park Mainland. The results of the ecosystem assessment will underline the importance of nature into the socio-economic fabric of the municipalities and will inform local budget and policy decisions on conservation measures. Beyond the direct impacts mentioned above, the outcomes of this assessment should also affect public awareness, fostering community support for further actions.



3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystems and ecosystem services

Ecosystem types of interest in this ecosystem service assessment are all types found within National Park Mainland boundaries being :

- Forest
- Grassland
- Heathland
- Inland wetland
- Sparsely vegetated areas/land dunes

Inherent to the ecosystem service approach it is best to assess the total bundle of ecosystem services relevant for National Park Mainland. The relevance will be defined together with different stakeholders in the area. Their definition can be found in CICES.

The ecosystem service assessment should identify and quantify the strength of potential interrelationships between the ecosystem services. In the proposal, the contractor will clearly describe and justify the methodology that will be used to identify and quantify these trade-offs.

Geographical and temporal scale

The ecosystem service assessment is to be conducted in the geographical location and local scale of the National Park Mainland. If possible regional scale for ecosystems such as flood protection.

Within the geographical and spatial extent of this ecosystem service assessment, the results should be presented as spatially explicit as possible within the context of available data. The assessment should be conducted over the years 2024-2030. Results should be reported for each year within this time period, so the temporal variations in the level of supply of the ecosystem services and related benefits could be evaluated.

Biophysical and monetary value

The ecosystem service assessment should measure ecosystem service in biophysical and where possible monetary terms. Supply and use should be measured. The demand is not necessarily requested but could be interesting to know for certain ecosystem services such as pollination and recreation to detect deficits. The assessment needs to measure all relevant ecosystem services qualitatively and where data is available quantitatively.

Social and health values

The ecosystem service assessment should measure the social values. It will also consider the value of ecosystem services in terms of their relevance to human health using relevant metrics, especially health benefits and risks of contact with nature. If data are available health outcomes could be included. Forest health will be measured through the forest condition assessment that will be included in this assessment.

Sustainability and ecosystem condition

The ecosystem service assessment should include an evaluation of the condition of forest ecosystems. It should include analyses to highlight and understand the influence of this



ecosystem condition on the supply of the ecosystem service(s) of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used. The evaluation of ecosystem condition in this assessment should encompass the following aspects: a general index of ecosystem condition, biotic indicators (species, structure, function), abiotic indicators (physical and chemical), and landscape-level characteristics. The assessment shall identify and evaluate sustainable use levels for the ecosystem services wood production, and recreation.

Spatial and temporal characteristics

The assessment should evaluate the spatial variation in the condition of the ecosystems and the supply levels of carbon sequestration services over the spatial extent, scales, time period and temporal scale considered in this assessment. Results should provide recommendations for maintaining and / or enhancing the supply of the ecosystem services of interest without negatively affecting ecosystem condition.

Scenarios

The ecosystem service assessment should include a scenario analysis to measure the impact of the restoration measures. Scenarios that should be considered are: Land use and land cover changes following the operational plan.

The specific deliverables required in this assessment are:

- An executive summary designed for informing national and local policymakers.
- Technical report covering approach and methodologies designed to be replicated in time or by other National Parks.
- Tables of the ecosystem services supply to easily summarize the results of the assessment.
- A lay man fact sheet / infographic to use in the communication towards citizens and other stakeholder groups.

4. STAKEHOLDER ENGAGEMENT

Prior to starting the assessment, the applicant will be asked to conduct a detailed stakeholder analysis to identify the key stakeholders that will be involved in the development of the project.

Key stakeholders who could be involved are the three municipalities on which National Park Mainland lays, Nature organisations and farmers should be involved. It will enhance the integration of local knowledge and legitimacy of the results. Other scientists doing research in National Park Mainland should also be involved in order to exchange data and validate results of the assessment.



5.6.2 Methodology

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Valuation

The study should design and apply value transfer methods to estimate the economic value of each identified ecosystem service. Transferred values should be adjusted to reflect the characteristics of the study site in terms of ecosystem extent, condition, population of beneficiaries and income level. This could involve the use of available databases of ecosystem service values and/or the use of published value transfer functions.

The ecosystem service assessment should also measure the contribution of the ecosystem service(s) of interest to the economic development of the area of interest. Particular economic indicators of interest are impacts on the recreation sector and local employment. The ecosystem service assessment should report the attitudes, perceptions, and values of social groups toward the ecosystem service(s) of interest. The results should lead to deliver actionable insights based on stakeholder preference.

Ecosystem condition

It should include analyses to highlight and understand the influence of the ecosystem condition on the supply of the ecosystem service(s) of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used. The evaluation of ecosystem condition in this assessment should encompass the following aspects: biotic indicators (species, structure, function), abiotic indicators (physical and chemical), and landscape-level characteristics. These will be combined in a general index of ecosystem condition

2. UNCERTAINTY

The ecosystem service assessment should evaluate and document uncertainty arising in the assessment. The contractor should clearly discuss the reliability of the methods and results in the context of their uncertainty and what it means for the decision-making that would arise from any of the results of this assessment. When reporting uncertainties, the contractor should clearly explain and justify the choice of methods used.

3. VALIDATION

The ecosystem services assessment should validate the methodology and results of the ecosystem service assessment. The validation process should involve the commissioners. It should be carried out both internally to the contractor's organisation, and involved third parties such as stakeholders. The validation process of the ecosystem services assessment should notably include a comparison of the results with other key published data including studies done in National Park Mainland.

4. STAKEHOLDER ENGAGEMENT

Stakeholders are expected to be involved in different stages of the ecosystem service assessment including identification of relevant ecosystem services, valuing certain ecosystem services, validation and communication of the results. This can be done through the existing advisory board, scientific expert group and focus groups.

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5.6.3 Evaluation Criteria

1. FRAME & SCOPE

The proposals sent by the applicants will be evaluated according to their alignment with the frame and scope defined in the call, as well as the methodological approach(es) chosen to include the criteria of importance. Particular care should be given to:

- Include the ecosystem types of interest;
- Include the correct time period and temporal scale for the results;
- Include the correct spatial scales for the results;
- Quantify ecosystem services in biophysical terms and monetary values;
- Quantify ecosystem service supply and use;
- Include social and health aspects;
- Include an evaluation of forest ecosystem condition;
- Include a stakeholder analysis.

2. METHODOLOGY

The proposals sent by the applicants will be evaluated according to their alignment with the methodological characteristics defined in the call. The proposed methodological approach(es) to measure the methodological characteristics defined above including modelling methods, metrics and indicators should be clearly described and justified. Of particular importance are the following methodological characteristics:

- Specify and justify the economic valuation methods that will be used in the assessment;
- Quantify indicators of the contribution of ecosystem service(s) to economic development;
- The approach taken to document and report uncertainties in relation to decision-making, modelling and scenarios if applicable;
- The approach taken to validate the methodology and results of the ecosystems service assessment;
- The approach taken and timeline to inform, consult and involve stakeholders throughout the ecosystem service assessment. The foreseen ways of engaging with the stakeholders and the relevant stakeholders in alignment with the scope of the assessment, will be assessed in the stakeholder analysis.



6. References

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<https://project-selina.eu/>

7. Annex

7.1 Typology of purposes





7.1.1 Public Sector ecosystem service assessment purposes

7.1.1.1 Purpose in the policy cycle

Ecosystem service assessments are a large subset of valuation methods of nature's contributions to people (IPBES²⁰ Values Assessment, 2022). An ecosystem service assessment that is explicit about its purposes, and which identifies the entry point in a policy or project cycle, reduces uncertainty about the kind of decision the assessment is supporting, has potentially better targeting of the assessment, and a greater potential for uptake by stakeholders. Policy cycles are often thought of as public, but the generic figure could apply to any type institution and “policy” could be substituted for “a framework for action(s)” (Figure A.1).

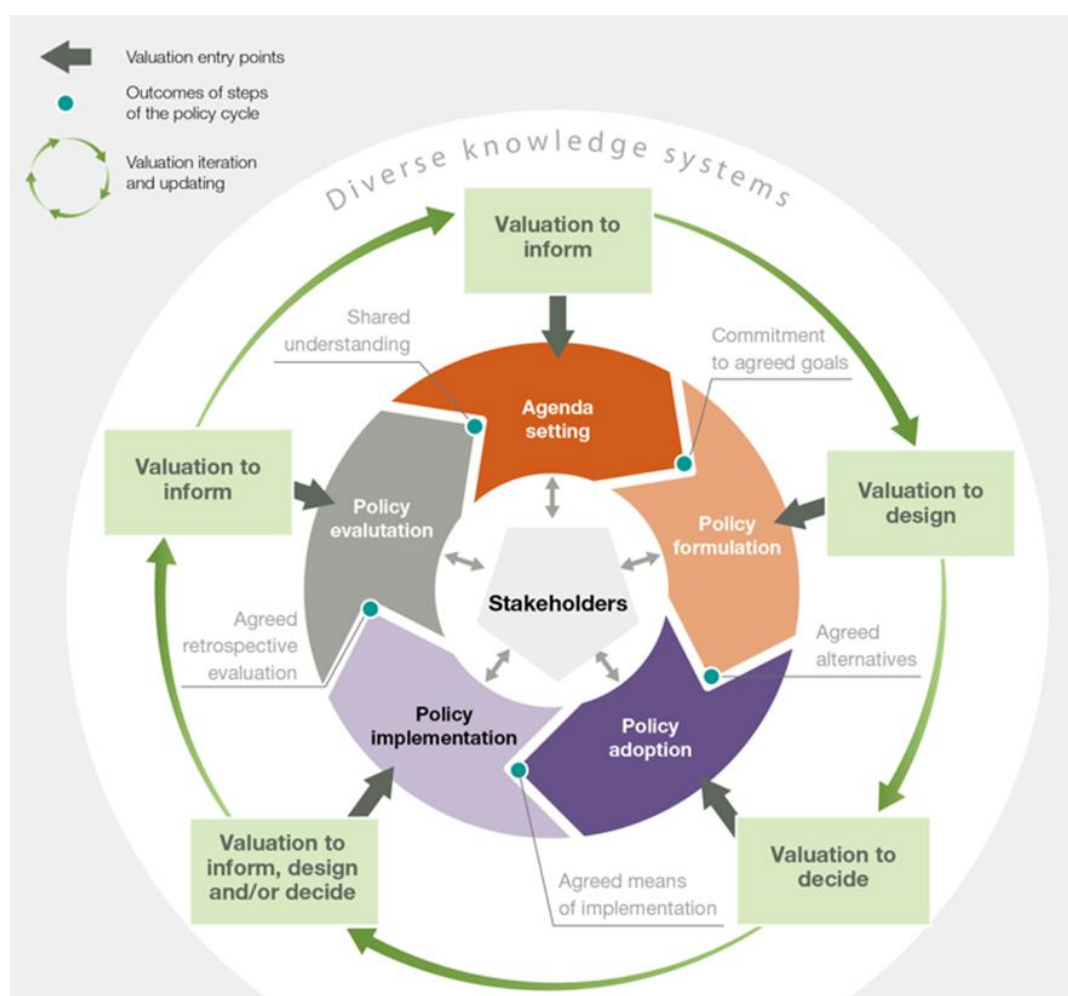


Figure A.1 - Policy cycle and generic purposes of ES assessment (valuation). *Source: Intergovernmental Science – Policy Platform on Biodiversity and Ecosystem Services Values Assessment, Pascual et al. 2023.*

An assessment purpose is not the same as a “policy window” (Rose et al., 2020). The identification of policy windows refers to the strategic assessment of the external political, social, and economic contexts in which policy decisions are made (Michaels et al., 2006). It

²⁰ Intergovernmental Science – Policy Platform on Biodiversity and Ecosystem Services Values Assessment



involves recognising specific moments or conditions when policymakers and key stakeholders are particularly receptive to new ideas, evidence, or policy proposals related to biodiversity, ecosystem condition and ecosystem services **Table A.1** presents the generic steps and purposes in the policy cycle, and associated questions for identifying purpose (Kato-Huerta et al., 2023).

Table A.1- Generic purposes and their associated generic steps in the policy cycle.

Generic purposes	Associated generic steps of the policy cycle
INFORM	Agenda setting - Ecosystem Service assessment to support commitment to agreed goals Often assessments to inform and raise awareness about the importance of a previously undocumented ecosystem and its ecosystem services. Directed at specific non-research audiences - more specific than ‘to whom it may concern’. <u>Needs addressed with this purpose:</u> Does your proposed assessment aim to address the importance of a previously under-documented ecosystem assessment? Is it communicated to a specific audience other than researchers?
	Policy evaluation - Ecosystem service assessment to evaluate policy ex post and achieve understanding for new agenda setting cycle <u>Needs addressed with this purpose:</u> Does your proposed assessment aim at retrospectively evaluate performance of a policy ?
DESIGN	Policy formulation – Ecosystem service assessment to support design of policy alternatives It can be argued that almost all knowledge can be leveraged to support policy formulation, and that policy formulation and updating takes places continually. Often these assessments are consultancies and not published because they explore alternatives that will not be proposed. For example, ecosystem service willingness-to-pay studies that explore feasible payment for ecosystem services levels; gap analysis; ecosystem service mapping to identify ‘cold’ spot as potential priority locations for measures. <u>Needs addressed with this purpose:</u> Does your proposed assessment aim for strategic planning? Listing of possible policy settings or scenarios? Generating alternatives or identifying ‘sufficient’ characteristics, or possible parameter setting of policy proposals?



DECIDE	Policy adoption – Ecosystem service assessment to support decisions about which policy alternatives to implement <u>Needs addressed with this purpose:</u> Does your proposed assessment suggest a ranking of different decision alternatives facing stakeholders ? For example through some form of cost-effectiveness, benefit-cost or multi-criteria decision analysis?
	Policy implementation - Ecosystem service assessment to inform, redesign, decide regarding the running management measures to implement the policy – trial and error identifying needs for evaluation <u>Needs addressed with this purpose:</u> Does your proposed assessment take place after a policy has been adopted, to adopt how it is implemented through management measures? For example to monitor implementation, to adjust technical implementation, redesign measures? For instance, ecosystem accounts are an example of assessment conducted during an implementation, assessment or accounting period



7.1.1.2 Detailed purposes in the policy cycle

When you have chosen your general purposes try to define the detailed purpose as exemplified below in **Table A.2**. The IPBES Values Assessment supporting material provides a detailed definition of these purposes.

Table A.2 - Classification of detailed valuation purposes (intended and actual). *Source: adapted from Barton et al. 2022*

General purpose	Specific examples from Ecosystem services valuation (ESV)	Short description	Description
INFORM	Formative Affirmative	Value formation or affirmation (not used decisively or for technical purposes)	A paper that mentions ESV/NCPV valuation process as a resource for training and education, or a process used to help stakeholders form, express, or affirm importances of nature. The valuation setting is designed for the purposes of forming, and answering research questions about values. Value formation / affirmation through participation in these studies is not used for any of the decisive or technical purposes below.
	Awareness raising	Advocacy and raising awareness of total value, trade-offs, conflicts, scenarios.	An article that suggests or advocates that ESV/NCPV results are influential, or should be influential in creating the awareness, with respect to the importance of environmental issues, ecosystems preservation, etc. i.e. where ESV reveals, demonstrates, suggests the importance of ecosystems for society, including where it brings conflict with other values. Not related to a specific policy or decision to be made.
	Justification (ex post of a decision)	Evaluation of existing projects and policies (ex post)	An article where ESV/NCPV is used to justify (or to challenge) <i>already made</i> decisions, <i>existing</i> projects, policies or instruments. The key criterion here is “ <i>ex-post</i> ”: evidence after the decision has been made, the policy adopted and implemented.



	Accounting & Indicators	Assessment of historic trends	An article where ESV is used for ecosystem accounts or single indicators to assess long-term historic trends, of physical or monetary ecosystem services. Can include first time demonstration of indicator with the intention of accounting over multiple periods. Studies that just value the current state with no mention of follow-up/trends/accounting perspective, are awareness raising.
DECIDE	Recommendations & guidance	Guidances, strategies, plans	ESV/NCPV has been used to justify which values are considered in recommendations, strategies, guidance documents for decision-making (e.g. meta-analysis for guidance values, EIA guidelines, national strategies...)
	Participation	Negotiation, arguments for discussion, shared norms & conflict resolution	ESV/NCPV has been used as a process to organise or support the expression of preferences, opinions, positions, of stakeholders or people in a context where a decision had to be made, and before it had to be made (<i>ex ante a decision</i>).
		Formulation of decision problem and structuring	ESV/NCPV has been used as a process or an instrument to structure the expression of preferences, opinions or positions of stakeholders, by <i>formulating the options</i> under scrutiny.
	Prioritization Trade-offs	screening alternatives	ESV/NCPV has been used to define and specify the alternatives to be considered in a decision to be made. Valuation has been used in benefit-cost analysis or multi-criteria analysis to identify a set of alternatives that pass some minimum criteria (e.g. net present value > 0)
		ranking alternatives	ESV/NCPV has been used to rank alternatives considered in a decision to be made, a policy to be designed. E.g. by ranking alternatives by net present value in a CBA, or by total utility our outranking in a multi-criteria analysis.



	Environmental management criterion	Policy target-setting	ESV/NCPV has been used to specify, and especially quantify, the target of a given policy or instrument to be decided upon or implemented (e.g. thresholds, biological indicators, quality levels, compliance rates, reserve area target, restoration, conservation targets etc.).
		Criteria for spatial targeting (zoning, planning)	ESV/NCPV has been used to produce a zoning and a spatial planning of environmental policies, instruments (prioritization of conservation objectives...). Mapping of ecosystem services as valuation.
		Allocation of rights to land and natural resource use	ESV/NCPV to determine welfare from changes in operating, use, extraction, emissions rights regimes. Rights could include ownership / licencing / permitting / certification / quotas/ responsibilities / use norms and rules.
DESIGN POLICY	Price-setting	Environmental standard setting (implicit pricing)	ESV/NCP has been used to value a physical minimum standard or conservation target: e.g. harvesting quota allocation, pollution emissions permits, reserve site selection
		Pricing, setting incentive levels (explicit pricing)	ESV/NCP has been used to specify an economic parameter of an economic instrument: tax and fees rates, level of payment for ecosystem services. Explicit use for pricing: does not include payment instrument for eliciting willingness-to-pay (in CVM, CE studies) used to estimate welfare estimates.
	Damage compensation	Establishing levels of damage compensation	ESV/NCP has been used to quantify the damages and the compensation required, in a legal process



7.1.1.3 Example of detailed purposes in the policy cycle

The generic policy purposes in the policy cycle (**Figure A.1**) may be ‘reconfigured’ when addressing a particular ecosystem and a particular actor. In **Table A.3**, purposes are distinguished as strategic, operational and tactical for a municipality. Strategic-operational-tactical have long-medium-short term context not captured in the generic policy cycle. A cross-walk with the generic policy cycle purposes in **Figure A.1** is outlined.

Table A.3 - Example - Municipal purposes of mapping and valuation of urban trees. *Source: Translated from Table 1 in Barton et al. 2024.*

Overall purpose	Detailed purpose	Examples related to valuation of urban trees
1. Political and strategic Agenda setting and policy formulation & adoption	General awareness	Communication about the importance of trees between different agencies in the municipal administration, with politicians and decision-makers, with citizens and the media.
	Visibility in maps	the municipalities' legal and strategic documents, regulations and guidelines.
	Climate accounts	trees' total contribution over time to the municipality's carbon storage and emissions.
	Nature accounting and budgeting	Change analyses for green area, condition and ecosystem services; calculation of the economic value of ecosystem services to justify allocations for maintenance and restoration
	Nature & Health Strategy	highlight tree canopy coverage available for human health and quality of life for prioritizing planting.
2. Operational Policy implementation & evaluation	Planning climate change adaptation	map the spatial effect of trees on surface runoff in catchments.
	Planning nature-based solutions	map the spatial distribution of ecosystem services in the building zones.
	Biodiversity planning	map tree species as a basis for more resilient planting strategies.
	Site analysis in the early phase	map the location of trees, the effect on the degree of utilisation, the location of buildings and the protection/preservation of land in area development, area plans and zoning plans.



3. Tactical Implementation only	Building permit and Blue-Green Factor (BGF) norm	calculation of the tree-crown deck's contribution to BGF on a property
	Compensation measures physically	tree planting measures to compensate for the loss of physical ecosystem services in connection with developments.
	Compensation financially	Documented wood inventory can be the basis for preservation in land-use planning and local regulations with compensation claims for trees that are felled without a permit. Data basis for method for valuation of trees (VAT)

7.1.2 Private Sector ecosystem service assessment purposes

7.1.2.1 The Governance for Valuation Framework

In the framework for [Governance for Valuation](#), Capital Coalition shows the steps to make better-informed **decisions** and a common structure for **reporting** to build confidence in valuation of capitals (**Figure A.2**).

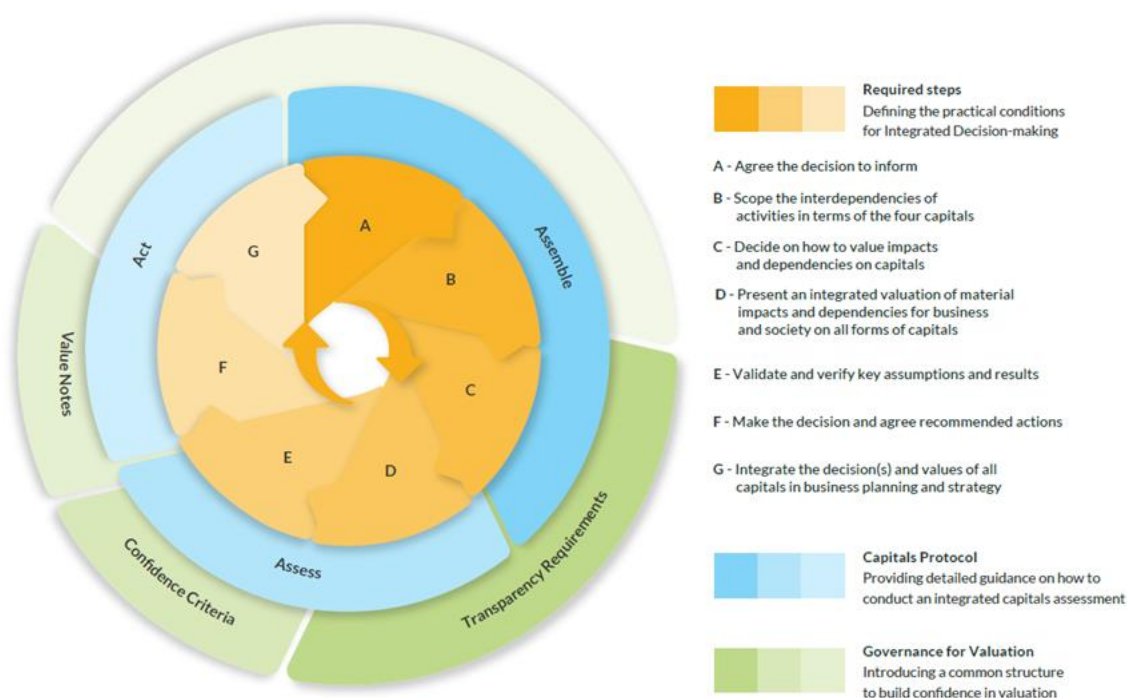


Figure A.2 - Links between the Capitals Protocol and the Governance for Valuation. *Source: Governance for Valuation, Capital Coalition, 2024.*

7.1.2.2 Does a private sector “capitals assessment” have the same purpose as a public sector ecosystem service assessment”?

The difference is mainly one of different boundaries: integrated capitals assessment looks at (i) **impacts** of operations and (ii) **dependencies** in the value chain from the perspective of the company. The impacts and dependencies on natural capital are for all intents and purposes ecosystem service assessments. However, in the public decision-support context ES assessment is usually of actors impacts on ecosystems and their services. The public sector seldom regulate private actors’ exposure to risks from loss of ecosystem services in their value chains. In summary, for impacts the purposes of public policy and private project cycles are quite aligned.

There are similarities between the decision-making processes of the public policy cycle, the typical business decision-making process (Roobeek et al, 2023; Hilton & Platt, 2015) and the Capitals Protocol. See **Table A.4** below for a cross-walk . In table 2 we have merged these steps with “applications of capitals assessment” from [Governance for Valuation](#), Capitals Coalition.

Table A.4 - Table Cross-walk of decision-making steps and purposes for ES assessment in a capital assessment. *Source: derived from Roobeek et al, 2023; Hilton & Platt, 2015 and Capitals Coalition, 2024*

Capitals protocol integrated decision-making steps	Business decision-making steps	Examples of purposes for capitals assessments in Governance for Valuation
Assemble	1. Agenda setting Agree on the decisions to inform	To understand key impacts and dependencies, and associated risks and opportunities to prioritize management actions. To identify and evaluate potential investment opportunities. To determine the total holistic value of an asset / land holding
	2. Gathering information Scope the interdependence of activities in terms of four capitals	



	3. Identifying alternatives and decide how to value impacts and dependencies of decisions on capitals	To inform the setting of ambitious targets & actions. (at the company, product or project level);
Assess	4. Assessing the options Integrated valuation of material impacts and dependencies for business and society for all forms of capital Validate and verify key assumptions and results	To determine whether something is contributing towards net zero or net positive (e.g., nature positive, or water positive). To establish an appropriate amount of ecological restoration and compensation.
	5. Choosing an option Make the decision and agree on actions	To compare multiple options (e.g., investment options) to optimise between trade-offs between capitals and values and decide on a preferred option. To prioritise items from a long list (e.g., high-risk sites / products / activities).
Act	6. Take action Integrate the decision and values of all capitals in business planning and strategy	To facilitate transformation as to the way companies and stakeholders operate.
(Report) Transparency requirements Confidence criteria Value Notes	7. Evaluation and reviewing and reporting your decisions	To generate a range of outputs informing internal and / or external stakeholders of the approach and results of the above applications. To prioritise or contextualise information for non-financial (sustainability) reporting. To report on the impact of a project or series of projects, e.g., to investors in the organisation's green, social or sustainability bonds. To help inform and / or educate staff internally to transform behaviours and inform strategy.



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What would you like to know more about?

[Social benefits in ecosystem service assessments](#)

[Health benefits in ecosystem service assessments](#)

[Economic valuation in ecosystem service assessments](#)

[Condition and capacity in ecosystem service assessments](#)

[Spatial and temporal characteristics in ecosystem service assessments](#)

[Uncertainty characteristics in ecosystem service assessments](#)

7.2.1 Social benefits in ecosystem service assessments

7.2.1.1 General information

This section offers an overview of key concepts, definitions, and background information for integrating social benefit considerations into ecosystem service assessments. Social aspects are central to understanding how ecosystem services are distributed, accessed, and valued by various social groups. Moreover, this integration is vital to ensure that ecosystem service assessments reflect the lived experiences of all communities, focusing on who benefits and who is excluded.

1. What are social benefits?

In this document, social benefits (**Figure A.3**) derived from ecosystem services encompass improvements in health, quality of life, economic stability, and cultural identity, among many others (Schmidt et al., 2016). These benefits can range from direct, material advantages (such as access to water or food) to more intangible values (such as spiritual or cultural connections to nature) (Chan et al., 2012). However, these benefits are often unequally distributed, with certain groups facing barriers to access or being entirely excluded from the advantages of ecosystem services altogether (Selmi et al., 2021).

2. Why are social benefits important?

Understanding the social dimensions of ecosystem services involves recognising how different social groups connect with different ecosystem types and the services they provide. This includes how people rely on ecosystem services for their livelihoods, cultural practices, and overall well-being. The sociodemographic context (such as age, gender, income, and ethnicity, etc) is critical in shaping how individuals interact with ecosystems and which services they benefit from (Calderon-Argelich et al., 2021). For instance, women, youth, and Indigenous communities often experience different access rights or legal entitlements compared to other groups (Basu et al., 2021; Satyal et al., 2016). This disparity can be exacerbated by historical injustices and unequal power dynamics that must be carefully examined to prevent the perpetuation of harms.

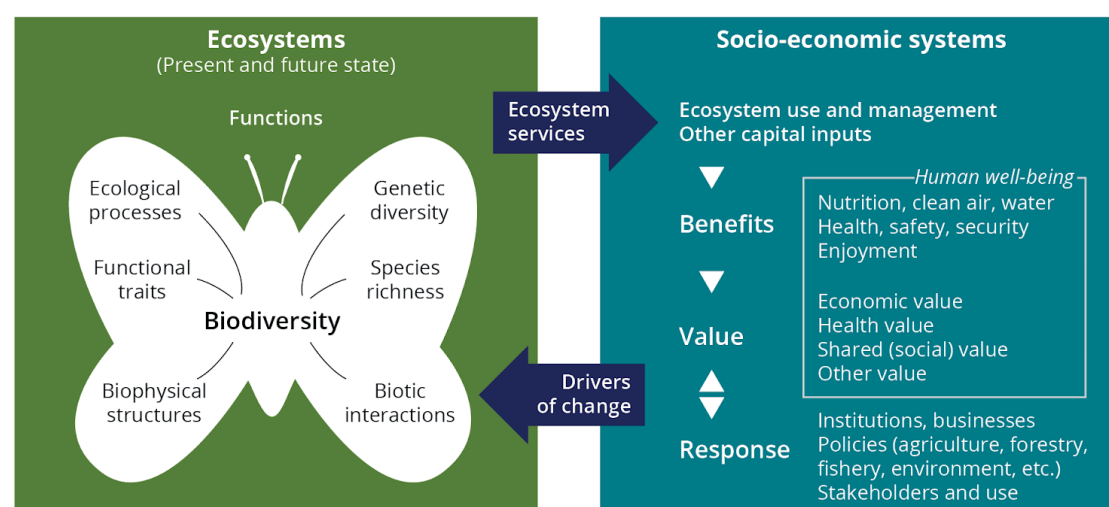


Figure A.3- Conceptual framework of the relationship between ecosystems, ecosystem services and social benefits. Source: MAES et al., 2014



While social benefits are important, ensuring justice in ecosystem service assessments (**Figure A.4**) requires more than simply identifying the distribution of benefits (Loos et al., 2022). It also entails making sure that the assessment process is inclusive and equitable. This involves addressing questions such as who has the right to participate, whose values are recognised, and whether the distribution of benefits and burdens is fair (Kato-Huerta & Geneletti, 2022).

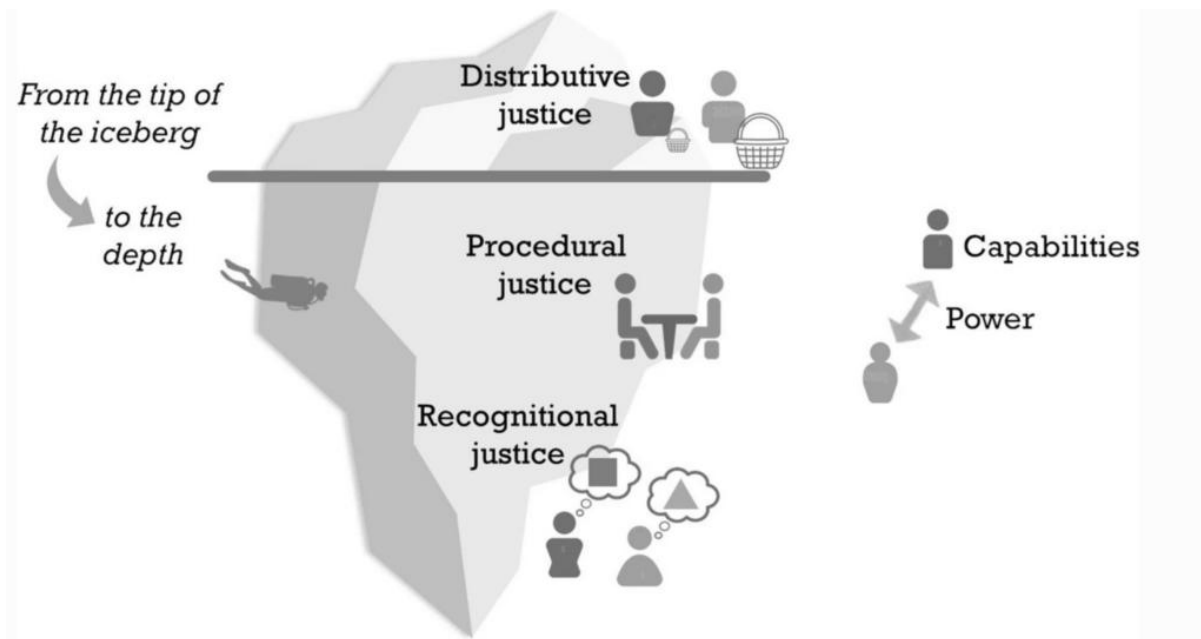


Figure A.4 - The “iceberg” of the Justice dimension in ecosystem service assessment and management. According to Loos et al., (2022) the Justice dimensions in ecosystem service assessments and management can be visualised as an iceberg. Instead of focusing solely on the visible, distributive aspects, the authors emphasized the importance of delving deeper into the social-ecological system to uncover and appreciate the diverse values, knowledge systems, capabilities, and power dynamics that shape decision-making processes around ecosystem services."

3. How does the advanced content complement the Terms of Reference templates?

The advanced questions in this document complement the original questions posed in SELINA's Terms of Reference (ToR). These advanced questions help commissioners delve deeper into the social dimension of ecosystem service assessments, considering not only who benefits but also who may be excluded, whose voices are heard, and how their needs, values, and perspectives are represented. By integrating these considerations from the beginning, commissioners can ensure that the assessment is not only scientifically and technically sound but also socially robust, inclusive, and aligned with principles of equity and justice.



7.2.1.2 Social benefits in Framing and Scoping for an ecosystem service assessment

The framing and scoping phase establishes the foundation for the entire ecosystem service assessment. This phase involves key decisions regarding what will be studied, whose perspectives will be considered, and the expected impact of the assessment. If equity and justice are not explicitly addressed at this stage, they will unlikely emerge significantly in later phases.

This section presents a series of advanced questions that expand upon the SELINA ToR Frame and Scope template, helping commissioners integrate social benefit relevance and inclusivity from the early stages. As such, these questions invite commissioners to reflect on:

- Whether historically underrepresented groups (such as informal land users, ethnic minorities, youth etc) ought to be included, and
- Whether social benefits and equity goals are explicitly stated in the assessment's purpose.

When used thoughtfully, the questions can enhance the fairness, credibility, and usefulness of the assessment for everyone whose outcomes may be impacted.

Should the identification of key stakeholders include under-represented or non-institutional groups?

Description: Many assessments primarily involve visible, formal stakeholders such as government agencies. This approach can overlook critical perspectives from groups that depend on ecosystem services yet receive little formal recognition.

Example: The assessment could explore how different groups may have unequal capacities to participate in or influence decisions related to ecosystem services. This might include identifying where certain groups require additional support to engage meaningfully, or where others may dominate due to their institutional or political advantages.

Should the assessment analyse how the social and demographic context may influence or constrain access to ecosystem services?

Description: A list of demographic characteristics of the population relevant to the assessment (e.g. age, income, ethnicity) is a good starting point, but potentially not enough to understand how different people interact with their ecosystems. What matters is how those characteristics shape opportunities, risks, and barriers related to ecosystem services. This question helps ensure that the assessment includes a detailed, contextual social analysis that informs decision-making.

Example: Stakeholder engagement strategies could be adapted to reflect the capacities, interests, and roles of different groups. This may involve a deeper level of involvement for those directly affected by decisions, and a lighter level of engagement for those with advisory or supportive roles.



Should equity and social benefit goals be a core part of the assessment's purpose?

Description: Without clearly defining equity goals from the beginning, it is unlikely that methods and outputs will align with social justice outcomes. This question ensures that the assessment describes ecosystems and works towards fairer outcomes for various groups, particularly those historically excluded from the benefits they provide.

Example: The framing of the assessment could include an explicit aim to support more equitable access to the benefits ecosystems provide. This may involve identifying groups that are currently underrepresented in planning or who receive fewer benefits, and ensuring the assessment provides insights that help address these disparities. Integrating equity goals early on also increases the likelihood that future decisions based on the assessment will be fair, inclusive, and socially relevant.



7.2.1.3 Social benefits in designing the Methodology of an ecosystem service assessment

An ecosystem service assessment methodology involves more than just a technical framework. It forms the foundation determining whose realities are captured, whose values are recognised, and whose needs are ultimately addressed in the results. When social dimensions are poorly integrated into the methodological design, the assessments risk misrepresenting reality, excluding marginalised voices, or reinforcing existing inequities.

This section offers commissioners a series of advanced questions designed to integrate broader social and justice considerations into the methodological framework of an ecosystem service assessment. These questions build on the ones already posed in the SELINA ToR Methodology template by highlighting issues frequently overlooked in standard designs, such as:

- Whether power dynamics and barriers to participation are recognised in stakeholder analysis
- How different groups should be engaged at various levels of the process,
- How data are disaggregated (and whether they reflect overlapping vulnerabilities),
- Whether the full range of cultural, spiritual, and relational values is captured using appropriate methods,
- How trade-offs between ecosystem services affect different social groups
- How the long-term impacts of decisions are evaluated across generations.

Should the stakeholder analysis assess power, influence, and vulnerability differences among social groups?

Description: General stakeholder consultation risks being too broad, potentially resulting in box-ticking rather than meaningful input. Some groups may require more intensive support, translation, or safe spaces to engage effectively, while others may already possess strong decision-making structures. This question ensures that engagement strategies are equitable, responsive, and tailored to the realities of different population groups relevant to the assessment process.

Example: The assessment could explore how different groups may have unequal capacities to participate in or influence decisions related to ecosystem services. This might include identifying where certain groups require additional support to engage meaningfully, or where others may dominate due to their institutional or political advantages.

Should stakeholder engagement be tailored to different levels of involvement (e.g., inform, consult, co-design), depending on group context?

Description: General stakeholder consultation risks being too broad, potentially resulting in box-ticking rather than meaningful input. Some groups may require more intensive support, translation, or safe spaces to engage effectively, while others may already possess strong decision-making structures. This question ensures that engagement strategies are equitable, responsive, and tailored to the realities of different groups relevant to the assessment process.



Example: The assessment could differentiate how stakeholders are involved based on their relationship to the ecosystem services, their capacity to participate, and their level of influence or vulnerability. For instance, communities that are directly and heavily impacted by ecosystem management decisions might be engaged more intensively, through co-design processes or regular dialogue. In contrast, groups with more indirect stakes may be engaged primarily through consultations or information sharing. Tailoring engagement in this way helps ensure that those most affected by the outcomes are meaningfully involved and that engagement efforts are efficient and proportionate to the roles of stakeholders.

Should the ecosystem service assessment address intersecting forms of disadvantage when disaggregating results?

Description: Disaggregation is essential for uncovering who benefits from and who is excluded from ecosystem services. However, standard disaggregation by a single category (e.g., gender or income) can mask more complex issues. For example, people's experiences are shaped by overlapping disadvantages that interact in complex ways. This question aims to capture these intersecting inequalities as addressing this complexity leads to more accurate, fair, and actionable assessments.

Example: The assessment could consider how multiple, overlapping factors, such as gender, income, ethnicity, disability status, or geographic location, interact to shape people's ability to access, use, or benefit from ecosystem services. Rather than analysing one dimension at a time, this approach can uncover how certain combinations of disadvantage may amplify exclusion or vulnerability. Including intersectional analysis can help decision-makers better understand who is most at risk and tailor responses accordingly.

Should the assessment include culturally appropriate methods for eliciting diverse values?

Description: Standard data collection methods may not fully capture the diverse values people associate with ecosystem services, particularly cultural, spiritual, and relational values. Indigenous, rural, or marginalised communities often hold these values, which may not be expressed in conventional terms. Addressing this question could help ensure that the assessment provides respectful, representative results rooted in the lived experiences of the population groups involved or affected by the assessment.

Example: The assessment might use methods that are responsive to different ways of expressing value, particularly when dealing with services that are spiritual, symbolic or identity-related. For example, participatory tools, storytelling, or visual methods may be more effective in capturing these non-material values than surveys or economic metrics. This approach ensures that the perspectives of targeted populations with culturally specific relationships to ecosystems are respectfully and accurately represented in the results.

Should the ecosystem service assessment evaluate trade-offs between different social benefits that ecosystem services provide?

Description: Decisions regarding the management and use of ecosystem services risk benefiting some groups while disadvantaging others. For example, improving access to one type of benefit may lead to reduced access to another. Without assessing how trade-offs play out across different social groups, there's a risk of reinforcing existing inequalities or



introducing new forms of exclusion. This question encourages the assessment to be transparent about who wins, who loses, and what can be done to address potential imbalances.

Example: The assessment could explore how actions to enhance certain ecosystem services may unintentionally reduce access to other services, or shift benefits away from one group toward another. For instance, increasing recreation access may lead to restrictions on resource extraction, or a conservation measure might limit land access for traditional users. Identifying these trade-offs in advance enables more transparent decision-making and supports the development of strategies to mitigate harm or redistribute benefits fairly.

Should the assessment consider intergenerational equity and change over time?

Description: Today's decisions regarding the use and management of ecosystem services influence future access to services, both for marginalised groups and future generations (Golub et al., 2011). Without a long-term perspective, assessments may prioritise short-term gains at the expense of long-term equity. This question aims to provide results sensitive to temporal dynamics and considers the need to maintain fair access over time.

Example: The assessment could examine how current ecosystem service use and management decisions may influence the ability of future generations to access those same services. This includes reflecting on whether current benefits are being achieved at the cost of future supply, and whether today's resource use is adaptable to future environmental or social change. Considering intergenerational fairness helps ensure that long-term impacts, especially for young people and future communities, are not overlooked in favour of short-term gains.

Should the results of the ecosystem assessment evaluate the capacity of mitigation, adaptation, and resilience of the most vulnerable social groups to changes in supply and access to ecosystem service(s) or condition?

Description: Ecosystem service assessments should go beyond simply identifying which groups benefit from services. It is crucial to evaluate how vulnerable or marginalised groups can mitigate the impacts of changes in ecosystem services or adapt to shifts in availability due to environmental changes or management decisions. Understanding this resilience capacity can guide decisions on how to enhance their ability to cope with disruptions in service supply or access.

Example: The assessment might analyse whether vulnerable or marginalised groups have the resources, knowledge or institutional support needed to adapt to changes in ecosystem services, including reduced supply, degraded condition or restricted access. Highlighting these dynamics can guide interventions aimed at reducing risk, building adaptive capacity, and supporting long-term social resilience in the face of ecosystem change.



7.2.1.4 Social benefits in evaluating a proposal for an ecosystem service assessment

This section assists commissioners in assessing whether proposals effectively address the social dimensions of ecosystem service evaluations. The aim is not merely to verify the inclusion of social aspects but to examine how they are framed, what methods are proposed for engaging with them, and what these choices indicate about the assessment's credibility, fairness, and usefulness. The questions extend beyond those in the Evaluation Criteria ToR template, helping to uncover more nuanced strengths or gaps in the handling of social considerations.

Recognising that detailed research may not be feasible at the proposal stage, it remains important for applicants to demonstrate a basic awareness of key social factors that could influence the assessment's relevance and design. Proposals might only outline broad intentions or summarise planned approaches; in such instances, commissioners are encouraged to follow up during negotiations to clarify or expand on these aspects.

In addition to identifying what is included or missing, this section invites commissioners to consider how the proposal's framing of social issues could influence the outcomes of decision-making. Each question is paired with an explanation and example to encourage thoughtful review and ensure that assessments are not only technically sound but also socially responsive and inclusive.

Does the proposal demonstrate a clear understanding of the social context of the assessment area?

Description: A proposal should demonstrate awareness of the social dynamics in the area where the assessment will take place. This includes identifying who uses and depends on ecosystem services, how different groups interact with the landscape, and the historical, economic, or cultural contexts that shape those relationships.

While detailed research is not expected at the proposal stage, potential contractors should demonstrate a basic understanding of the key social factors likely to influence the assessment's relevance and design. At the proposal stage, applicants might only present a broad summary of what will be used. In that case, it would be helpful for the commissioners to follow up and ask for more details during the negotiation phase.

Example: The proposal could identify different social groups who use local ecosystem services, recognising that their needs and values may vary. The proposal could also note that further work will be needed during the assessment to confirm these differences and understand how they might affect the study's design and results.



Does the proposal justify the choice of social indicators and data types used to assess social benefits?

Description: Proposals should explain why specific social indicators or data types are chosen (e.g. whether they aim to reflect ecosystem services availability or access, perception, dependency, etc) and how these relate to the assessment's objectives. Indicators must be meaningful within the context of the ecosystem services being studied and relevant to the population under study.

At the proposal stage, applicants might only present a broad summary of what will be used. In that case, it would be helpful for the commissioners to follow up and ask for more details during the negotiation phase.

Example: If a proposal includes only standardised socio-economic indicators (e.g., income levels or education) without justifying their relevance or mentioning locally meaningful values (e.g., recreation use, spiritual ties), it may fail to reflect what matters most to people on the ground.

Does the proposal show how it will analyse and interpret social data to inform decision-making?

Description: This question entails that an assessment should not only focus on collecting social data but also on how such data will be used. A strong proposal should clearly explain how findings on social values, perceptions, or dependencies will inform conclusions and decision-making processes. It should also clarify how social data will be synthesised with biophysical or economic information. At the proposal stage, applicants might only present a broad summary of what will be used. In that case, it would be helpful for the commissioners to follow up and ask for more details during the negotiation phase.

Example: If the proposal collects community preferences but fails to describe how those preferences will inform the final recommendations, there is a risk of symbolic inclusion with little actual influence on outcomes.

Does the proposal include a plan for returning results to targeted communities and stakeholders?

Description: Proposals should clearly explain how they plan to share findings with those who provided data or will be impacted by the assessment. This includes the formats (e.g., community presentations, summary leaflets, translated materials) that will be used, as well as the methods for conducting follow-up engagement. Sharing results transparently strengthens accountability, trust, and local relevance. It also ensures findings are validated, potentially corrected, and used in meaningful ways by targeted populations.

Example: A proposal that plans to publish only in academic journals or policy briefs may limit access to findings for targeted groups. This can undermine the legitimacy of the assessment and reduce its long-term usefulness in local decision-making.



7.2.1.5 Social benefits in evaluating the outcomes of a study after completion

Once an ecosystem service assessment has been completed, it is essential to evaluate not only the technical quality of the outputs but also the extent to which the social dimensions were meaningfully addressed. While Section 4 focused on assessing how well a proposal plans for the inclusion of socially relevant outputs, Section 5 guides commissioners in reviewing whether those intentions translated into credible, equitable, and useful outcomes.

Does the proposal's outcomes reflect the social goals/objectives made in the original proposal or Terms of Reference?

Description: A key way to evaluate the credibility of an assessment is to compare its outcomes to its stated goals. If the proposal or ToR included commitments to equity, disaggregation, or participatory engagement, the final results should reflect those intentions. Commissioners should assess whether the work delivered met expectations, and if not, whether any limitations were transparently explained.

Example: If key social aspects that were prioritised early on are absent from the final report or appear underdeveloped, social goals were not fully integrated during implementation, or there were unaddressed constraints in the process.

Does the proposal's outcomes meaningfully apply its understanding of the social context when interpreting and presenting results?

Description: A well-executed assessment should not only describe the social context but also use it to shape how findings are analysed, explained, and communicated. This includes demonstrating how local realities influenced the interpretation of the results. It also requires transparency about any limitations in the data or understanding, as well as how these may affect the conclusions drawn. Acknowledge this helps ensure that the assessment results are credible and usable, especially for decisions that could have a direct impact on the targeted population.

Example: The final assessment should show that the social context was meaningfully considered. For example, it may reflect on how different groups interpret or are affected by the findings, and explain any assumptions or data limitations. This helps decision-makers understand who could be most impacted by proposed actions and where additional care, adaptation, or support may be needed when using the results to shape policies or interventions.

Have the methodological process and its limitations been clearly described and documented in the final assessment?

Description: A clear documentation of methods and the limitations inherent to them is critical for assessing the reliability and usability of results, especially in the context of social benefit assessment, where indicators are often context-dependent. This includes describing how social data were collected, why specific metrics and indicators were chosen, and what uncertainties, biases, or constraints may affect the interpretation of the findings. This question is also closely linked to the broader issue of uncertainty in assessing ecosystem services. Commissioners may review the Uncertainty Detailed Guidance Document when



interpreting how methodological limitations could affect the confidence in socially relevant findings.

Example: If the assessment provides results on social benefits but does not explain how those results were produced and what their limitations are, it may give a false sense of completeness or confidence. This can impact how results are interpreted and incorporated in decision-making, and potentially reduce their usefulness or legitimacy.

Are the social findings presented in a way that is accessible, relevant, and actionable for decision-makers and targeted populations?

Description: Even if social data were collected and analysed accordingly, poor presentation can make them unusable. Commissioners should assess whether findings are communicated effectively, whether they inform real-world decisions, and whether they are presented in formats that the target assessment population can access and engage with. This includes visual clarity, language accessibility, and the use of narratives or case examples alongside statistics, maps, and other visual aids.

Example: If social data are difficult to interpret, not connected to recommendations, or not shared in formats suited for a range of audiences, the assessment's usefulness and credibility may be diminished, even if the analysis itself is robust.



7.2.1.6 Glossary of relevant terms for understanding social benefits in the context of an ecosystem service assessment

Term	Definition
Social Benefits (concerning ecosystem services)	Positive impacts of ecosystem services on people's lives, including well-being and quality of life.
Social Groups	Groups defined by shared characteristics such as gender, age, income, or livelihood, etc, that influence how they relate to ecosystems.
Disaggregation	Breaking down data by social categories to reveal differences in access to or benefits from ecosystem services.
Intersectionality	Understanding how overlapping social identities create unique experiences of advantage or disadvantage.
Equity	Fairness in the distribution of benefits, burdens, and decision-making power among different social groups.
Justice (Environmental or Social)	Includes fairness in outcomes, processes, and recognition of different rights and values in environmental contexts.
Participatory Methods	Approaches that actively involve stakeholders in the design, implementation, or interpretation of assessments.
Cultural Values	Non-material values like identity, heritage, and spiritual meaning that are derived from ecosystems.
Access to ecosystem services	The ability of people to use or benefit from ecosystem services, influenced by rights, norms, or infrastructure. The perception of access to ecosystem services can also be subjective
Availability of ecosystem services	The actual presence or provision of ecosystem services in a specific area or at a particular time.
Dependency	The degree to which people or communities rely on specific ecosystem services for their livelihoods, health, or well-being.
Resilience	The ability of communities or systems to adapt to and recover from changes in ecosystem services.
Recognition	Acknowledging and respecting the rights, values, and knowledge systems of all social groups, particularly marginalised or Indigenous communities.



Term	Definition
Procedural Justice	Fairness in the decision-making process, ensuring that all targeted groups have the opportunity to participate meaningfully.
Distributive Justice	Fair distribution of the benefits and burdens resulting from ecosystem management or environmental decisions.
Feedback Mechanism	A structured process to gather, assess, and respond to input from stakeholders after the delivery of results or during project phases.



7.2.1.7 References and suggested literature

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7.2.2 Health benefits in ecosystem service assessments

7.2.2.1 General information

The Terms of Reference (ToR) guidelines relating to health in this document aim to help commissioners determine whether it is important for them to include health within the scope of their ecosystem service assessment, and to decide how such health-related assessments should be focused; these decisions will in turn inform the selection and engagement of stakeholders and the kinds of scientific information, indicators, metrics and outputs which may be most relevant.

However, health is a broad and complex subject and understanding how it relates to the biophysical components and condition of ecosystems, their extent, other ecosystem services and various management options, or the degree to which spatial and temporal scales should be considered, can seem daunting. Unfortunately, conceptual frameworks for understanding ecosystem services have often approached health in relatively imprecise or ambiguous ways, for example placing health as an ill-defined or limited concept in the realm of cultural ecosystem services and overlooking not only the primary importance of health as a component of well-being but also failing to address the multiple and complex ways in which ecosystems and health are intertwined, and how such interlinkages are influenced by social, cultural and economic factors. This has not helped the uptake of health issues within ecosystem service assessments, and furthermore has hindered the mainstreaming of ecosystem service approaches into the health sector.

To provide further support to commissioners in overcoming some of the major barriers to uptake, this section offers an overview of key concepts, definitions, and background information for integrating health considerations into ecosystem service assessments. It also provides some more advanced content which a commissioning entity for an ecosystem service assessment may wish to consider in order to ensure that an assessment of the linkages between ecosystems services and health appropriately consider the range of issues and mediating factors which may be most relevant in their particular thematic, geographic or policy context(s).

1. What is health?

The primary focus of “health” in this section is human health; the health of ecosystems is broadly synonymous with ecosystem condition, and therefore not considered directly here. However, ecosystem health, the health of humans, and the health of plants, animals and other biota are intimately connected, and ecosystem service assessments can be employed to explore any or all of these dimensions; for further information, see “Using the One Health approach”, below.

The Constitution of the World Health Organisation (WHO, 1948), defines health as “a state of complete physical, mental and social well-being, and not merely an absence of disease or infirmity”. This definition was ground-breaking and of great significance at the time by its inclusion of mental health issues, and by recognising the important influence which society has (including through social relationships, community connections and cultural practices) on the health of individuals, families, and communities. However, this definition is often considered inadequate in a modern context, when the existence and persistence of multiple



environmental, social and psychological stressors on a majority of the world's population makes the notion of a state of complete well-being seem somewhat unobtainable. Furthermore, under the WHO definition, many in society who suffer from long-term illness might be considered to be unhealthy, even though they may otherwise lead happy, productive and fulfilling lives. In recent years a broader concept of "positive health" has been put forward, with a greater focus on the capacities of individuals to overcome health problems and return to active life. This has important parallels in the concept of ecosystem health, with its focus on resistance and resilience, and the capacity of ecosystems to withstand and recover from disturbance.

This broader view of health is useful in the context of understanding and assessing the role which ecosystem services play in shaping our health. It offers a conceptual framework wherein we can recognise not only the direct ways which ecosystems support health – *e.g.* by providing medicinal resources, nutritious food, or spaces for restorative recreation – but their importance as the broader settings within which healthful, active lives can be led – *e.g.* by sustaining cultural diversity, and by supporting social connections and cohesive communities.

For the purposes of this document, a health benefit from an ecosystem services is defined as "an advantage derived from biodiversity or an ecosystem service(s) which promotes, sustains or enhances physical, mental and / or social well-being for individuals, communities or groups of people, including via the provision of settings and resources for the prevention or treatment of ill-health, for enhancing health outcomes, for addressing or reducing health risks, and / or by promoting the attributes of resistance and resilience to health threats." This definition takes a very anthropocentric viewpoint, in line with the framing of ecosystem services as "Nature's contribution to people", but commissioners are reminded that human health in an ecosystem service assessment is always explored in the context of the health of ecosystems and of other species.

2. The determinants of health

The health of an individual, community or broader population is affected by a range of social, economic, environmental, cultural and biological factors, broadly referred to as the determinants of health or of health outcomes.

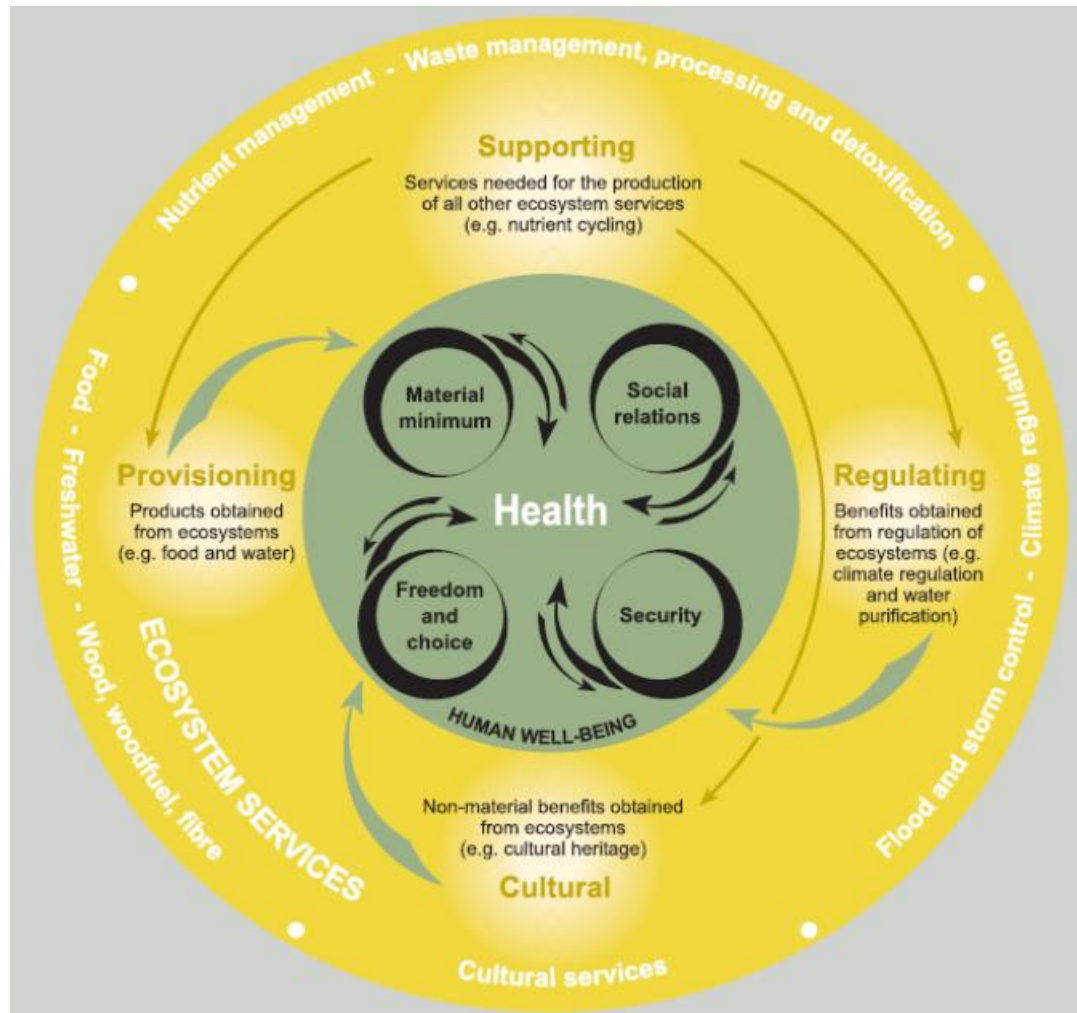


Figure A.5 - Conceptual framework for the links between ecosystem services and health from the Millennium Ecosystem Assessment. Source: WHO, 2005.

Some indicative examples of these determinants are included in **Table A.5** below. These determinants can act in complementary, synergistic, additive, cumulative or contradictory ways. For example, in a society with a high degree of social cohesion and a sense of collective self-interest, and which promotes outdoor activities such as hiking in nature, one may expect that several key indicators of mental and physical fitness would trend positive across the general population. However, people whose economic circumstances force them to live in substandard housing or in urban areas with relatively high levels of air pollution, may experience worse health outcomes relative to the broader population. In other words, the interplay between social, economic, and environmental factors is not straightforward and should never be assumed to be uniform across any population.

For commissioners of ecosystem service assessments, this simply requires that the social, economic and demographic contexts of the population relevant to the ecosystem service assessment are taken into account – often a prerequisite for ensuring that any ecosystem service assessment is designed, conducted, reported and / or communicated in a just and equitable manner. Indeed, noting the importance of social well-being as a key component of health, it is important to recognise that health aspects are closely related to social aspects, and often constitute a core element of assessments of the contribution of ecosystem services to society in general, or to specific populations, social groups, or communities. This will be particularly important if it is intended that the results of an assessment should be of value to the health sector, or to exploring potential relevance of ecosystems services to health policies, since issues of health equity and health inequality are a significant and growing concern for the health sciences, planners and practitioners.

Table A.5 - Examples of key determinants of health outcomes.

Type of determinant of health	Examples
Biological	Genetic predispositions, age, sex
Social	Social connections, familial relationships, community cohesion
Economic	Education attained, income level, employment status and type of employment
Environmental	Access to safe and nutritious food, air and water quality, the built environment, access to green and blue spaces
Behavioural	Smoking, exercising, diet, alcohol or illicit drug use
Cultural	Cultural norms, profile of / engagement in arts and heritage pursuits, sense of place and identity, environmental values

Therefore, if health aspects are to be included in an ecosystem service assessment it is strongly recommended that the inclusion of social aspects is given careful consideration. Social aspects are not covered in this section except where additional context is deemed useful, and readers are advised to review the relevant questions on social aspects in the main text and the related advanced content section.

3. Why are health benefits important?

Health interacts with and affects many other aspects of well-being – such as one’s ability to work and socialise, to participate in family life, and be an active part of the community. As such, in many cases it may be singled out as the most crucial element of well-being. Health is also an important component in self-reported assessments of well-being, and an important consideration in determinations of quality of life (WHOQOL, 1994, Skevington 2009). From an economic perspective, investments in health and healthcare account for a significant amount of public expenditure at regional, national and local levels, with an EU average investment equivalent to approximately 11% of GDP and 20% of gross national budgets, as well as being



a key area of household expenditure for individuals and families. Furthermore, the health sector directly or indirectly encompasses a broad diversity of scientific disciplines, policy sectors and areas of economic activity; as such, the health sector may be seen as an important instrument of economic policy (Jagrič et al., 2020). Health is recognised as a significant component of well-being and sustainability, influencing individual and societal metrics on quality of life, lived experience, personal development and social interaction (e.g., Ruggeri et al., 2020) and therefore should factor explicitly in assessments of nature's contribution to people.

4. Using the One Health approach

The growing body of research evidence on the links between biodiversity and health as given rise to several cross-cutting disciplines and initiatives over the past 25 years, including conservation medicine, ecohealth, healthcare without harm, and One Health (all of which have much in common). Perhaps the most well-known and widely utilised is One Health, a concept which is recognised in the context of multilateral environmental agreements including the UN Convention on Biological Diversity, and is referenced in the preamble to the 2022 Global Biodiversity Framework as a key consideration for its implementation.

In essence, the One Health concept recognises that the health of humans, animals, plants and ecosystems are intimately interconnected in multiple ways, and that efforts to address challenges for one dimension of health without accounting for the influence of others will frequently prove ineffective in the long term. Recent experience of the Covid-19 pandemic has provided clear examples of the connections between the health of the environment, human health and the health of other species (IPBES, 2020), leading to the inclusion of the One Health approach as a key element of the Pandemic Agreement adopted by the World Health Assembly in May 2025. **Figure A.6** below provides a useful illustration of how impacts on the health of ecosystems can impact on human health.

While the focus of most ecosystem service assessments will be on human health, commissioners should recognise that this will often require consideration of how the sustainability of health-related ecosystem services relate to ecosystem condition, and how changes in the health of animal or plant populations may also impact human health. For example, habitat loss may be a driver for increased interactions between wildlife and livestock, leading to increased risk of veterinary diseases in domesticated animals, with a risk of spillover into human populations. Therefore, when setting out the frame and the scope of the assessment, commissioners should decide the degree to which the health of non-human biota should be included.



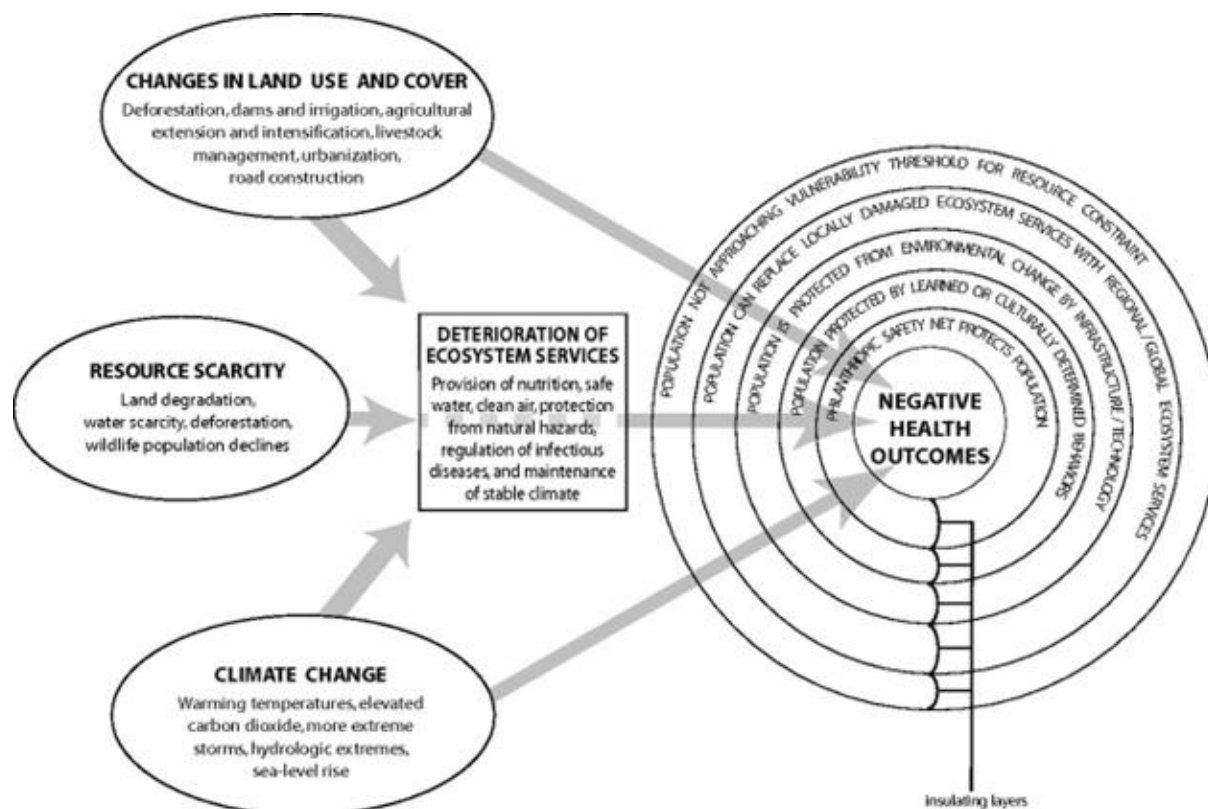


Figure A.6 - Schematic of relationships between ecosystem change and human health.
Source: Myers et al., 2013

5. How does the advanced content complement the Terms of Reference templates?

The advanced questions in this document complement the original questions posed in SELINA's Terms of Reference (ToR). These advanced questions help commissioners better understand and explore the health dimension of ecosystem service assessments. Again, it is strongly advised that commissioners seeking to incorporate health dimensions into their ecosystem service assessments also take social dimensions into account, in order to ensure that the core issues surrounding health equity and justice are built into the assessment framework from the beginning.



7.2.2.2 Health in Framing and Scoping for an ecosystem service assessment

The framing and scoping phase establishes the foundation for the entire ecosystem service assessment. This involves key decisions regarding what dimensions of health will be considered, which will inform the design and selection of assessment methods, indicators and metrics, stakeholder engagement, and report outputs.

At this stage, there are three key points to consider when seeking to include the health dimension:

1. What dimensions of health will be studied – e.g. is the focus to be only on human health, or also animal health (e.g. livestock or other domesticated animals, and / or wildlife), plant health (e.g. food crops or other domesticated plant species, and / or wild flora)
2. The extent to which the health scope will be related to the health of wider ecosystems (i.e. ecosystem condition) through a One Health approach
3. Whether and to what extent social dimensions will also be included in the assessment, with particular consideration to be given to dimensions of justice

From a health perspective, including social considerations is important in order to account for the social, economic and cultural determinants of health. It recognises that different communities or groups within society can have distinct relationships with their local biodiversity resources and ecosystem services, and that their perspectives on the local environment, including their store of traditional ecological knowledge, can often be a key factor in the relationships between ecosystems and their health.

As stated in the advanced questions for social aspects, if issues of equity and justice are not explicitly addressed at this stage, they will unlikely emerge significantly in later phases. Excluding such considerations from the assessment will significantly limit the value of the outputs, and reduce their relevance to actors working with the health sciences or the wider health sector. Commissioners should refer to that section and related questions in the ToR when considering health during the framing and scoping phase of the assessment.



7.2.2.3 Health in designing the Methodology of an ecosystem service assessment

This section offers commissioners a series of advanced questions designed to help integrate more detailed health considerations into the methodological framework of an ecosystem service assessment.

A key consideration will be whether the assessment will consider the potential **health benefits** from ecosystem services (i.e. the ways in which ecosystems can support health, such as “urban parks provide opportunities for physical activity”), or the potential **health risks** posed by ecosystems or ecosystem change (i.e. the potential disservices to health arising from ecosystems, or the ways that loss of ecosystem services could negatively impact health, such as “loss of peatland ecosystems may increase threats of floods or reduce water quality”), or **health outcomes** (i.e. the actual measured changes to population health related to the availability and use of ecosystem services, often related to a specific geographic and / or temporal scale, such as “increasing access to woodland ecosystems for recreation lead to a measured reduction in mental health referrals in a specific community over a specific period of time”).

As with the framing and scoping phase, it is strongly recommended that the commissioners review and incorporate the social aspects of an ecosystem service assessment alongside the health aspects. This will ensure that the appropriate stakeholders are engaged, that the health needs, challenges and perspectives of all relevant groups are accounted for, that the often unique health challenges of vulnerable groups are considered, that the relevant metrics and indicators are identified, and ultimately that the reporting of health linkages are robust enough to inform decision-making.

Should the assessment account for confounding factors which affect or mediate the relationships between ecosystems and health?

Description: Drawing direct linkages between ecosystem services and health – particularly health outcomes – risks oversimplification and can lead to inaccuracies which can impact the reliability or efficacy of any ecosystem-based approaches (or nature-based solution) to health challenges. If the results of the assessment are to be used to inform health policy or guide development of health interventions, then the role of other determinants of health – *e.g.* social, cultural, economic, and wider environmental factors – should not be overlooked.

Example: The assessment could explore how (and to what extent) various health issues are influenced by social and economic factors, and the extent to which the role of ecosystem services in shaping health outcomes is mediated by those other factors. This may vary between various social groups, and in some cases the health of the most vulnerable groups may be least influenced by ecosystem services – and yet have the greatest potential to benefit from improved access to those services.



Should these linkages be assessed in the context of ecosystem condition? (association / causation / settings-based approaches / resource management)?

Description: A One Health approach may seek to determine how the health of an ecosystem may influence the sustainability and availability of ecosystem services related to health. Health stakeholders may be particularly interested to understand how ecosystem condition relates to their key priorities. For example: what level of ecosystem deterioration may represent a health risk, or what level of ecosystem restoration may present a health benefit? Will enhancing the condition of green and blue urban environments improve health outcomes for the local population? Will wetland restoration be likely to significantly reduce the risk of water-borne diseases? Will reforestation of degraded land reduce the risk of tick-borne infections?

Example: The assessment can start by identifying what particular aspects of health may be associated with the ecosystem types in question. Then, by understanding if and how those health areas may be influenced by the ecosystems in question, detailed questions about the role of specific ecosystem types and their condition can be prepared. This can be further related to the main health issues of relevance to the target human population being considered, as identified by local health authorities or practitioners, or through discussions with local communities or other stakeholders.

Should the spatial and temporal characteristics of these linkages be assessed? (epidemiology / interactions with other determinants - climate, development, demography etc.)?

Description: Ecosystems and any health risks or health benefits associated with the services they provide may be separated in space and time. For example, nutritional benefits of consuming fish harvested from marine or coastal fisheries may be important to populations far removed from those ecosystems. Conversely, the spillover of an infectious disease from wildlife to livestock or humans as a result of deforestation can have global public health implications. The commissioner may wish to decide whether and to what extent such spatial and temporal relationships might need to be considered. This generally requires some consideration of demographics, social and economic factors, and in some cases inputs from epidemiology.

Example: The assessment could first consider whether the health benefits or risks associated with ecosystem services are currently being experienced by local communities, or whether they are contingent upon some scenario of ecosystem change (perhaps a new land management strategy or restoration plan) being realised. The assessment can then consider the time frame within which the change in ecosystem services relevant to health (positively or negatively) is likely to occur, and the potential geographic range of populations who may be exposed to those benefits or risks. For example, creation of a new nature reserve open to the public for recreational purposes may attract (and benefit) visitors from a wide catchment. Creation of a new regional food brand based on local sustainable produce may yield positive impacts on local social and mental well-being in the short term, but have nutritional benefits more widely and over a longer period.



What indicators and metrics are most appropriate for the assessment, communication and / or reporting of the health aspects of ecosystem services?

Description: The choice of indicators will be informed by the specific health dimensions to be considered, including whether human, animal or plant health is to be addressed, which specific health issues might be included, and which populations or social groups are likely to be affected. It will also be dependent upon the purpose of the assessment and the intended audience – for example, health practitioners may require specific health metrics or the use of epidemiological models.

Example: The assessment might first consider the level of detail required for reporting on health benefits, risks or outcomes, the availability of relevant data, and whether existing ecological (or health) indicators can be used or adapted. For example, an assessment of the importance of pollination to dietary health may wish to consider metrics for the yields of foods from entomophilous crops, as well as the nutritional value of those crops and their contribution to local diets. Similarly, an assessment of the mental health benefits of enhancing biodiversity in urban parks may wish to consider community perspectives on the values attributed to parks and urban nature, as well as epidemiological data on mental health issues within the local population. Alternatively, an assessment of health risks posed by the spread of avian influenza by wild birds that may use a restored wetland might consider feeding, roosting, breeding and migratory patterns of water birds as well as geographic information on agroecosystems and animal health monitoring data.



7.2.2.4 Health in evaluating a proposal for an ecosystem service assessment

This section assists commissioners in assessing whether proposals effectively address the health dimensions of ecosystem service evaluations. The aim is not merely to verify the inclusion of health aspects but to examine the level of knowledge of the proposer, how health issues are identified, what methods are proposed for assessing them, and what these choices indicate about the assessment's credibility and usefulness. The questions extend beyond those in the Evaluation Criteria ToR template, helping to uncover more nuanced strengths or gaps in the handling of health aspects of the assessment.

Recognising that detailed research may not be feasible at the proposal stage, it remains important for applicants to demonstrate a basic awareness of key relationships between health and ecosystems that could influence the assessment's relevance and design. Proposals might only outline broad intentions or summarise planned approaches; in such instances, commissioners are encouraged to follow up during negotiations to clarify or expand on these aspects.

Does the proposal demonstrate a clear understanding of the relationships between ecosystems and health relevant to the assessment area?

Description: The proposal should demonstrate a clear understanding of the generalised relationships between ecosystem services and health.

While much of the details of the relationships between ecosystems and health in the research area will not be known at the proposal stage, prospective contractors should nevertheless be able to identify potential linkages and propose areas for detailed assessment or specific focus based on the parameters set out by the commissioner – e.g. from the geographic area to be assessed, major ecosystem types in the area, the policy context, and social and cultural context.

If specific health issues have been identified by the commissioners in the invitation to tender, then the proposal should be able to identify key ecosystems or ecosystems services of relevance to those health issues. Even if only discussed in broad terms, there should be some awareness demonstrated of how the assessment can be targeted to explore any linkages. If such detail is not provided in a proposal, the commissioning entity may consider requesting further information, perhaps during a negotiation phase, to determine how ecosystem and health relationships will be assessed.

Example: The proposal could identify key health issues which may be linked to local ecosystems; for example, aquatic ecosystems and wetlands may be associated with health issues linked to water quality, whilst agricultural ecosystems may be linked to health aspects of air, water and soil quality, nutrition security, etc. Conversely, if health issues have already been highlighted to prospective contractors then the key ecosystems and ecosystem services of relevance could be identified for an initial assessment; for example, if non-communicable disease such as cardio-vascular illnesses or diabetes are a concern, then ecosystems associated with air quality and those which offer opportunities for physical activity may be important. Such general associations can usually be inferred in order to inform the selection of methods, indicators, stakeholders etc.



Does the proposal demonstrate an awareness of key stakeholder groups likely to affect, be affected by, or be interested in relevant health issues?

Description: Including stakeholders who have a role or interest in local health issues or how those issues link with local ecosystems may expand the pool of consultees significantly, so it is important that some general indication of how this will be addressed is provided.

Certain health issues may fall under the remit of specific national or local government agencies or non-governmental organisations or other civil society groups. This may include health service executives, health-focused charities and research bodies, or other organisations providing advocacy or support for specific health challenges. Depending on the degree to which animal or plant health issues are to be considered, organisations active in veterinary health or phytosanitary issues may be important. It may also include non-health organisations focused on health-relevant activities, such as companies engaged in tourism or outdoor pursuits, “active age” community groups, homeless shelters etc.

Example: The proposal may identify an initial list of stakeholder groups to be considered, linked to an understanding of how ecosystems in the area for the assessment may be linked with health issues. For example, an assessment of health benefits of urban ecosystems may aim to consider physical, social and mental health aspects, which may require input from urban health authorities, active age groups, mental health charities, local youth organisations and sports clubs, social housing groups, and urban mobility advocates, etc.

Does the proposal show how it will collate, analyse and interpret health data generated by the assessment?

Description: A proposal should identify the type of health data which is to be utilised in the assessment, and this should be linked to an understanding of the health issues which the assessment might consider. For example, a general assessment of health benefits or risks associated with certain ecosystems or ecosystem changes may not require detailed population level health data, however some useful data may be gathered using social-scientific methods. Alternatively, a more detailed focus on health outcomes arising from the use of (or changes in availability of) ecosystem services may require epidemiological data, which may be available from relevant health authorities or research institutions.

It is important that any health data to be gathered for the assessment is handled appropriately, accounting for any issues of data protection and privacy which may arise. If it is proposed that health data will be gathered from individuals or groups within a target population then a clear method for handling this data in line with applicable laws, policies and best practice (e.g., the GDPR²¹ in the EU).

This issue also has a links to issues of social benefits and justice – for example, it should be clear from the proposal whether the data collection strategy will address issues of representativeness (i.e., which groups the data represents)

A proposal should also identify any confounding factors which may mediate the relationships between ecosystems and health in the area to be assessed, For example, for some health issues where social and economic factors may play a crucial role in determining health outcomes, the proposal should allow commissioners to understand how these will

²¹ [General Data Protection Regulation](#), European Council and Parliament, 2018



be integrated with health data, or otherwise factored into the interpretation of the results of the health-related assessment.

Example: The proposal should identify general types of data to be used in the assessment of health aspects and potential sources of that data, and provide suggestions (as a minimum) on how the data will be gathered, managed and analysed – *e.g.*, an assessment may seek to utilise existing open access health datasets from a local health executive, or collaborate with health researchers or epidemiologists working on relevant areas or issues. The proposal should identify any data privacy and security issues involved, and identify relevant standards or best practice methods to be employed in data processing – *e.g.*, the proposal may include information on GDPR-compliance. Where there is ambiguity in a proposal, further details may be gathered through a negotiation phase of the tender process.



7.2.2.5 Health in evaluating the outcomes of a study after completion

Once an ecosystem service assessment has been completed, it is essential to evaluate not only the technical quality of the outputs but also the extent to which the health dimensions were meaningfully addressed. While Section 8.2.2.4 focused on assessing how well a proposal plans for the inclusion of health relevant outputs, Section 8.2.2.5 guides commissioners in reviewing whether those intentions translated into credible and useful outcomes.

Do the proposal's outcomes reflect the health objectives identified in the original proposal or Terms of Reference?

Description: The key objectives of the health-related assessment of ecosystems services – *e.g.*, to identify potential or actual health benefits or risks associated with certain ecosystems or with changes in land use, etc., or to identify the contribution of ecosystems to certain health outcomes, or to use data on ecosystems services to develop a One Health strategy – should be clearly met in the completed work, or at the very least any incomplete work should be clearly rationalised and explained – *e.g.*, lack of availability of relevant health data, lack of engagement of key health stakeholders, etc.

Example: If specific health issues were identified or prioritised early on but are not adequately or completely addressed in the assessment outputs, then as a minimum these should be identified in the reports and a clear explanation for the deficiencies should be provided so that the shortfalls can be tackled in future work.

Do the proposal's outcomes present a logical and evidence-based interpretation of the relationships between health and ecosystems, demonstrating a clear understanding of the mechanisms involved?

Description: The assessment should present a clear picture not only of the relationships between health and ecosystem services but also of the mechanisms involved, whether they are through direct or indirect use of ecosystems benefits or exposure to green and blue environments, etc. Any interpretation of relationships should be based on an understanding of real-world situations and account for any relevant policy, social, or cultural contexts. Depending on the initial objectives of the assessment, this may require consideration of the interplay between environmental, social, cultural and economic determinants of health. It should also be clear from the outputs whether the results are representative of a specific population, or whether results may vary for certain groups in society.

Example: It should be clear from the final reports whether associations between ecosystems and health have been appropriately linked to ecosystem structures, functions, or condition, and whether the flow of health-related ecosystem services is generalised or assessed in detail. A clear determination of how conclusions were drawn from the data used should be presented. This will be particularly important if the outputs are to be of use in developing further health-related assessments, in guiding nature-based solutions or other ecosystem-based approaches to health, or for communicating with actors in the health sector.



7.2.2.6 References

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7.2.3 Economic valuation in ecosystem service assessments

7.2.3.1 General information

Economic value is simply a means to describe how important the things we use are to us, including our use of ecosystem services and natural capital. It is generally the case that there are no prices that reflect the value of ecosystem service because to a large extent they are not traded in markets (*e.g.*, climate regulation, coastal protection, biodiversity). As a result, we tend not to take the value of ecosystem services into consideration when we make decisions that affect extent and condition of ecosystems. When we investigate the consequences of environmental change (*e.g.*, climate change, land use change, pollution) we need to fully understand the effects on ecosystem services and human well-being.

Economic valuation tries to measure the importance of environmental change, usually in monetary terms, in order to communicate the scale of impacts to human well-being. Such information can be used to raise awareness of the economic importance of ecosystems, set fees for the use of ecosystem services, or determine compensation payments for environmental damage.

Economic valuation of ecosystem services involves identifying and quantifying the contribution of environmental resources to human well-being; and incorporating this information into decision-making and the design of financing mechanisms and policy instruments.

Economic valuation methods do not stand alone but are often used in combination with other methods for assessing environmental change and the provision of ecosystem services. The added value of using economic valuation methods is that the importance of ecosystem services is expressed in terms of human welfare and measured in common units (*i.e.*, money), allowing values to be aggregated across ecosystem services and directly compared with the values of other goods and services in the economy.



7.2.3.2 Economic valuation in Framing and Scoping for an ecosystem service assessment

1. Why is the valuation of ecosystem services important in decision-making?

The rationale for valuation of ecosystem services to support decision making is as follows: ecosystem services contribute substantially to human welfare and in some cases are fundamental to sustaining life (e.g., climate regulation, nutrient recycling). The natural capital from which these services flow is, however, finite and cannot necessarily be regenerated or replaced. With growing human populations and consumption per capita increasing over time, it is highly likely that human use of natural resources will outstrip their availability (i.e., human use of the environment will be unsustainable). These simple realities of resource limitation mean that choices have to be made between alternative uses of available resources; and every time a decision is made to do one thing, this is also a decision not to do another. In other words, values on each option are being subtly applied. This valuation is unavoidable and is the essence of decision making. So if valuation of alternative resource uses is unavoidable in making decisions, it is arguably better to make these values explicit and ensure that they are well informed in order to aid decision making. The valuation of ecosystem services attempts to do this.

2. What can economic valuation bring to decision-making?

There are many decision-making contexts in which information on the economic value of ecosystem services may be useful, including to:

- Raise awareness of the value of the environment. Estimates of the value of ecosystems can highlight its importance to the public and to policy makers;
- Design effective policy instruments for environmental management. Resource use and polluting activities affecting ecosystems can be managed using policy instruments such as taxes, transferable quotas, certification and labelling, and trade restrictions;
- Design mechanisms for sustainable financing, including setting appropriate fees for use of ecosystem services;
- Compare costs and benefits of alternative uses of the environment or alternative conservation and restoration activities;
- Reveal the distribution of costs and benefits of management decisions among different stakeholders. Transparently measuring who incurs the costs and who receives the benefits of resource management provides key information for decision makers;
- Include ecosystem service values in ecosystem accounts with the aim of measuring the importance of natural capital to the economy and identify whether the exploitation of resources is unsustainable; and



- Set compensation for environmental damage. Information on the full costs of environment damage can be used to determine the level of compensation that needs to be paid.

3. Limitations and criticisms of ecosystem valuation

Ecosystem services valuation provides a useful framework for identifying and quantifying the benefits that humans derive from nature. There are, however, a number of limitations to the effective implementation of this framework and criticisms of attempting to value ecosystem services that are useful to be aware of.

The limitations or barriers to implementing the ecosystem service approach include:

- Lack of knowledge and understanding of the underlying state and functioning of ecosystems. The bio-physical relationships between ecosystem functioning and the provision of ecosystem services are often not well understood and are characterized by high uncertainties. Similarly, the understanding of long-run impacts, sustainability, positive and negative feedbacks and thresholds effects is limited. An understanding of such relationships, however, is fundamental to determining how policy decisions that affect natural capital stocks and ecosystem functioning will filter through to changes in the flow and value of ecosystem services.
- A related challenge in assessing ecosystem services is due to the complexity of trade-offs between different ecosystem services. In many cases, the level of sustainable activity for one ecosystem service may not be compatible with the sustainable level of another. For example, trade-offs have been observed between fisheries and tourism sectors in which restricting one, benefits the other. Such trade-offs introduce further complexity to any analysis since it becomes necessary to consider how the one use of a resource affects other potential uses. This, however, can also be seen as a strength of the ecosystem service framework in that it enables these trade-offs to be explicitly analysed.
- Ecosystem service assessments are resource intensive and time consuming. The physical and social scientific methods applied to assess ecosystem services are sophisticated, time consuming and often expensive to implement. Economic valuation methods generally require extensive data, which may not be available especially for small scale studies. Moreover, the necessary technical expertise to conduct valuation studies is often lacking in the agencies that are responsible for environmental protection and resource management.

The criticisms and potential risks of the ecosystem service approach include:

- Quantification and valuation of ecosystem services may lead to their commodification (the transformation of something *e.g.*, goods, services, nature etc. into commodities or objects of trade) that can then be sold. Many ecosystem services are public goods that beneficiaries enjoy without any charge for their use. There is concern that the process of quantifying the value of such services is a step towards setting prices for them and requiring beneficiaries to pay. Such a development potentially represents a transfer of wealth from beneficiaries to resource owners.



- The explicit identification of resource owners, custodians, users, and beneficiaries can raise questions of property rights, tenure and conflict. The tenure or property rights to many natural resources remains unassigned. For society, this can be both a positive characteristic from the perspective that such resources are open to all, or a negative characteristic from the perspective that such resources tend to be over-exploited. A potential risk in applying an ecosystem service approach is that issues of resource ownership become sources of conflict between different stakeholders.
- Valuation of ecosystem services can lead to changes in the management of natural resources to favour the highest value uses, to the detriment of lower valued uses. A potential result of an ecosystem assessment is the recommendation to manage a resource (e.g., a forest) to increase the availability of high value ecosystem services (e.g., tourism) as the expense of relatively low value ecosystem services (e.g., non-timber forest products). Without sufficient and appropriate compensation, this can have distributional consequences across stakeholder groups.
- The framing of ecosystem services as nature's contributions to people is contrary to traditional understanding of the relationship between humans and the environment in some cultures and can disrupt traditional approaches to managing common natural resources. The concept of humans as recipients of benefits from nature, as opposed to part of the natural system, might be at odds with some indigenous and traditional systems of managing natural resources even to the point that it alters the effectiveness of such systems.
- The ecosystem service approach narrows the conception of the value of nature to anthropocentric or utilitarian values. The concept of nature having intrinsic value irrespective of any benefits it contributes to people does not fit in the ecosystem services framework.
- The ecosystem services approach has not resulted in substantial changes in environmental policy or human behaviour to address the serious environmental challenges that the planet faces. The required scale of change in humanity's use of natural resources to avoid major environmental disasters (e.g., climate change, massive loss of biodiversity) is not taking place. The ecosystem services approach has only resulted in small incremental changes in environmental and development policies and not the fundamental changes in economic systems that are necessary.



7.2.3.3 Economic valuation in designing the Methodology of an ecosystem service assessment

1. **Economic valuation methods**

A variety of methods have been developed for quantifying the importance of ecosystem services. These valuation methods are designed to span the range of complex interactions between the natural environment and people. The intention of this guidance is to provide an understanding for commissioners of ecosystem service assessments on which valuation method can be used to value each ecosystem service, and explain the key strengths, limitations, and data requirements of each method. It is beyond the scope of this guidance to provide a complete manual on how to apply each valuation method. Indeed, some methods are highly technical, require advanced expertise and have lengthy manuals devoted to explaining their application.

It is important to note that bio-physical, economic and social valuation methods are not mutually exclusive but more often provide complementary information on the importance of ecosystem services.

Figure A.7 provides a representation of the available economic methods for valuing ecosystem services. A first categorisation of methods is into “primary valuation methods” and “value transfer methods”. The former methods produce new or original information generally using primary data whereas the latter methods use existing information from primary valuation studies, as described more fully below.

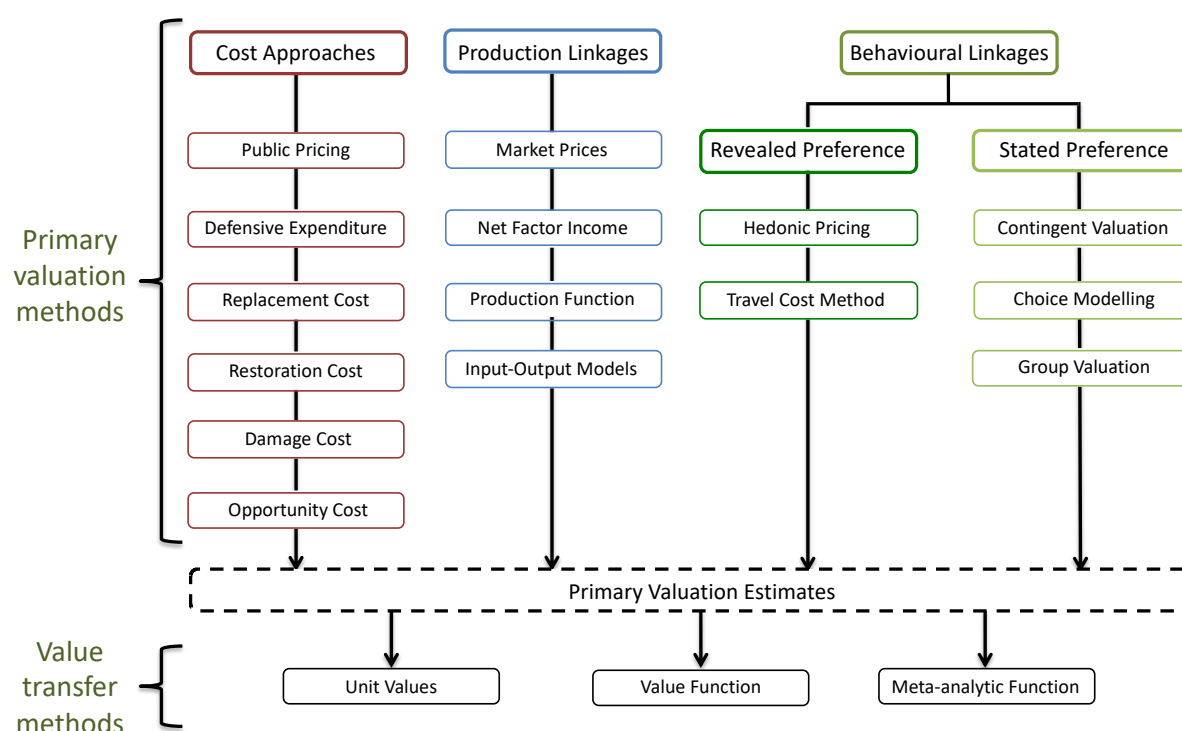


Figure A.7 - Overview of economic valuation methods. *Source: Brander (2018a)*



2. Primary valuation methods

Primary valuation methods are those that produce new or original value information generally using primary data. **Table A.6** provides an overview of primary valuation methods, typical applications, limitations and indicates which primary valuation methods can be used to value which ecosystem service.

An important distinction between primary valuation methods is the difference between revealed preference methods (those that observe actual behaviour of the use of ecosystem services to elicit values) and stated preference methods (those that use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services). Revealed preference methods may be favoured since they reflect actual behaviour but are limited in their applicability to some ecosystem services. Stated preference methods on the other hand rely on responses recorded in surveys or experiments but are more flexible in their application and can in principle be used to value any ecosystem service.

It should be noted that different valuation methods produce different measures of economic value that are not necessarily equivalent and cannot be directly compared. The valuation method, and the measure of economic value that it estimates, will have a substantial bearing on the magnitude of the value estimated. It is therefore important to understand what each measure is and to select a measure that is relevant to the case in hand. There are numerous existing publications that provide guidance on the use of primary valuation methods.

The choice of which valuation method to use is determined to a large extent by what is being valued. The applicability of some valuation methods is limited to specific ecosystem services.

Figure A.8 illustrates this by drawing linkages between a set of ecosystem services and the valuation methods that are most applicable to value them.

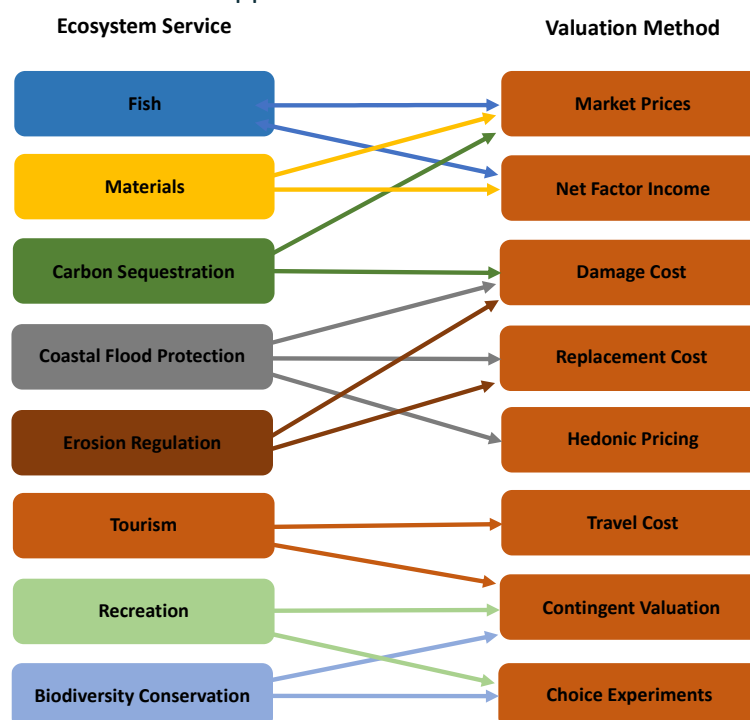


Figure A.8 - Linkages between ecosystem services and relevant primary economic valuation methods. *Source: Brander (2018b)*



Table A.6 - Primary valuation methods, applicability to ecosystem services, examples and limitations. *ES stands for ecosystem service. Source: (adapted from Table A2, Brander 2013)*

Valuation method	Approach	Data requirements and sources	Application to ecosystem services	Example ecosystem service	Limitations
Market prices	Prices for ES that are directly observed in markets.	Prices of some ES can be obtained from markets or surveys of businesses and households.	ES that are traded directly in markets.	Timber and fuel wood from mangroves; fish; ecotourism.	Market prices can be distorted e.g. by subsidies. Most ES are not traded in markets.
Public pricing	Public expenditure or monetary incentives (taxes/subsidies) for ES as an indicator of value.	Data on public expenditures on the provision of ES obtained from government reports or key informants.	ES for which there are public expenditures.	Watershed protection to provide drinking water; Purchase of land for protected area.	No direct link to preferences of beneficiaries.
Defensive expenditure	Expenditure on protection of ES.	Data on public or private expenditure obtained from government reports, key informants, or surveys of businesses and households.	ES for which there is public or private expenditure for its protection.	Recreation and aesthetic values from protected areas.	Only applicable where direct expenditures are made for environmental protection related to provision on an ES. Provides lower bound estimate of ES benefit.
Replacement cost	Estimate the cost of replacing an ES with a man-made service.	Estimates of construction costs can be obtained from experts or based on past investments.	ES that have man-made equivalents.	Coastal protection by dunes (replaced by seawalls); water storage and filtration by wetlands (replaced by reservation and filtration plant).	No direct relation to ES benefits. Over-estimates value if society is not prepared to pay for man-made replacement. Under-estimates value if man-made replacement does not provide all of the benefits of the original ecosystem.



Valuation method	Approach	Data requirements and sources	Application to ecosystem services	Example ecosystem service	Limitations
Restoration cost	Estimate cost of restoring degraded ecosystems to ensure provision of ES.	Estimates of restoration costs can be obtained from experts or based on past investments.	Any ES that can be provided by restored ecosystems.	Coastal protection by dunes; water storage and filtration by wetlands.	No direct relation to ES benefits. Over-estimates value if society is not prepared to pay for restoration. Under-estimates value if restoration does not provide all of the benefits of the original ecosystem.
Damage cost avoided	Estimate damage avoided due to ecosystem service.	Data on past damage costs and frequencies can be obtained from government reports and household surveys.	Ecosystems that provide storm, flood or landslide protection to houses or other assets.	Coastal protection by dunes, mangroves and reefs; river flow control by wetlands; landslide protection by forests.	Difficult to quantify changes in risk of damage to changes in ecosystem condition.
Social cost of carbon (SCC)	The monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The social cost of carbon (SCC) therefore also represents the value of damages avoided for a one tonne reduction in emissions.	Estimates of the SCC can be obtained from Integrated Assessment Models of climate-economy impacts and published summaries of model results.	Carbon storage and sequestration.	Carbon sequestered and stored by protected or restored mangroves.	SCC is a specific application of the "damage cost avoided" method. SCC is characterized by high modelling uncertainties and partial coverage of climate change impacts.



Valuation method	Approach	Data requirements and sources	Application to ecosystem services	Example ecosystem service	Limitations
Opportunity cost	The next highest valued use of the resources used to produce an ecosystem service.	Data on the value of alternative land uses (e.g. agriculture, aquaculture, housing, hotels etc.) can be obtained from markets and surveys of businesses and households.	All ecosystem services.	The opportunity cost of ecosystem services from a natural ecosystem might be the value of agricultural output if the land is converted to agriculture instead of conserved in a natural state.	Measures the cost of providing ecosystem services instead of the benefit.
Net factor income (residual value)	Revenue from sales of a marketed good with an ES input minus the cost of other inputs.	Revenues can be obtained from markets; costs can be obtained from business surveys.	Ecosystems that provide an input in the production of a marketed good.	Filtration of water by wetlands; commercial fisheries supported by mangroves and reefs.	Tendency to over-estimate values since all normal profit is attributed to the ES.
Production function	Statistical estimation of production function for a marketed good with an ES input.	Data on production, inputs, costs and revenues can be obtained from business surveys.	Ecosystems that provide an input in the production of a marketed good.	Soil quality or water quality as an input to agricultural production.	Technically difficult. High data requirements.



Valuation method	Approach	Data requirements and sources	Application to ecosystem services	Example ecosystem service	Limitations
Input-Output Models	Quantifies the interdependencies between economic sectors in order to measure the impacts of changes in one sector to other sectors in the economy. Ecosystems can be incorporated as distinct sectors.	Data on production inputs, outputs and prices for multiple economic sectors can be obtained from government statistics. Data on ecosystem inputs and outputs can be observed or modelled using bio-physical methods.	Ecosystem services with direct and indirect use values, particularly inputs into production.	Ecosystem inputs into agriculture; or into the tourism sector.	Requires substantial data on ecosystem-economy linkages to parameterise connections between sectors.
Hedonic pricing	Estimate influence of environmental characteristics on price of marketed goods (usually residential property).	Data on house prices and characteristics can be obtained from estate agents or public records. Data on environmental characteristics can be observed or modelled using bio-physical methods.	Environmental characteristics that vary across goods (usually houses).	Urban green open space; air quality moderated by ecosystems.	Technically difficult. High data requirements. Limited to ES that are spatially related to property locations.
Travel cost	Estimate demand for ecosystem recreation sites using data on travel costs and visit rates.	Data on travel costs and visit rates can be obtained through visitor surveys.	Recreational use of ecosystems.	Recreational use of beaches, reefs, national parks etc.	Technically difficult. High data requirements. Limited to valuation of recreation. Complicated for trips with multiple purposes or to multiple sites.



Valuation method	Approach	Data requirements and sources	Application to ecosystem services	Example ecosystem service	Limitations
Contingent valuation	Ask people to state their WTP for an ES through surveys.	Data collected through public surveys.	All ecosystem services.	Biodiversity; recreation; landscape aesthetics; flood risk attenuation.	Expensive and technically difficult to implement. Risk of biases in design and analysis.
Choice modelling (choice experiment)	Ask people to make trade-offs between ES and other goods to elicit WTP.	Data collected through public surveys.	All ecosystem services.	Biodiversity; recreation; landscape aesthetics; flood risk attenuation.	Expensive and technically difficult to implement. Risk of biases in design and analysis.
Group / participatory valuation	Ask groups of stakeholders to state their WTP for an ES through group discussion.	Data collected in workshop settings.	All ecosystem services.	Biodiversity; recreation; landscape aesthetics; flood risk attenuation.	Risk of biases due to group dynamics.

3. Value transfer methods

Decision-making often requires information quickly and at low cost. New ‘primary’ valuation research, however, is generally time consuming and expensive. For this reason, there is interest in using information from existing primary valuation studies to inform decisions regarding impacts on ecosystems that are of current interest. This transfer of value information from one context to another is called “value” or “benefit transfer”.

Value transfer is the use of research results from existing primary studies at one or more sites or policy contexts (“study sites”) to predict welfare estimates or related information for other sites or policy contexts (“policy sites”). Value transfer is also known as benefit transfer but since the values that are transferred may be costs as well as benefits, the term value transfer is more generally applicable.

In addition to the need for expeditious and inexpensive information, there is often a need for information on the value of ecosystem services at a different geographic scale from that at which primary valuation studies have been conducted. So even in cases where some primary valuation research is available for the ecosystem of interest, it is often necessary to extrapolate or scale-up this information to a larger area or to multiple ecosystems in the region or country. Primary valuation studies tend to be conducted for specific ecosystems at a local scale whereas the information required for decision-making is often needed at a regional, national or multi-national scale. Value transfer therefore provides a means to obtain information for the scale that is required.

The number of primary studies on the value of ecosystem services is substantial and growing rapidly. This means that there is a growing body of evidence to draw on for the purposes of transferring values to inform decision-making. With an expanding information base, the potential for using value transfer is improved.

Value transfer can potentially be used to estimate values for any ecosystem service, provided that there are primary valuations of that ecosystem service from which to transfer values. Value transfer methods have been employed widely in national and global ecosystem assessments, value mapping applications and policy appraisals. The use of value transfer is widespread but requires careful application. The alternative methods of conducting value transfer are described here:

- **Unit value transfer** uses values for ecosystem services at a study site, expressed as a value per unit (usually per unit of area or per beneficiary), combined with information on the quantity of units at the policy site to estimate policy site values. Unit values from the study site are multiplied by the number of units at the policy site. Unit values can be adjusted to reflect differences between the study and policy sites (*e.g.*, income and price levels).

- **Value function transfer** uses a value function estimated for an individual study site in conjunction with information on parameter values for the policy site to calculate the value of an ecosystem service at the policy site. A value function is an equation that relates the value of an ecosystem service to the characteristics of the ecosystem and the beneficiaries of the ecosystem service. Value functions can be estimated from a number of primary valuation methods including hedonic pricing, travel cost, production function, contingent valuation and choice experiments.
- **Meta-analytic function transfer** uses a value function (see above) estimated from the results of multiple primary studies representing multiple study sites in conjunction with information on parameter values for the policy site to calculate the value of an ecosystem service at the policy site. Since the value function is estimated from the results of multiple studies it is able to represent and control for greater variation in the characteristics of ecosystems, beneficiaries and other contextual characteristics. This feature of meta-analytic function transfer provides a means to account for simultaneous changes in the stock of ecosystems when estimating economic values for ecosystem services (i.e., the “scaling up problem”). By including an explanatory variable in the data describing each “study site” that measures the scarcity of other ecosystems in the vicinity of the “study site”, it is possible to estimate a quantified relationship between scarcity and ecosystem service value. This parameter can then be used to account for changes in ecosystem scarcity when conducting value transfers at large geographic scales.

These three principal methods for transferring ecosystem service values are summarized in **Table A.7** together with their respective strengths and weaknesses. The choice of which value transfer method to use to provide information for a specific policy context is largely dependent on the availability of primary valuation estimates and the degree of similarity between the study and policy sites. In cases where value information is available for a highly similar study site, unit value transfer may provide the most straightforward and reliable means of conducting value transfer. On the other hand, when study sites and policy sites are different, value function or meta-analytic function transfer offers a means to systematically adjust transferred values to reflect those differences. Similarly, in the case that value information is required for multiple different policy sites, value function or meta-analytic function transfer may be a more accurate and practical means for transferring values. Using meta-analytic functions that include a parameter for ecosystem scarcity provides a means to account for simultaneous changes in the stock of ecosystem on the value of all ecosystem services (i.e., more accurately “scale-up” ecosystem service values).



Table A.7 - Value transfer methods, strengths, weaknesses. *ES stands for ecosystem service.*
Source: adapted from Table 3, Brander (2013)

Method	Approach	Strengths	Weaknesses
Unit value transfer	Select appropriate values from existing primary valuation studies for similar ecosystems and socio-economic contexts. Adjust unit values to reflect differences between study and policy sites (usually for income and price levels).	Simple	Unlikely to be able to account for all factors that determine differences in values between study and policy sites. Value information for highly similar sites is rarely available.
Value function transfer	Use a value function derived from a primary valuation study to estimate ES values at policy site(s).	Allows differences between study and policy sites to be controlled for (e.g. differences in population characteristics).	Requires detailed information on the characteristics of policy site(s).
Meta-analytic function transfer	Use a value function estimated from the results of multiple primary studies to estimate ES values at policy site(s).	Allows differences between study and policy sites to be controlled for (e.g. differences in population characteristics, area of ecosystem, abundance of substitutes etc.). Practical for consistently valuing large numbers of policy sites.	Requires detailed information on the characteristics of policy site(s). Analytically complex.



7.2.3.4 References

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7.2.4 Sustainability and condition in ecosystem service assessments

7.2.4.1 General information

This section offers an overview of key concepts, definitions, and background information for integrating the properties of ecosystems, their structures and functions, into ecosystem service (ES) assessments. This integration is critical to ES assessments since ecosystems underlie ES, and changes in their properties will result in changes in ES. Also, both ES use and actions to protect and / or restore ecosystems will affect ES supply. In this section we aim to explain how these interlinkages are understood and how ecosystem properties can be measured.

1. *What is ecosystem condition?*

The notion of good ecosystem condition is related to ecosystem resilience, i.e. the capacity of ecosystems to recover from disturbances and adapt to environmental changes (United Nations et al., 2024). Ecosystems, including their biodiversity (Life under Water and Life on Land), addressing climate change and ensuring clean water are the pillars of sustainable societal development (**Figure A.9**).

Ecosystem condition indicators refer to measurements of ecosystem properties that enable us to evaluate its composition, structure, and functioning over time. Ecosystem condition measurements are used to assess and monitor ecosystem change and, in this way, help identify opportunities for protecting, restoring and sustainably managing them.

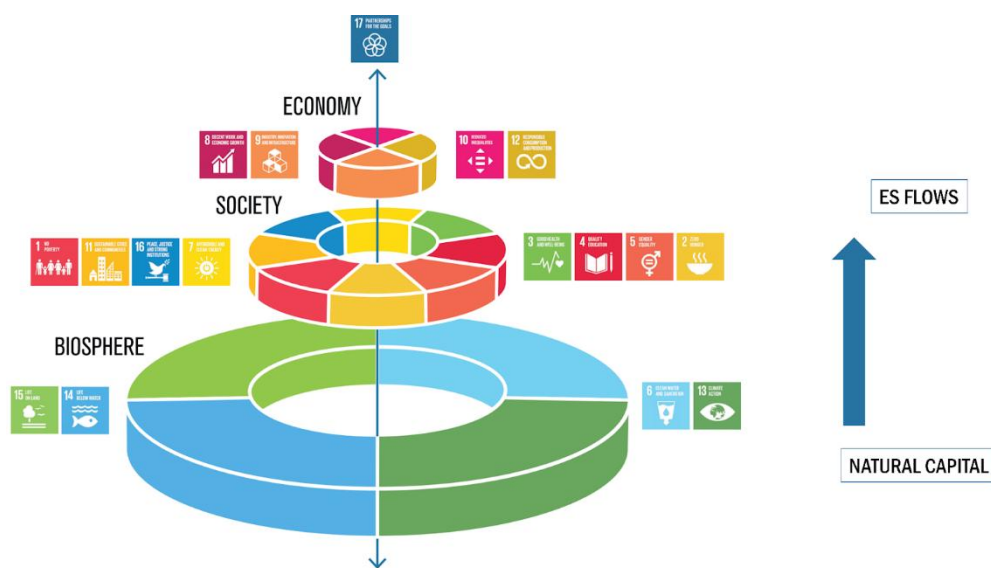


Figure A.9 - A new way of viewing the Sustainable Development Goals and how they are all linked to food. *Nature supports societal values and these further, sustainable economy. Natural capital and ecosystem services flows from ecosystems to society and the economy.*
Source: Stockholm Resilience Centre.



2. How do ecosystem properties relate to ES supply?

In a broad sense, the purpose of ES assessments is to raise awareness of the dependency of human well-being on nature. These assessments are especially relevant in decision-making situations where the benefits from nature are not taken into account, and where decisions lead to negative impacts on nature. Built on this background, the science and practice of ES aims at developing models and methods that quantify and / or describe how ecosystems support human well-being.

ES supply represents magnitudes of what ecosystems provide to society. Levels of ES supply depend on the properties of the ecosystem, which can be measured in different ways, using different variables (see examples in **Table A.8**). In some contexts, they are conceptually referred to as ES capacity. In more in-depth ES assessments, commissioners may require contractors to specify the kind of variables used to quantify both ecosystem properties and ES supply. The documents on ‘Spatial and temporal scales’ and ‘Uncertainty’ provide further information about how to relate the choice of variables to the relevant level of detail of the assessment and how to consider knowledge gaps and variability.

Table A.8 - Examples of ecosystem properties connected to ES supply, use and demand; and examples of variables to operationalize the different ES components. *ES properties’ variables can be used to derive ecosystem condition indicators. In the SEEA EA²² framework (United Nations, 2024), account tables include ecosystem type (the service providing unit), ecosystem condition, ES supply and ES use. In the framework, no distinction is made of ES potential supply, or between ES actual supply and use. Hence, in these cases indicators of ecosystem condition and ES potential supply could be used interchangeably if the data are intended for analyses of sustainable levels of use. Definitions of the terms are provided in [8.2.4.5 Glossary](#) below)*

ES type	Ecosystem properties from which condition indicators can be derived	ES potential supply	ES (actual) supply = ES use	ES demand
Provisioning Wood provisioning	Volume of timber (m ³)	Volume of harvestable timber per year (m ³ /yr)	Volume of timber harvested in a particular year (m ³ /yr)	Volume of timber needed beyond current use (m ³ /yr)
Regulating & Maintenance Water purification services (water quality regulation) -	Ability of the ecosystem to retain and breakdown pollutants measured as the presence and abundance of	Amount of pollutants removed or volume of clean water produced per year (m ³ /yr)	Volume of drinkable water consumed (m ³ /yr)	Volume of drinkable water needed beyond current use (m ³ /yr)

²² System of Environmental Economic Accounting – Ecosystem Accounting



ES type	Ecosystem properties from which condition indicators can be derived	ES potential supply	ES (actual) supply = ES use	ES demand
Retention and breakdown of pollutants	decomposer (functional) species groups in the soil			
Regulating & Maintenance Waterflow regulation - Peak flow regulation	Ability of the ecosystem to retain water and regulate peak flows	Total area that is saved from once-in-hundred-years flood events (daa (decares) or ha)	Area with buildings that is saved from once-in-hundred-years flood events (daa (decares) or ha)	Area required for infrastructure that is safe from once-in-hundred-years flood risk beyond current built area (daa (decares) or ha)
Cultural Recreation-related; Spiritual, artistic & symbolic	Features of a nature reserve that enables an experience in nature, e.g. wildlife and bird species richness, old-growth forest character, presence of rare birds, absence of noise (bird species diversity, occurrence of rare species, old-growth forest features)	Maximum number of visitors to the nature reserve that ensures that the quality of the nature experience is maintained (number of visitors/yr or season)	Number of visitors per year visiting a nature reserve (number of visitors/yr or season)	Number of potential visitors to the nature reserve (number of visitors/yr)
Cultural Recreation-related	Population size and recruitment rates of fish species attractive for recreational fishing (number of recruits/yr)	Number of fish allowed to be caught by anglers each summer (number of fish/yr)	Number of fish caught by anglers each summer (number of fish/yr)	Number of fish that could be caught beyond the levels set by current regulation (number of fish/yr)



3. How are Ecosystem condition, ES supply and ES use related to sustainability?

To the extent that ecosystem condition reflects the properties of ecosystems that underpin ES supply, ecosystem condition and ES are interconnected. However, the relationship between them varies among different services and ES models. One assumption in ES theory is that physical and biological diversity improve short-term performance and long-term resilience of ES to environmental changes (Smith et al., 2017). This provides a strong argument for sustainable ecosystem management.

However, in the SEEA EA guidelines – the currently most advanced attempt to operationalize ES through reporting to national statistics – ecosystem condition criteria aim to include ecosystem properties which can, to a large extent, be independent of those integrated in ES models. It is stated that “the range of characteristics of ecosystem condition, along with their associated measured variables and indicators, should encompass more than just those relevant to the provision of final ES used by humans” (United Nations et al., 2024). Hence, the SEEA EA aims to provide a general view of how changes in ecosystem conditions affect the provision of services through its logic chain, and by connecting ES flows to ecosystem occurrences. Although this integration can support better decision-making for sustainable management and policy development (La Notte et al., 2022), it limits the scope of information to guide actions towards sustainable use objectives. There is a need to overcome the limitations of traditional models that operate independently, focusing either on “biodiversity” (ecosystem properties *per se*) or ES. Integrating these models can provide a more comprehensive understanding of how changes in ecosystem properties affect the provision of services (Meraj et al., 2022). Integrating ecosystem condition variables into ES modelling is crucial to accurately assess and predict changes in human well-being. Ecosystem condition variables linked to ES include species occurrences and population viability metrics, soil health, water quality, and vegetation cover, which are essential for maintaining the ecological functions that underpin ES (Weiskopf et al., 2022).

Disentangling the concepts of ecosystem condition, ES potential supply, actual supply and use, and demand, is important for clarity and consistency of ES assessments. These components of ES models (**Table A.8**) can help identify mismatches between human needs and wishes and nature’s ability to meet these needs or wishes. Therefore, they can inform management decisions related to sustainability. For instance, if demand exceeds sustainable supply, then interventions, such as ecological restoration, actions to reduce consumption, and policy changes, are needed to ensure the resilience and sustainability of the socio-ecological system. Assessments that clearly distinguish and address these concepts could facilitate the uptake in policy making by ensuring transparent and credible step-by-step procedures, and could help policy evaluation by assessing mismatches, considering flow/supply feedback loops, and monitoring responses to current policies

Sustainable levels of ES use can be understood as those levels of use that do not exceed the capacity of ecosystems to supply ES. In ES assessments, sustainable levels of ES use can be assessed in different ways.

One way can follow the SEEA EA statistical standards (United Nations, 2024; **Figure A.10**). Here the capacity of the ecosystem to supply ES is determined by the ecosystem condition, and in turn, the value of ES supply equals that of ES use. Hence, it is not possible to assess whether the levels of use are sustainable or not (*i.e.*, if the levels of use exceed ES supply). In

this framework, the (un-)sustainable levels of use need to be assessed by monitoring changes in ecosystem condition, i.e., if ecosystem condition shows negative trends, one can assume that the levels of use exceed the capacity of ES supply (or ES potential supply; Burkhard et al., 2012).

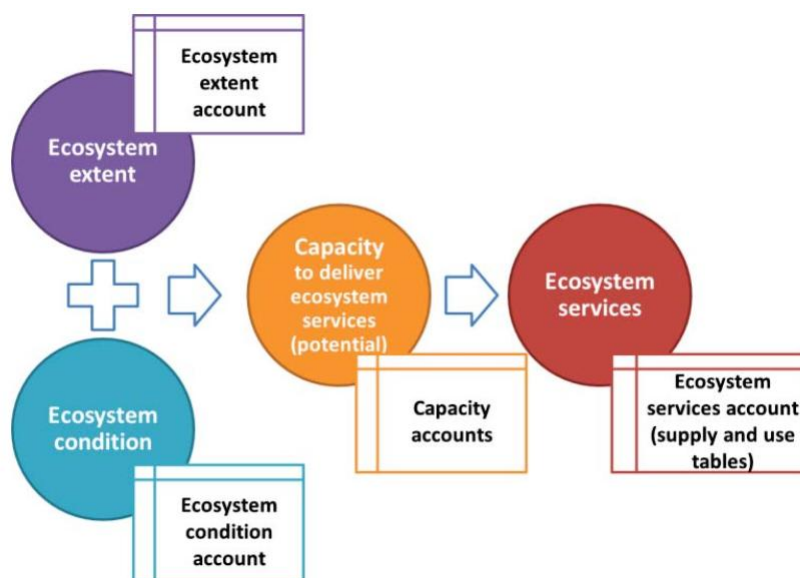


Figure A.10 - The place of ecosystem condition accounts in a natural capital accounting framework. *Ecosystem extent and ecosystem condition define the total capacity to deliver ES. Using this capacity generates a flow of ES.* Source: Maes et al., 2018

A second way is to calculate the potential ES supply independently of the levels of ES use. In these cases, sustainable use levels can be determined by assessing the difference between the levels of ES potential supply and use. Unsustainable use levels are established when the values of ES use exceed those of ES potential supply.

4. How does ES use relate to ES demand?

In ES assessments, the levels of use represent current ES use values. However, the need or demand for ES may not correspond to levels of ES use. In ES assessments, ES demand can be higher than the level of ES supplied. An analysis of ES demand can help understand areas or actors where ES are undersupplied. Declining levels of ES use can also be understood as trends in ES demand.

5. How does the advanced content complement the Terms of Reference templates?

The advanced questions in this document complement the original questions posed in SELINA's Terms of Reference (ToR). These advanced questions help commissioners think through possible more advanced uses of the ES assessment, including answering questions of sustainable use of ES, and accordingly, request contractors to provide more detail in the biophysical valuation of ES.

7.2.4.2 Ecosystem Condition, ES supply, Use & Demand in Framing and Scoping for an ecosystem service assessment

Should the assessment include a general metrics of ecosystem condition (i.e. an index of ecosystem condition)?

Description: An overarching metrics of ecosystem condition, as proposed for ecosystem accounting (SEEA EA; United Nations et al., 2024) can be suitable if the purpose of the ES assessment is to relate levels of ecosystem services with a general metrics of ecosystem condition, without considering causal or functional relationships between ecosystem properties and ES supply.

Example: The analysis of the spatial correspondence between areas with different levels of overall ecosystem condition with types and levels of ES supply, without considering causal linkages.

Should the assessment of ES supply explicitly identify variables that will enable monitoring ecosystem condition?

Description: Attempts to implement an approach without explicit reference to the ecosystem's potential to supply ecosystem services are unlikely to be successful (Maseyk et al, 2017) because while ES can increase with use intensity, if the condition of the ecosystem is eroded, gains in ES will only be short-term. The authors also stress the importance of being able to disentangle reversible and irreversible ES loss, as well as to understand the nature of the undersupplied or functionally extinct ES. Both factors are highly relevant to guide ecosystem restoration actions.

Example: With robust (timely and sensitive to change), ecologically grounded indicators, declines in ecosystem condition can be used as early warnings of threats to the supply of ES (Mace et al., 2015).

Should the assessment aim to set ES-based targets of ecosystem restoration?

Description: Ecosystem restoration has been at highest priority globally - the UN Decade of Ecosystem Restoration 2021-2030 – with goals that aim to both reverse trends in loss of biodiversity and to improve ES.

Example: The Convention on Biological Diversity (CBD) identifies the following ES that could be addressed in restoration actions *i.e.*:

- Combat climate change: Forests, wetlands, and other ecosystems act as natural carbon sinks, absorbing carbon dioxide from the atmosphere.
- Protect biodiversity: Restoring habitats can help species recover from population declines and prevent extinction.
- Improve livelihoods: Ecosystem restoration can create jobs and provide benefits for local communities, such as improved water quality and increased agricultural yields.



Should the assessment of ES supply and ES demand enable monitoring trends and evaluating threats to future ES supply?

Description: Maron et al. (2017) stressed the importance of developing frameworks that enable the assessment of risks related to both the undersupply of an ES and / or the complete cessation of supply, not only for quantifying the current state of ES supply and demand. Tracking trends in ES supply over time can enable us to assess important effects on human well-being and to assess the likelihood of (further) ES loss. In these cases, ES threat assessments must evaluate both ES supply (i.e. the potential of ecosystems to generate benefits for people) and demand (i.e. the level of service provision desired or required by people) (Maron et al., 2017). Such framework would enable to understand the following questions (adapted from Maron et al., 2017):

1. the human well-being implications due to persistent unmet demand
2. the degree to which ES demand is met through flows of ES from other regions
3. the degree to which ES demand is met through substitution by technology or built infrastructure or other means
4. whether demand declines or ceases due to changes in human preferences, through emigration or other kinds of loss of those demanding the service
5. Priority-setting for ecosystem restoration actions and monitoring their impact on ES

Example: Monitoring state and trends in both ES supply and demand can be used to assess whether current and future ES are sustainable. Socio-ecological thresholds can be identified to avoid crossing them and not meeting sustainability objectives (also Arias-Maldonado, 2013).



7.2.4.3 Ecosystem Condition, ES supply, Use & Demand in designing the Methodology of an ecosystem service assessment

Should the assessment provide details about the development of ecosystem condition metrics?

Description: A typical example of operationalizing an overarching ecosystem condition assessment is the one provided in the guidelines for ecosystem accounting (United Nations, 2024). Ecosystem condition in the SEEA EA is described through combinations of physical, chemical, and biological indicators whose change can be tracked over time. The values of ecosystem variables are transformed to a common scale which enables comparability between areas and in time. These indicators can be aggregated into an index that reflects the overall condition of the ecosystem (Czúcz et al., 2021a)

Example: The SEEA EA uses an Ecosystem Condition Typology (ECT) (United Nations et al., 2024); a hierarchical system for organising data on ecosystem condition characteristics, applicable to all ecosystem types. It provides a structured approach for selecting variables and indicators, facilitating data aggregation and enhancing comparability among different assessments. The ECT combines different properties of ecosystems, including structures and functions, in agreement with the idea that to address questions of ecosystem properties, ES and sustainability, the biotic components of ecosystems cannot be seen in isolation; ecosystem-level functions are important as well (Mace et al., 2012). The ECT includes six classes of ecosystem state variables (see **Table A.9**). Those variables are sensitive to human pressures and climate change which make them suitable as indicators of ecosystem responses to land and water management.

Table A.9 - Ecosystem Condition Typology from the System of Environmental Economic Accounting – Ecosystem Accounting. *Source: United Nations et al., 2024*

ECT groups and classes
Group A: Abiotic ecosystem characteristics
Class A1. Physical state characteristics: physical descriptors of the abiotic components of the ecosystem (e.g. soil structure, water availability)
Class A2. Chemical state characteristics: chemical composition of abiotic ecosystem compartments (e.g. soil nutrient levels, water quality, air pollutant concentrations)
Group B: Biotic ecosystem characteristics
Class B1. Compositional state characteristics: composition/diversity of ecological communities at a given location and time (e.g. presence/abundance of key species, diversity of relevant species groups)
Class B2. Structural state characteristics: aggregate properties (e.g. mass, density) of the whole ecosystem or its main biotic components (e.g. total biomass, canopy coverage, annual maximum normalized difference vegetation index (NDVI))
Class B3. Functional state characteristics: summary statistics (e.g. frequency, intensity) on the biological, chemical and physical interactions between the main ecosystem compartments (e.g. primary productivity, community age, disturbance frequency)
Group C: Landscape-level characteristics
Class C1. Landscape and seascape characteristics: metrics describing mosaics of ecosystem types at coarse (landscape, seascape) spatial scales (e.g. landscape diversity, connectivity, fragmentation)



Should the assessment detail the methodology for establishing reference condition and reference levels of ecosystem condition variables?

Description: One way of standardising ecosystem condition variables is to set the boundaries for the comparisons, for instance, by establishing *reference conditions* that can help tell whether the ecosystem is maintained within a steady-state situation or if it is moving towards a degraded or an improved state. A *reference condition* is then, the condition against which past, present and future ecosystem condition is compared in order to measure relative change over time. It represents the state of an ecosystem with high integrity, where all condition indicators have a value of 1 (100%) (see also SELINA Deliverable 3.3).

Example: In the current SEEA EA guidelines, the reference condition is typically based on the natural state of the ecosystem, reflecting its structure, composition, and function dominated by natural processes (United Nations et al., 2024). For managed ecosystems, there are still gaps in the guidelines on how to establish reference conditions to ensure sustainable use (i.e. that the properties of the ecosystem are maintained) and resilience (i.e. that the capacity of the ecosystem to cope with fluctuations is kept or enhanced). In these cases, reference conditions characterised by sustainable use and adaptability can be selected. The Terms of Reference could request details about how reference conditions were established.

Should the assessment focus on species populations as indicators of ecosystem condition?

Description: For any ecosystem condition metrics, and / or for establishing ecosystem properties functionally linked to ES supply, it is important to recognise the spatial and temporal dynamics of populations (e.g., migration patterns) and ecosystems (e.g., natural variability in species dominance and community composition). Hence, not all species or species-based indicators are suitable for assessing conditions at all scales (United Nations et al., 2024). However, when species' life-history and ecological requirements are well studied, and the negative impacts of human activities on these populations well understood, species-based indicators are useful ecosystem condition indicators.

Example: Species-based indicators of ecosystem condition could include, e.g., population status of threatened species supporting fisheries or recreational fishing (e.g., the Norwegian Quality Norm for Atlantic Salmon).

Should the assessment specify ES-based restoration targets?

Description: A challenge remains about how to set targets for ecosystem restoration and how to monitor the impact of restoration actions. Assessing the impact of ecosystem restoration on ES will be challenging because besides the efforts of standardizing ecosystem condition metrics, there are in principle no guidelines about how restoration targets could be set, and how changes in ES would be monitored. It has been acknowledged that some ES can potentially be recovered, but this could be achieved either by restoring supply or altering demand, which adds important complexity to existing frameworks (Maron et al., 2017). However, ecosystem restoration actions could target the ability of ecosystems to support ES supply (ES potential supply) regardless of whether there is a current use or



demand. This approach would be more aligned with sustainability principles, understood as improving or maintaining the condition of ecosystems (not substituting them) so that ES supply will continue in the future also for coming generations. Setting restoration targets and monitoring progress based on ES will nevertheless be challenging and requires a systematic approach that can help disentangle some of the complex interactions between ecosystem condition, the capacity of the ecosystem to support ES, the potential flow and the use or demand.

Example: (1) Restoration of surface water bodies to reach drinking water standards. (2) Restoration of forest patches connectivity sufficient to ensure the long-term viability of old-growth forest species.

Should the assessment distinguish between indicators of ecosystem condition and of pressures on the ecosystem?

Description: The purpose of monitoring ecosystem condition and how it affects ES is to be able to detect when levels of use or human impacts are harmful and lead to undesirable states of the ecosystem. An *environmental pressure* is a human-induced process that negatively alters the condition of ecosystems. Due to the connection between *environmental pressures* and *ecosystem condition*, in some instances, environmental pressures are considered as indirect indicators of ecosystem condition. Especially when data on the state of ecosystems are limited, measures of pressures can serve as surrogates, provided the relationship between pressures and ecosystem condition are well understood. However, when the analysis of ecosystem conditions aims to identify cause-response relationships (of pressures on ecosystem condition), it is important to distinguish drivers of change (pressures) from the properties of the ecosystem to avoid circular reasoning. The distinction is relevant when the same level of pressure affects ecosystem types differently, and when the ecosystem responses to different levels of pressures are poorly understood. However, the use of pressure indicators as proxies may be justified in some cases, for instance, when differences between state and pressure indicators are difficult to tell, or when there is a lag between pressure evidence and state change. In any case, in assessments where ecosystem condition is evaluated, it is necessary to clearly communicate the alternative metrics that were evaluated, to justify the choices made, the kind of analysis that the assessment allows, as well as how the results should be interpreted.

Example: In the case of cropland, one pressure indicator could be the amount of nitrogen applied with fertilisers and the condition indicator, the nitrogen content in the soil or the amount of fertilizer residuals. Reference conditions should be selected carefully to account for natural levels of nutrients in the soil.

Should the ES assessment specify functional relationships between ecosystem condition and ES supply?

Description: One important caveat related to the ecosystem condition typology (ECT) in the SEEA EA is that it does not explicitly indicate criteria for the selection of variables that correspond to levels of ES flows measured in biophysical terms. However, these can be made explicit in ES assessments. If ecosystem condition variables that are responsive to management practices are integrated as factors in ES models, the ES assessment will enable



the analysis of how management actions affect ES supply. Making this connection explicit remains a challenge, but it is possible through the explicit formulation of ES models (Zulian et al. 2013, Vallecillo et al. 2018, Vallecillo et al. 2019, La Notte et al. 2021, La Notte et al. 2022). If the ecosystem properties in these models are subject to anthropogenic impacts, the connections enable us to analyse how the loss of or changes in certain properties translate into loss of benefits and increase in risks and costs for society.

Example: (1) Flower resources and nesting sites are critical properties of flower-rich meadows and grasslands which support wild pollinator species and the supply of pollination services. The area and qualities of these habitats can be integrated into models of crop pollination (e.g. Lonsdorf et al. 2011). Empirical data connecting habitat quality with levels of crop pollination are often lacking, but approaches based on expert opinion can be used (e.g., Zulian et al., 2013). (2) Another approach to establish functional relationships between ecosystem properties and ES supply is by defining species functional groups. Assessing the diversity of species grouped according to their 'effect traits' (*sensu* Lavorel et al., 2002) can inform levels of ecological function, for instance 'pollinators', 'organic matter decomposers', 'symbiotic nitrogen fixing organisms'.

Should the ES assessment evaluate whether levels of ES use match those of ES potential supply?

Description: If ES potential supply (see **Table A.8**) and ES current use are assessed independently, it is possible to quantify whether levels of use are sustainable, i.e., levels of use do not exceed those of ES potential supply. This kind of analyses is relevant for consumptive use as in the case of provisioning services, and / or when other uses of ES may have negative impacts on the ecosystem (e.g., cases of overcrowding in nature-based tourism).

Example: (1) The assessment will identify which levels of fish catch (ES use) are compatible with population recruitment capacity (population growth) (ES potential supply). (2) The assessment will identify visitor levels to a protected area (ES use) that ensure no damage to the vegetation nor negative impacts on wildlife populations (ecosystem condition/ES potential supply).



7.2.4.4 Ecosystem Condition, ES supply, Use & Demand in evaluating a proposal for an ecosystem service assessment

Once the proposals for ES assessments have been received, it is important to evaluate both if the needs and objectives identified in the Terms of Reference have been adequately addressed, and whether the technical quality of the proposals meet the envisaged standard.

Does the proposal clearly define how ecosystem condition will be assessed and monitored?

Description: The proposal should specify the indicators and data sources used to assess ecosystem condition, including how these indicators are sensitive to change and relevant to the ecosystem types under study.

Example: The proposal includes a list of condition indicators such as vegetation cover, soil organic carbon, and water quality, and explains how these will be measured or monitored over time.

Does the proposal distinguish between ES potential supply, actual supply and use?

Description: The proposal should demonstrate an understanding of the conceptual differences between these components and explain how each will be measured or estimated.

Example: The proposal outlines separate methods for estimating potential supply (*e.g.*, habitat suitability models), actual supply (*e.g.*, observed flows), and use (*e.g.*, consumption or visitation data).

Does the proposal include a method for assessing sustainable use of ES?

Description: The proposal should describe how they will determine whether the current or projected ES use exceeds sustainable levels, either through condition trends or supply-use comparisons.

Example: The proposal explains the use of a threshold-based approach to compare fish catch data with recruitment rates to assess sustainability of provisioning services.

Does the proposal address ES demand and potential mismatches with supply?

Description: The proposal should indicate whether the assessment will explore the relationship between ES demand and ES supply.

Example: The proposal mentions that the assessment will include stakeholder consultations to understand local needs for recreation and clean water, and will compare this with available data to identify areas of supply-demand mismatches.



Does the proposal integrate ecosystem condition into ES models?

Description: The proposal should explain how ecosystem condition variables will be used as inputs or constraints in ES models to reflect the impact of degradation or restoration.

Example: A crop pollinator model includes variables such as floral resources availability and nesting habitat quality derived from condition assessments.

Does the proposal include a plan for setting and evaluating restoration targets?

Description: The proposal should outline whether and how the assessment will support the identification of ecosystem restoration needs and the potential to define targets. This includes describing the ES that could benefit from restoration and the general approach to identifying degraded areas.

Example: The proposal states that the assessment will identify areas with reduced vegetation cover and poor water retention capacity, which may be prioritised for future restoration planning. The assessment will make projections in biophysical terms of the expected changes in the supply of two ecosystem services, amount of soil retained (erosion control) and soil moisture content (related to soil water holding capacity) during the crop growth season.



7.2.4.5 Glossary

Term	Definition
Biophysical valuation	The quantification of ecosystem services in physical units (e.g., tons of carbon sequestered, liters of clean water).
Ecosystem condition	Ecosystem condition is the quality of an ecosystem measured in terms of its abiotic and biotic characteristics.
Ecosystem service demand	The need for specific ecosystem services by society, particular stakeholder groups or individuals irrespective of current levels of use.
Ecosystem service potential supply	The ability of an ecosystem to provide services under current or reference conditions, regardless of actual use. It is a metric representing the level of provision of a service by a particular ecosystem, measured in biophysical units, irrespective of its actual use. It can be determined for a specified period of time (such as a year) in the present, past or future (Burkhard & Maes, 2017).
Ecosystem service (actual) supply	The current level of ES provision in biophysical units under the current condition of the ecosystem. In the SEEA EA accounting framework, ES supply tables record ES flows from different ecosystem types (United Nations et al., 2024).
Ecosystem service use (also referred to as ecosystem services flow (Schröter et al. 2014))	A measure for the amount of ES that are actually mobilised in a specific area and time, it refers to the actual utilisation of ecosystem services by people. It may or may not match the potential supply.
Environmental pressure	Human-induced process that negatively affects the condition of ecosystems.
Functional relationships (in ES models)	The causal links between ecosystem properties and the supply of ecosystem services.
Natural capital	Structures, function and condition of the ecosystem.
Reference condition	Ecosystem condition against which past, present and future ecosystem levels are compared to in order to measure relative change over time.
Reference level	Value of a variable at the reference condition, against which it is meaningful to compare past, present or future measured values of the variable.
SEEA EA (System of Environmental Economic Accounting - Ecosystem Accounting)	SEEA EA is a spatially based, integrated statistical framework for organizing biophysical information on ecosystems, measuring ecosystem services, tracking changes in ecosystem extent and condition, valuing ecosystem services and assets and linking this information to measures of economic and human activity (United Nations 2024)
Sustainable use of ecosystem services	(i) The level of ecosystem service use that does not exceed the ecosystem's capacity to regenerate or maintain service provision over time. In other words, when the level of



Term	Definition
	ecosystem service use does not exceed the ecosystem's ES potential supply. (ii) Sustainable use of ES is achieved when the use of one or more ES is not detrimental to the supply of other services. In this guideline, we use the first definition, since the focus is on models of single ecosystem services. An assessment of sustainable use following the second definition requires analysis of trade-offs and the assessment of multiple negative impacts of ES use.



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7.2.5 Spatial and temporal characteristics in ecosystem service assessments

7.2.5.1 General information

This section offers an overview of key concepts, definitions, and background information to highlight the importance of being aware of and transparently selecting the appropriate spatio-temporal scales in ecosystem service assessments. A useful introduction to the topic of mapping ecosystem services on various spatial scales can be found in Burkhard & Maes (2017). Temporal patterns of ecosystem services received less attention so far, but the review by Rau et al. (2020) provides a good starting point.

1. Why is it important to wisely select spatio-temporal scales?

When assessing ecosystem services (ES), understanding both spatial and temporal scales and their resolutions is crucial, because ecosystems operate across a wide range of conditions, locations, and periods. Each ES is influenced by different environmental, biological, and human factors that can vary significantly over space and time. While previous studies often assessed ES and their interactions only at a single spatial scale and single point in time, more recent studies highlight the importance of taking spatial and temporal variability into account, e.g. by following a multi-scale approach (e.g, Anderson et al., 2015; Cord et al., 2017; Xia et al., 2023).

2. How does the advanced content complement the Terms of Reference templates?

The advanced content and questions in this document complement the original questions posed in SELINA's Terms of Reference (ToR). These advanced questions help commissioners delve deeper into the relevance and applicability of spatio-temporal scales and / or give a feeling for the (in)completeness of the chosen approach.

By integrating considerations on the most appropriate spatial and temporal characteristics from the beginning, commissioners can ensure that the assessment is scientifically and technically sound and responds to the needs delivering the best possible results. Being in line with the latest research findings, they can derive the most significant benefit from explicitly considering multiple spatio-temporal scales in the ecosystem service assessment.



7.2.5.2 Space and Time in Framing and Scoping for an ecosystem service assessment

Although ecosystem services (ES) depend predominantly on the spatial component and the variation in spatial characteristics can explain the majority of changes in the supply of a respective ES, for many ES their changes over time also need to be taken into account (Qiu et al, 2020). However, a standardised scaling approach as in the spatial context has not yet taken place and thus making it more complicated to appropriately consider temporal characteristics in an ecosystem service assessment (Rau et al., 2018). In 2019, only 2% of all scientific studies addressing the ecosystem service concept, considered temporal variations in ecosystem service assessments (Rau et al., 2020).

When scoping for an ecosystem assessment, the spatial and temporal extent of the assessment are generally (more or less) predefined by the boundary conditions. In addition, for the methodological realisation, one is strongly dependent on the available data and its respective spatio-temporal resolution. However, the determination of the spatio-temporal scale(s) of the assessment allows for a certain flexibility and requires to make a conscious and informed choice, which influences the entire process chain and among others the choice of methods and the implications for spatial planning and management (Xia et al., 2023). Hence, it is recommended that the spatial and temporal scale of the assessment are carefully set.

Is the targeted spatial and temporal scale of the assessment explicitly stated in the Terms of Reference document?

Description: see explanation above.

Example: The outcomes of the assessment should be presented separately for each municipality on a quarterly basis.

Should trade-offs and / or synergies between various ecosystem services be assessed? If yes, it is recommended to explicitly analyse variations in temporal patterns.

Description: The supply of some ecosystem services remains constant, e.g. throughout the year, while for others it may change linearly, cyclically or non-linearly, e.g. due to seasonal variations or through a system shock. This question asks whether a bundle of multiple ecosystem services should be assessed and recommends to include temporal variations in supply, flow, and / or demand over the temporal extent in the assessment, as this might affect the final outcomes averaged for the reporting period.

Example: The supply of timber provision increases slowly but monotonically over several decades, while the trees in the area under investigation continue to grow. They are harvested at one point, resulting in a peak in ecosystem service flow. The cultural recreation service flow in the same forest ecosystem might fluctuate with a seasonal cyclicality. The regulating service of soil retention peaks high in phases of strong rainfall intensity. Depending on the time of the investigation, different results will emerge from assessing this ES bundle.



7.2.5.3 Space and Time in designing the Methodology of an ecosystem service assessment

Determining the appropriate spatial and temporal scales and resolutions is essential in ecosystem service assessments to ensure accurate, reliable, and meaningful evaluations. It affects the data collection strategies and the modelling approaches used. Coarse resolutions might miss essential local interactions, while very fine resolutions might be (too) resource intensive and unnecessary for certain assessments.

The appropriate scale strongly depends on the purpose of the assessment (Burkhard & Maes, 2017). For instance, carbon sequestration might be assessed at the plot level (to understand local interactions between carbon sinks and sources), at the landscape level (to understand regional climate implications and initiate management measures if needed), at global level (to obtain estimates of carbon sequestration needed for international environmental and climate agreements).

Assessing ecosystem services supply, flow, and use often requires multi-scalar analyses that combine different spatial and temporal scales to provide a comprehensive understanding.

What is the reporting frequency to be considered in the ecosystem service assessment?

Description: This question asks whether an update of the assessment is planned over a certain time interval.

Example: If you aim for restoration planning in a municipality following a five-year plan, you might need to repeat the tendered ecosystem service assessment with the same methodology on an annual basis over the five-year time interval to track and report on the progress of the restoration efforts.



7.2.5.4 Space and Time in evaluating a proposal for an ecosystem service assessment

Once an ecosystem service assessment has been completed, it is essential to evaluate its quality and usefulness. Here are some criteria focussing on spatio-temporal characteristics that may be helpful for identifying the most appropriate proposal.

What is the spatial resolution proposed and is it sufficient for the purpose of the ecosystem service assessment?

Description: This question asks whether the proposed spatial resolution is adequate for the specific objectives of the ecosystem service assessment and allows for making informed decisions without significant information loss. Consider the size of the key features under study. If the features of interest are smaller than the used pixel size or minimum mapping unit, the resolution may be insufficient.

Example: If you aim for restoration planning in a municipality, improving the ecosystem condition of a small river course and its surrounding floodplain, you would need a high spatial resolution that captures small-scale processes and allows for a spatially explicit implementation of restoration measures.

What is the spatial accuracy proposed and is it sufficient for the purpose of the ecosystem service assessment?

Description: This question is closely linked to the one on spatial resolution above and refers to how precisely the location and boundaries of features under study are represented on a map (spatially explicit or aggregated to a certain level).

Example: If you aim for identifying areas with significant recreational service value to prioritize for eco-tourism development and others for conservation management, it may be most suitable to obtain assessment outputs aggregated for administrative units. This provides actionable insights for decision makers, enabling them to balance conservation with tourism and optimize recreational benefits.

Was the regional context considered?

Description: Verify if the spatial extent in the proposal aligns with the spatial extent of the area you are interested in and if not, whether deviations were justified. Furthermore, check if the broader spatial embedding was considered, including adjacent land uses, connectivity with other ecosystems, impacts and dependencies from areas outside of the study area.

Example: If you aim for improving flood management strategies and enhancing biodiversity conservation in a riparian ecosystem surrounding a major river, it is most likely not sufficient to do an assessment for your municipality only (as spatial extent), but you would need to consider including upstream and downstream influences, as well as ecosystem connectivity along the river course.



Does the proposal address short-term and long-term temporal variation?

Description: Evaluate if the proposal includes short-term (immediate impacts and results) and long-term (lasting impacts, sustainability, time lag) assessments.

Example: Restoration efforts often require monitoring over different time periods to ensure the success and adaptability of the measures taken. When restoring meanders to formerly straightened rivers, an immediate impact may be a reduced flow velocity, while sediment deposition and its use as spawning ground will (eventually) follow with a time lag but therefore as lasting impact.

Does the proposal propose a multi-scale approach?

Description: Consider favoring proposals that employ a multi-scale approach, enabling the assessment of several spatial scales. Depending on the assessed ecosystem services, this flexibility is often necessary to address diverse stakeholder needs and ecological functions while keeping in mind broader ecological and economic contributions.

Example: At local level, a wetland provides direct ecosystem services to nearby residents, *e.g.* flood regulation, water purification. At a regional level, it is crucial for providing habitats for various species and contributing to climate regulation and mitigation of climate change by storing carbon in its biomass and soil. At national level, the wetland may support national regulation metrics or might be a focal point for national policies aimed at protecting important ecosystems. Besides, it could be a recreation site known for bird watching or eco-tourism attracting visitors from across the country.

Does the proposal propose monitoring?

Description: If the assessment of ecosystem services is carried out alongside the restoration measures, monitoring over several years is often desired to check whether the restoration measures are successful and fulfil the envisioned objectives.

Example: The restored river plain will be monitored on a quarterly scale over the next five years with the help of semi-automated analysis of high-resolution remote sensing data.



7.2.5.5 Glossary of relevant terms for understanding spatial and temporal characteristics in the context of an ecosystem service assessment

Term	Definition
Aggregation	This refers to the process where data that has been collected from various sources or finer spatial (temporal) units is combined, grouped or summarized to produce information at a broader spatial (temporal) scale or level of detail. It includes the notion of simplification.
Disaggregation	This refers to the process of breaking down aggregated data into finer, more detailed components. It involves taking summarized data and distributing it across smaller spatial units, time periods, or categories to better understand local variations or specific sub-components. It includes the notion of obtaining finer details but may likewise increase the complexity and uncertainty. For example, when focussing on social justice, it may be wise to disaggregate demographic data (<i>e.g.</i> , by age, gender, or ethnicity).
Minimum mapping unit (MMU)	This is the smallest size of an areal entity that is reliably mapped and represented as a discrete unit on a map. It reflects how spatial resolution is applied on a map. In the scoping phase, it helps to determine the spatial scale (level of detail) needed in the ecosystem service assessment.
Spatial accuracy	Spatial accuracy refers to the degree to which the position or location of features in a spatial dataset are correct or true to their real-world positions. It concerns the closeness of spatial data to the actual geographic location on the Earth's surface, <i>e.g.</i> , closeness of a modelling result to the ground-truthing dataset.
Spatial explicitness	Data or models incorporate detailed spatial information (<i>e.g.</i> , latitude and longitude), to show exactly where entities or activities are located (<i>cf.</i> Aggregation).
Spatial extent	It refers to the geographical location and the overall size (or two-dimensional extension) of the study area.
Spatial resolution	It is a technical term that refers to the level of detail of an input dataset, <i>e.g.</i> , data precision of a raster dataset ("pixel size") obtained from remote sensing.
Spatial scale	It refers to the level of detail at which a spatial assessment is/should be made, usually ranging from local, regional, national, to supranational and global. The person carrying out the assessment can determine it themselves.
Temporal extent	It refers to the overall duration or time period covered by the assessment.
Temporal resolution	It is a technical term that refers to the smallest time increment considered in the assessment, <i>e.g.</i> the measuring intervals of an indicator.



Temporal scale	It refers to the level of temporal detail, usually ranging from short-term (<i>e.g.</i> , daily or weekly) to long-term (<i>e.g.</i> , annual or decadal). The person carrying out the assessment can determine it themselves.



7.2.5.6 References

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7.2.6 Uncertainty in ecosystem service assessments

7.2.6.1 General information

1. **Why should you care about uncertainties in ecosystem service assessment?**

A conceptual simplification groups uncertainties commissioners should be aware of in ecosystem service assessment into three categories (**Figure A.11**):

- **scenario uncertainty** - predicted outcomes of your ecosystem service assessment may differ from futures that actually happen;
- **model uncertainty** - measurement errors in input data and model simplifications used by contractors may lead to predicted outcomes differing from what actually happens;
- **decision uncertainty** - the purposes of your assessment may be poorly defined for the contractor; or communication of the ecosystem service assessment outcomes by contractors to you may be inaccurate or insufficient

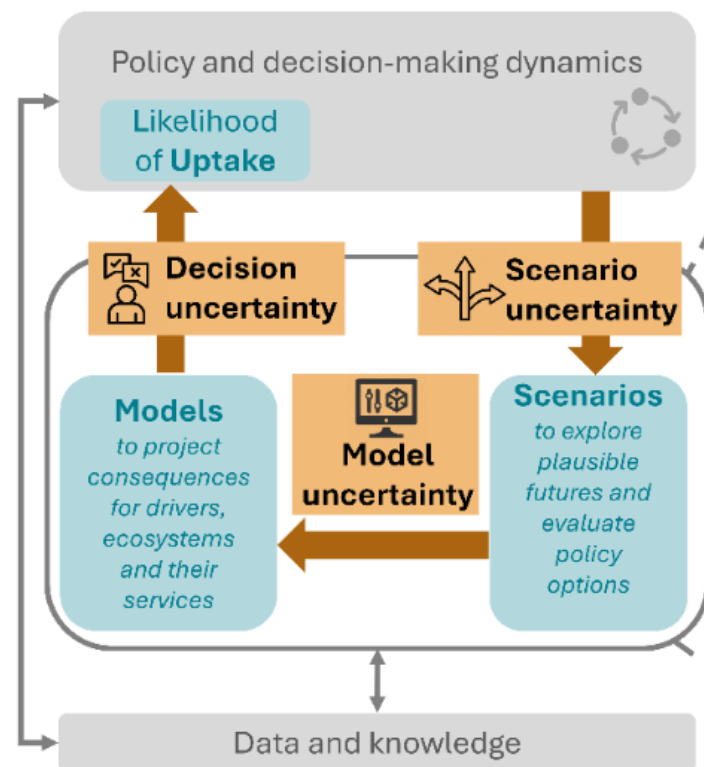


Figure A.11 - A conceptual model of uncertainties in assessing ecosystem services. *Source: adapted from Walther et al. (2025)*

1.2 **Why is documentation of uncertainties important to request from contractors?**

If the contractor doesn't document uncertainties the study will be less useful. Based on a large review of the scientific literature we conducted for SELINA (Walther et al. 2025) we see that ecosystem service assessments that don't document uncertainties are less likely to be



perceived as **credible, legitimate and relevant** by commissioners, and by the stakeholders concerned with the outcomes of the assessment.

1.3 How can you address uncertainties in your assessment?

From our reviews of published ecosystem service assessments and guidance documents we concluded that commissioners and contractors can do a few important things to improve a study's usefulness, whatever the ecosystem services of concern.

- **Commissioner:** clearly explain what the assessment will be used for. Explain your decision support needs. Specify policy entry points for the outcomes and any critical times for delivery of assessment results in relation to your decision or policy process. Increase legitimacy of the planned study by involving stakeholders in the scoping and framing of the ecosystem service assessments
- **Contractor:** these things will significantly increase the likelihood that the commissioner will trust and use the results of your work:
 - increase legitimacy by involving stakeholders in the ecosystem service assessment steps where possible (e.g. in data collection and validation, model assumptions, validation of results)
 - increase your confidence in and thereby the relevance of your work by comparing outcomes from different models of ecosystem services
 - increase credibility by documenting the input data and model uncertainties.
 - make the documentation public so it can be challenged by third parties and improved if and when needed.

Further readings on how we concluded with these simple recommendations:

Walther et al. (2025) <https://doi.org/10.1016/j.ecoser.2025.101714>

Barton et al. (2024) <https://doi.org/10.3897/oneeco.9.e120449>

1.4 What format(s) should you request for documentation of uncertainties?

As a commissioner you can ask for different ways of documenting uncertainties. The approach taken will depend on the purpose of your ecosystem service assessment.

- **Controlling decision uncertainty:**
 - Uncertainty report/section
 - Visual summary
 - Decision-relevant summary
 - Participatory documentation
- **Controlling scenario uncertainty:**
 - Scenario documentation
- **Controlling model uncertainty:**
 - Technical appendices



Table A.10 below provides further suggestions regarding these types of documentation that you can request from a contractor. If these don't meet your needs, develop alternatives with other stakeholders and discuss with the contractor.

Table A.10 - Approaches to documenting uncertainties

Uncertainty documentation	Description	Target purpose and examples
Uncertainty report/section	Ask the practitioners to document uncertainties in a separate section of the main report. Alternatively, ask for a separate short deliverable focused on describing uncertainties relating to the ecosystem service assessment. A report can include clear and popularised text, as well as summary tables displaying the uncertainties across all the different results, data sources and models used.	To inform, to decide or to design. A structured report on uncertainty can help design strategic planning by clarifying which ecosystem services have the smallest or highest uncertainty. Another example would be to help prioritizing actions and funding to ecosystem services whose measures are less certain.
Visual summary	Documenting uncertainties using visual cues can be easier and more intuitive to understand and communicate. Ask the contractor to report the uncertainties associated with the results using maps showing confidence levels for different parts of the study area; bars of confidence in interval in plots summarising model outcomes; a traffic light system can convey qualitative levels of reliability of the results (<i>i.e.</i>, green-orange-red).	To inform, decide and design. Uncertainty maps can be useful to inform spatial planning as areas where ecosystem services are most certain can be prioritised. Another example is the evaluation of the success of ecosystem restoration with the use of confidence intervals in plots. The efficiency of different measures can be more easily compared.
Decision-relevant summary	These types of summaries are tailored to decision-making. They can take several forms depending on the your interests such as: - executive highlights providing a high-level overview of uncertainties and their implications and relevance for	To inform and to decide. This type of documentation is key to have an overview to inform decision-making and decide implementations. For example a risk profile would support the establishment and comparison of policy alternatives by highlighting



Uncertainty documentation	Description	Target purpose and examples
	decision-making. This allows to underline the limitations and caveats of the results at a high-level. - risk profiles that would present the risks and limitations associated with different management options or recommendations given the uncertainties of the results. - main assumption register which would list the most critical assumptions that have been made in the ecosystem service assessment, their resulting uncertainties for the outputs of the assessment and their potential impact for decision-making.	the potential risks of each choice. The assumption register can be used in the same way.
Scenario documentation	Even if you have not requested a scenario analysis as part of the assessment, some assumptions about the future may be implicit in the contractors ES modeling, e.g. business-as-usual. As a commissioner you can ask for comparative tables where key results across different scenarios will be presented alongside their uncertainties. Commissioners can also ask for best and worst outcomes, compared to business-as-usual or status quo. These can be presented as upper and lower bounds associated with the results. Alternatively, the commissioners can also request for a more qualitative assessment relying on scenario narratives. These storylines would describe alternative versions of the results based on assumptions and expert-	To design and to decide. This type of documentation is extremely useful in the design phase. For example, it can help develop different adaptation strategies or select a policy option based on the most successful scenario. Another example is the preparation of risk management that can be supported by the identification of best and worst case scenarios.



Uncertainty documentation	Description	Target purpose and examples
	knowledge, but without modeling them.	
Participatory documentation	This type of documentation of uncertainties is qualitative and could be considered as the most basic level of documentation. It includes judgments from experts and / or relevant stakeholders regarding the uncertainties that pertain to the results. Involving stakeholders in the evaluation of the uncertainties can identify credibility issues and has the potential to increasing the legitimacy of the assessment.	To inform. This approach helps capture the concerns of stakeholders regarding the results of the ecosystem service assessment. It can be used to prioritise and identify specific goals in the development of strategy. Another example is to receive advice on the precautions that should be taken prior to deciding on or designing a policy.
Technical appendices	More advanced technical documentation can be requested. It is convenient as technical appendices to the ToR. Appendices encompass the detailed documentation of the data and model used. For full transparency you can ask for a description of the model structure, parameters and assumptions; methods for uncertainty analysis relating to the input data themselves and the results. For example, performing a sensitivity analysis on the results documents how the changes in the input data or the model affect the outputs.	To decide and to inform. This level of documentation supports a complete evaluation of the reliability and robustness of the methodology pertaining to the results. It allows to justify the results and the technical choices in front of commissions and steering committees. It also helps to identify key factors influencing the results and that should be addressed through policy interventions.



7.2.6.2 Uncertainty in Framing and Scoping of an ecosystem service assessment

In this section we have a few simple questions to continue scoping what you need for uncertainty. As a Commissioner the main issue to ask the Contractor is to align the ecosystem service assessment with your decision-making needs. A common understanding of scope - “what, when, where, for whom” - of the assessment is the key to reducing decision uncertainty. When this is clear you can move on to the next sections on methodology and evaluation - the “how” of it.

Checklist of scoping questions for Uncertainty - does Frame & Scope cover what you need?

1. Are the temporal and spatial scales and resolutions of the ecosystem assessment consistent with your decision-support needs?
 - 1.1. Is the timeline of the ecosystem service assessment you are considering aligned with the timeline of the decision-making it will support?
 - 1.2. Is the smallest land unit you are requesting enough to make a decision?
2. Have all the stakeholders relevant to the decision-making been identified?
3. Does your ES assessment need to follow a standardized methodology? (*e.g.*, municipal or national standards, SEEA EA²³, IPBES²⁴, IPCC²⁵ science-policy)
4. If you are using a standard, what are the indicators to use to define the ecosystem services? If you are not using a standard, are you clear about which indicators will help support your decisions?
5. Is it important that the Contractor separately explains their value judgements about the decision alternatives and modeling uncertainty about the impacts of the decisions? Should you request a separate uncertainty report/section?
6. Do you need to make decisions on which indicators to monitor to further reduce model uncertainty cost-effectively?

²³ System of Environmental Economic Accounting

²⁴ Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

²⁵ Intergovernmental Panel on Climate Change



7.2.6.3 Uncertainty in designing the Methodology of an ecosystem service assessment

Should the uncertainty pertaining to the results be quantified or assessed qualitatively?

Description: Answer yes, maybe, or no. Alternatively the choice can be left to the potential contractors.

This question covers all types of results requested in this assessment including supply and use of ecosystem services, condition indicators, health metrics, social and justice metrics, biophysical and economic values of ecosystem services.

Quantifying uncertainties and reporting them alongside the results is essential to understand the risks and level of variation associated with these results. Uncertainties can be difficult to quantify, therefore sometimes a qualitative assessment is easier to perform.

Why is it relevant? Every result from an ecosystem service assessment should be associated with an assessment of uncertainty to inform the commissioners how much they can rely on them with respect to the specific purpose of the assessment.

Example: If your purposes is to compare and rank or order ecosystem services in several places, at different times or for different decision alternatives, you will most likely need a quantitative assessment of uncertainty (*e.g.*, with statistical measures of confidence). If your are mapping or assessing a single situation (*e.g.*, a map of an ecosystem service in a study area last year), it might be sufficient with a qualitative description of uncertainty. There are many ways this can be done. See [8.2.6.6 The science of Uncertainty - expert content](#) for an example of a “national policy level” qualitative confidence assessment matrix used by IPBES.

Should the spatial variation of input data and output results be displayed in maps?

Description: Answer yes, maybe, or no. Alternatively the choice can be left to the potential contractors. Spatially-explicit results are results that are displayed in maps, such as maps of ecosystem services and other indicators, where variations across space can be seen..

Why is it relevant? Displaying ecosystem services variation in space is intuitive, salient and increases credibility by demonstrating model accuracy and context sensitivity. Some types of areas might show more variability than others. This variation across space implies that confidence in decision-making could vary depending on the areas.

Example: In

Figure A.12 below, two model outputs are compared in maps. The methodological differences and robustness of the model outcomes (land cover) to choice of method are visually intuitive.



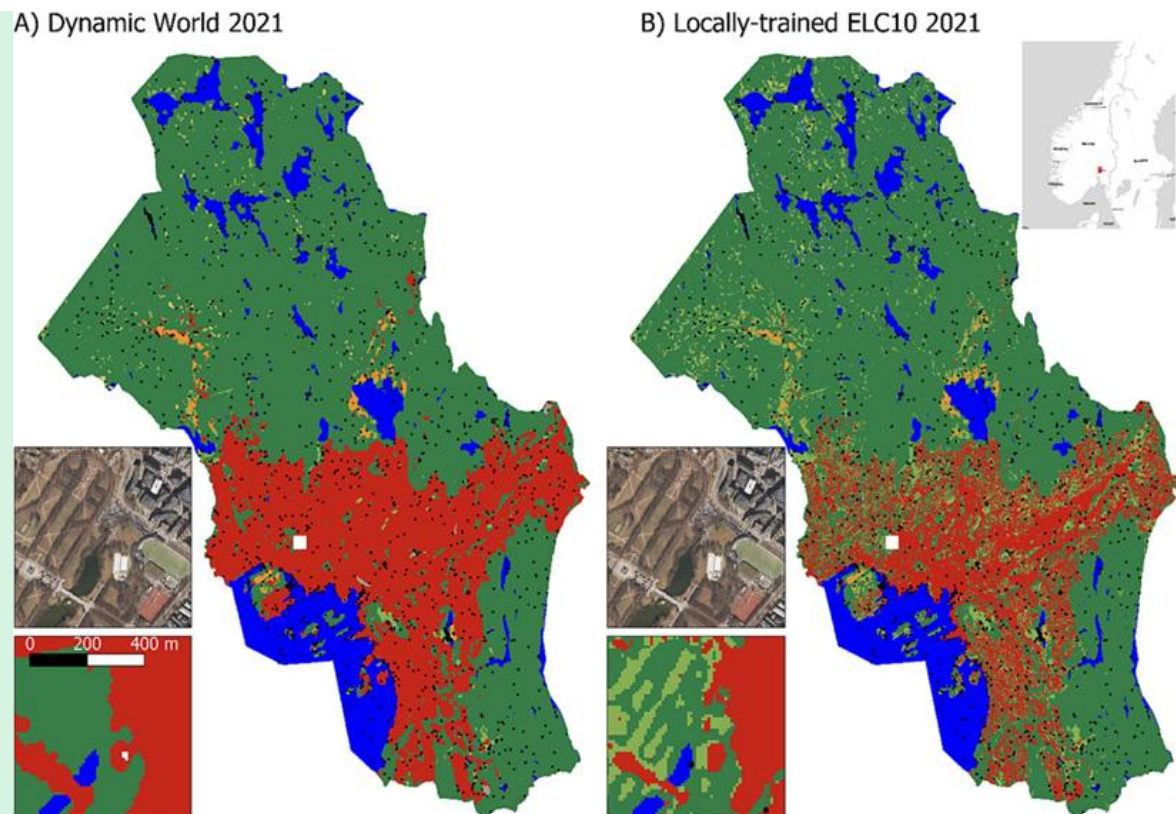


Figure A.12 - Maps of ecosystem extent in 2021 for Dynamic World and custom map which is a version of ELC10 trained on local reference data. *Source: Vanter et al., 2024*

Should the temporal variation be reported?

Description: Answer yes, maybe, or no. Alternatively the choice can be left to the potential contractors. Temporally-explicit results are displayed for different periods of time such as yearly, monthly, daily etc. It also means that the date of results and source data are clearly labelled and identified.

Why is it relevant? Ecosystem services and other metrics and indicators such as ecosystem condition vary over time. Variation depends on the periodicity and length of time results need to be reported. Some time periods could have less uncertainties than others. This variation of confidence across time is essential to be taken into account in decision-making.

Example: Figure A.12Figure A.13 below reports the outcome variable at different temporal resolutions - it shows that STRAVA recreational user frequency data is sensitive to the temporal resolution of the data with monthly results (A) presenting less variation than weekly (B) and daily (C) results:

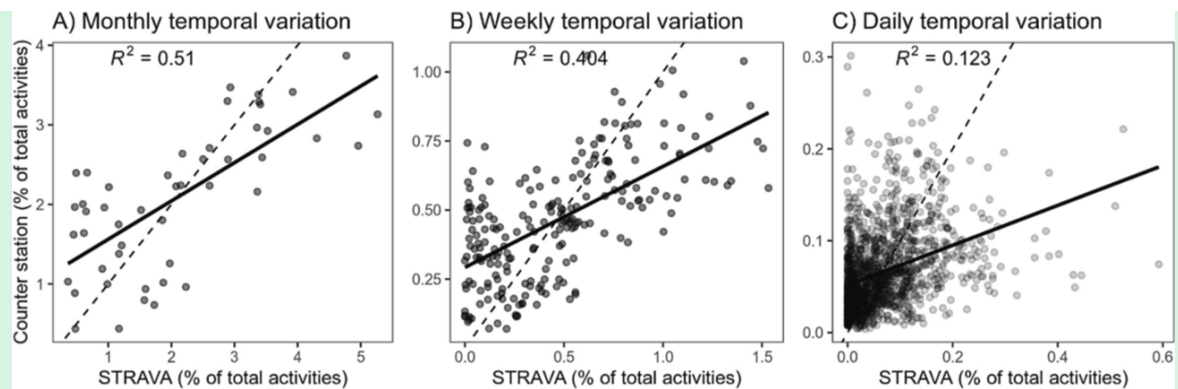


Figure A.13 - Temporal correlation between Strava and counter station activity counts between 2016 and 2020 for three levels of temporal aggregation including monthly (A; n = 48), weekly (B; n = 217) and daily (C; n = 1519) sums. *Source: Vanter et al., 2023*

Are indicators and / or metrics clearly defined in the proposal?

Description: Answer yes, maybe, or no.

Why is it relevant? Vagueness or openness of interpretation in the definition of the indicators and / or metrics to be measured may lead to uncertainties in the use or interpretation of the results

If ecosystem services are quantified, do you want to specify the acceptable level uncertainty in the model (significance levels)?

Description: Answer yes, maybe, or no. If yes and if the commissioner has the expertise, specify the significance level. Alternatively the choice can be left to the potential contractors. Significance levels in statistical models can be chosen and let you decide how certain you need to be about the variable predicting ecosystem service outcomes. This is a methodological choice made by the contractor which can affect accuracy of the outcomes.

Significance level could depend on the purpose of the assessment and how consequential the outcomes are (risk).

Another kind of uncertainty threshold is how confident you need to be about the outcomes of the ecosystem service costs and benefits. If this is a relevant question see [section 2. Confidence levels and Thresholds for making a decision](#) of [8.2.6.6 The science of Uncertainty – expert content](#).

Why is it relevant? The contractor can recommend the statistical criteria that are used throughout the assessment. Making an explicit choice makes the accuracy of the models used to support decision-making more transparent.

Deciding on the acceptance threshold of results can be very difficult in relation to the purpose of the ES assessment. This is an oft neglected decision. If commissioners do not have sufficient knowledge or expertise, we recommend to broadly describe the conditions under which they would find the results acceptable and feel confident enough to use them.



Example: For example, an error rate of 5% on predictor variables is commonly acceptable in the scientific literature but, depending on the scrutiny the models will be put under, this threshold could be placed higher (*e.g.*, 10%) or lower (*e.g.*, 1%).

See [section 2. Confidence levels and Thresholds for making a decision](#) of [8.2.6.6 The science of Uncertainty – expert content](#) for an example of acceptance thresholds for assessing confidence levels in the outcomes of the ecosystem service model.

Should the ecosystem service assessment evaluate how robust the results are for different scenarios?

Description: Answer yes, maybe, or no. An assessment considering different types of scenarios will provide different results according to different changes in indirect drivers such as climate, other environmental conditions, change in governance etc.

Why is it relevant? The results of the ecosystem service assessment will vary depending on both the choice of the scenario and how it is defined. Sometimes, the assumptions made for each scenario can have a bigger impact on the final results than small uncertainties within the model (chain) itself, which can lead to different results and thus different decision-support conclusions.

Example: If a model estimates water availability in a region, the results will notably vary depending on assumptions about future rainfalls. A scenario assuming high rainfall might suggest no water shortages, while a low-rainfall scenario could indicate severe scarcity. In this case, the choice of rainfall scenario has a greater effect on the outcome than small uncertainties in the model's calculations for assessing confidence levels in the outcomes of the ecosystem service model.



7.2.6.4 Uncertainty in evaluating a proposal for an ecosystem service assessment

Does the proposal follow a standardised framework to report and communicate uncertainties?

Description: Answer yes, no, or not specified.

Why is it relevant? Some frameworks such as the IPBES or IPCC describe how ecosystem services should be measured and give guidance on how uncertainty should be communicated. However, there are few standard protocols that can be followed or tailored.

Example: A qualitative approach describing state of knowledge about the ecosystem service being modelled: the ecosystem service modelling for air pollution mitigation from urban trees is “unresolved” - models at individual tree level and city landscape level show different air pollution mitigation efficiencies of vegetation. See section 6 for confidence assessment matrix used by IPBES.

A qualitative approach describing model quality: this is an ecosystem service model application with a AA quality rating. See section [4. Qualitative description of the confidence in models](#) of [8.2.6.6 The science of Uncertainty – expert content](#)

In Environmental Impact Statements following national legislation there may be guidance on how uncertainty should be communicated, *e.g.* with ranges either quantitative or qualitatively

There are no formal guidelines for documenting uncertainty in *e.g.* ecosystem accounting, despite SEEA EA being an international statistical standard. Venter et al. (2024) show how confidence intervals can be applied in an uncertainty audit of an extent account.

Has the contractor allocated a specific budget to documentation of the uncertainties? Does the contractor justify the budget in relation to the purpose of the ecosystem service assessment?

Description: Answer yes, maybe, or no. Analysis and documentation of uncertainties in ecosystem service ecosystem service models takes time. A contractor who has specifically planned and budgeted for this part of the analysis shows an awareness of its importance for study credibility. The contractor should be able to explain the relationship between the resources allocated, the uncertainty assessment methods and the purpose of the study.

Why is it relevant? Assessing and reporting uncertainties take time, the commissioner should ensure what is being proposed by the contractor is realistic as results without their uncertainties cannot be used reliably for decision-making. Public transparency and third party review increases confidence in the methodology.

Example: The assessment’s purpose is to provide input to ecosystem service criteria in a multi-criteria decision analysis. Ranking of decision alternatives is expected to be sensitive to some input data and model assumptions. Therefore, the contractor proposes that about 20% of resources for ecosystem service modeling will be allocated to sensitivity analysis and reporting. About 10 % of reporting will be allocated to documenting and publishing model code on a publicly accessible platform such as Github.



Are the information needs of every affected stakeholder clearly identified?

Description: Answer yes, maybe, or no. The results of ecosystem service assessments will rarely be used by the commissioner only. Other stakeholders can use them for other purposes.

Why is it relevant? Stakeholder involvement provides legitimacy to the assessment process, which can reduce uncertainty of results being misunderstood, misused, disqualified or ignored.

Should the assessment include documentation of stakeholder uptake?

Description: Answer yes, maybe, or no. Documentation of stakeholder participation in ecosystem service assessment process (*e.g.*, methodological design, validation of its outputs and scope) and the outcomes of their participation may lead to stakeholder use of the ecosystem service assessment results.

Why is it relevant? Transdisciplinary science-policy collaboration in assessments are more likely to make the ecosystem service assessment consequential and less contested; documentation of stakeholder participation can also strengthen learning, reducing future assessment uncertainty.

If ecosystem condition and / or capacity are input variables in the ecosystem service model, should the uncertainties for these variables be assessed?

Description: Answer yes, maybe, or no. Management measures can be aimed at increasing the capacity of a site (*e.g.*, visitor WCs), or improving condition (*e.g.*, bathing water quality).

Why is it relevant? Condition-capacity-enabled models are potentially more sensitive to management measures and therefore more useful for operational decision-making. However, these models are more complex, may be in model chains, where uncertainties are present at multiple steps of the modelling and should be addressed and reported.

Example: See model chain question below.

Does the proposal offer propose using a chain of models to compile the ecosystem services of interest?

Description: "A chain of models means that the input of one model comes from the outputs of another model. In that sense, models are successive to each other and form a chain as they are dependent on one another.

Using chains of models are not uncommon when modelling ecosystem services. This type of modelling can be difficult to handle as a change in one model will impact wither the entire chain or only part of it depending on where the change is located along the chain. In the example below a decision to change the extent and, condition of an ecosystem has

impacts on values through a linked set of models for the values which is compared to costs (Figure A.14).

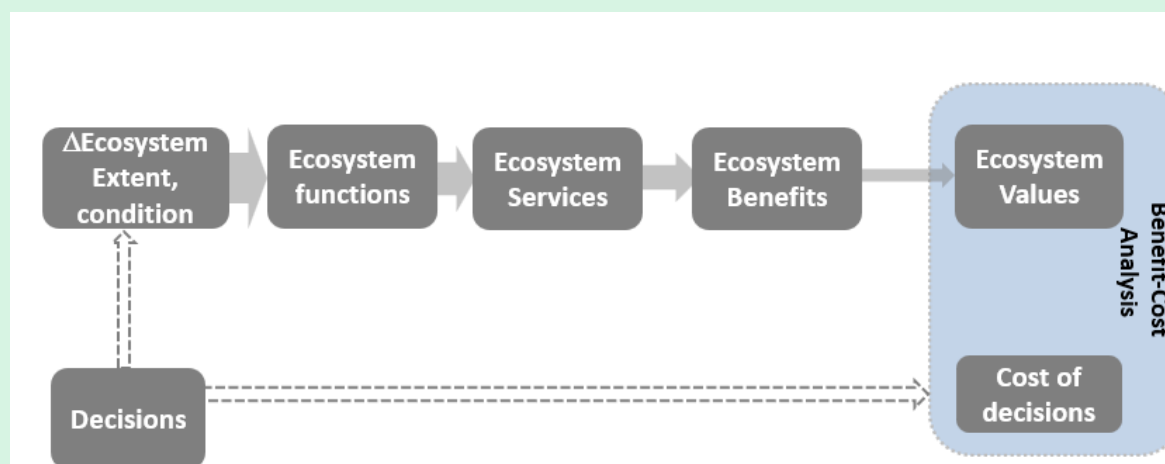


Figure A.14 - Logical chain to model ecosystem services. *Source: adapted from Barton et al., 2018*

Why is it relevant? In the proposal stage, applicants might only present a broad summary of what will be used. In that case, it would be helpful for the commissioners to follow up and ask for more details during the negotiation phase.

The main challenge with chains of models is that the uncertainties propagate from one model to the other along the chain, having a snowball effect at the end of the chain. This means that errors and variabilities that are inherently present in the model and data used cumulates along the models of the chain. As a consequence, the uncertainties linked to the results of chains of models can be really high. Studies that take uncertainty seriously, often find that cumulative uncertainty is too high to offer decision-support.

Commissioners should be very careful with contractors that offer chains of models as they might oversell the confidence in their modeling results. We recommend the commissioners to discuss these issues thoroughly with the contract and refer to experts if needed. Section 6 also present some brief content for contractors on this.

Example: On the one hand running uncertain (stochastic) models together is the only way to assess cumulative uncertainty. Mathematical methods for doing this are well known, e.g. Markov-Chain-Monte-Carlo (MCMC). If the models consider uncertainty (are stochastic), both error and variability are propagated along the chain - the “signal” from the physical change in the ecosystem at one end, to the value outcome at the end of the chain is weakened (attenuated) along the chain. Studies that take uncertainty seriously, often find that cumulative uncertainty is too high to offer decision-support. On the other hand, if models are conceptually linked, but run one by one, the outcomes at the end of the chain will appear more certain than they really are. This presents the Contractor with an incentive to not use linked models, overselling the confidence in their modeling results.

One reason model chains propagate uncertainty is that the spatial and temporal resolution - illustrated by the different dotted and dashed lines in the figure below - do not match

perfectly between the output of one model and the input of the following model in the chain. When this is the case, the model interfaces have to be adjusted. With this adjustment some information is lost at each model interface. When assessing the impact of a management measure upstream on ecosystem service downstream in the model chain, the “signal” of the measure is dissipated - information is lost at each model interface. See the example from modeling of nutrient abatement measures below. In the example, the longer the model chain the more accumulated signal dissipation - the more accumulated uncertainty between the measure upstream and the benefit of improved water quality downstream (Figure A.15).

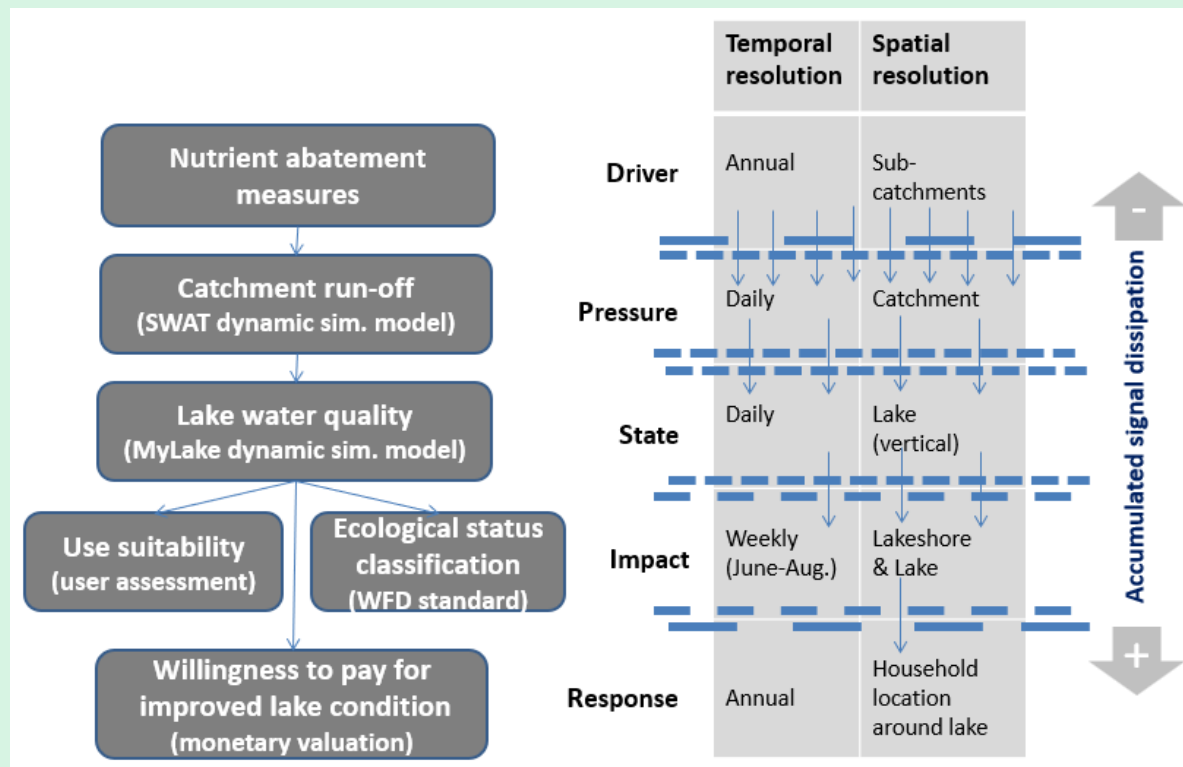


Figure A.15 - Example of model chain. Source: Barton et al., 2016.

Does the proposal indicate that the model(s) used in the ecosystem service assessment will be validated and tested?

Description: Answer yes, maybe, or no. Some modelling approaches require to use two independent sets of data. One set will be used to build the model, this means that we give these data to the model so it can learn from it and tune its parameter to fit the data at best. This set is commonly called a training set. And one set to actually run the model and test it to see if it works in the real world on data that it has never seen before. This set is commonly called a testing set. Empirical independent data refer to this testing set.

Why is it relevant? Trusting the results partially includes comparing them to reality. This reality cannot be represented by data that have been used in the modelling process as it would introduce circularity. It is important that contractors flag to commissioners that the validation process will be performed with independent data.

Example: In the example below, a part of the data is held back for testing, while the majority of the data is used to train the model (**Figure A.16**).

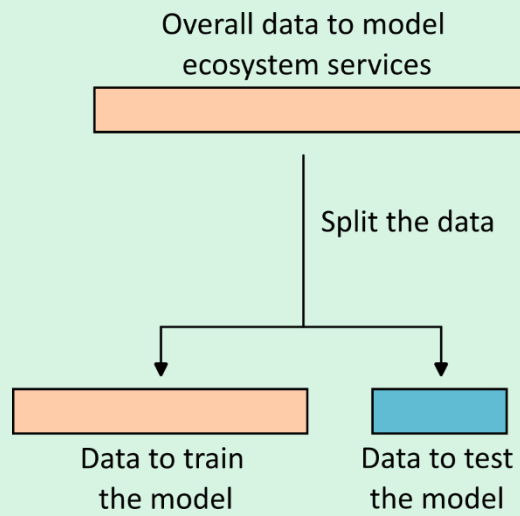


Figure A.16 - Testing and validating a model with training and testing data sets. *Source: own elaboration.*

7.2.6.5 Uncertainty in evaluating the outcomes of a study after completion

- How has the uptake by stakeholders be documented?
- Have the lack of uptake been explained in the assessment?
- Were the stakeholders properly involved in the assessment process to facilitate the uptake? (refer to social content as she describes a bit about how you should integrate stakeholders)



7.2.6.6 The science of Uncertainty - expert content

1. **Precision and Accuracy**

Uncertainty about an can be described in terms of precision and accuracy. See **Figure A.17** below. Accuracy can be described in terms of validity and reliability. Is the model indicator describing the ecosystem service (construct validity); is it reliably predicting the outcome or does it have a bias? Precision is about the amount of error or noise we have in our measurement of the variables predicting ecosystem services, which may result in error/spread in the ecosystem service outcome modelled (if it is a statistical and not a deterministic model).

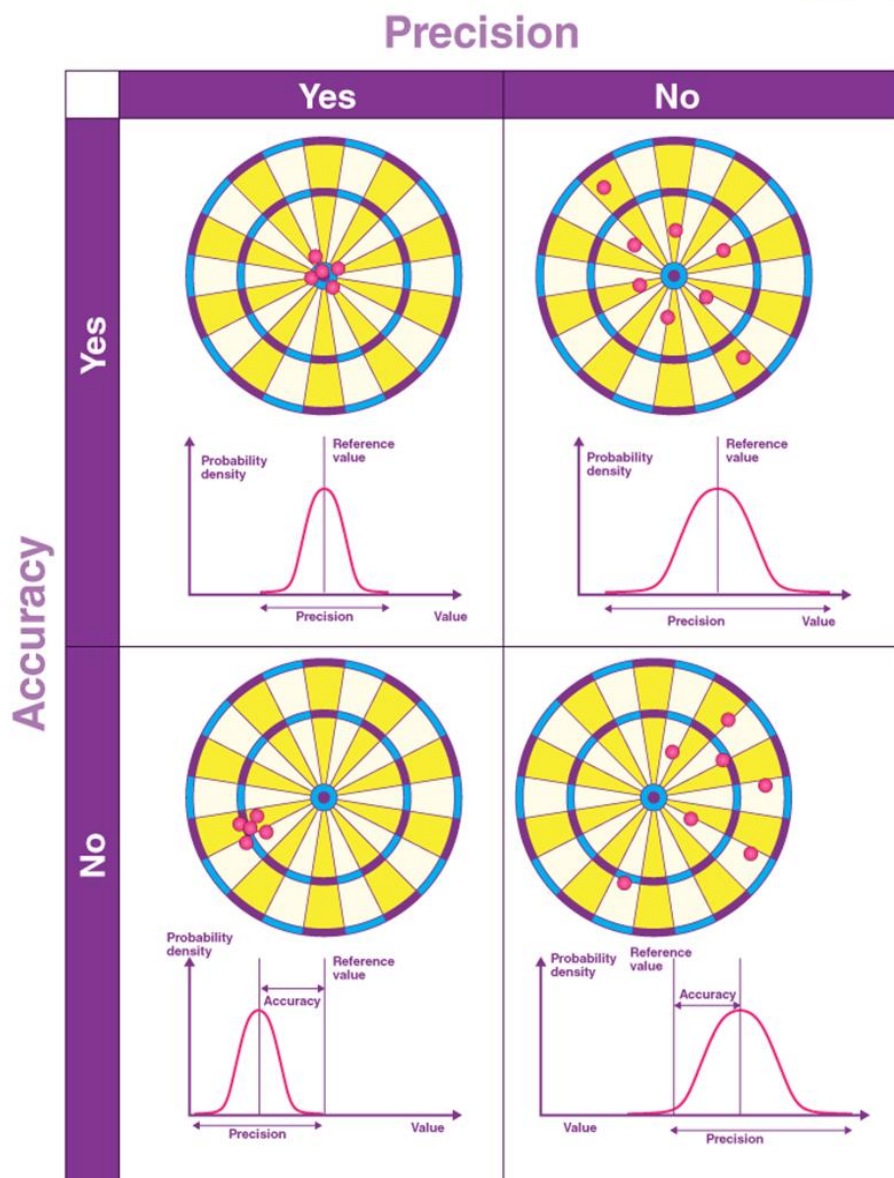
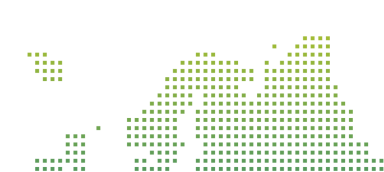


Figure A.17 - Precision and accuracy. *Source:* <https://byjus.com/physics/accuracy-precision-measurement/>



2. Confidence levels and Thresholds for making a decision

As an example, The Water Framework Directive regulates that water bodies can have a derogation from reaching “good ecological status” if costs are higher than benefits (net benefits < 0 ; so-called “disproportionate costs”). In the following example the contractor has calculated the net benefits of three physical measures to improve water quality relative to the status quo. The confidence threshold the decision-maker chooses determines whether to require ‘good status’ or not (=derogate). Does the decision-maker need to be 75%, 95% or 99% sure that benefits $<$ costs? This is not a methodological question to be decided by the contractor, but in this case a policy decision to be made by a water authority commissioning the work (**Figure A.18**).

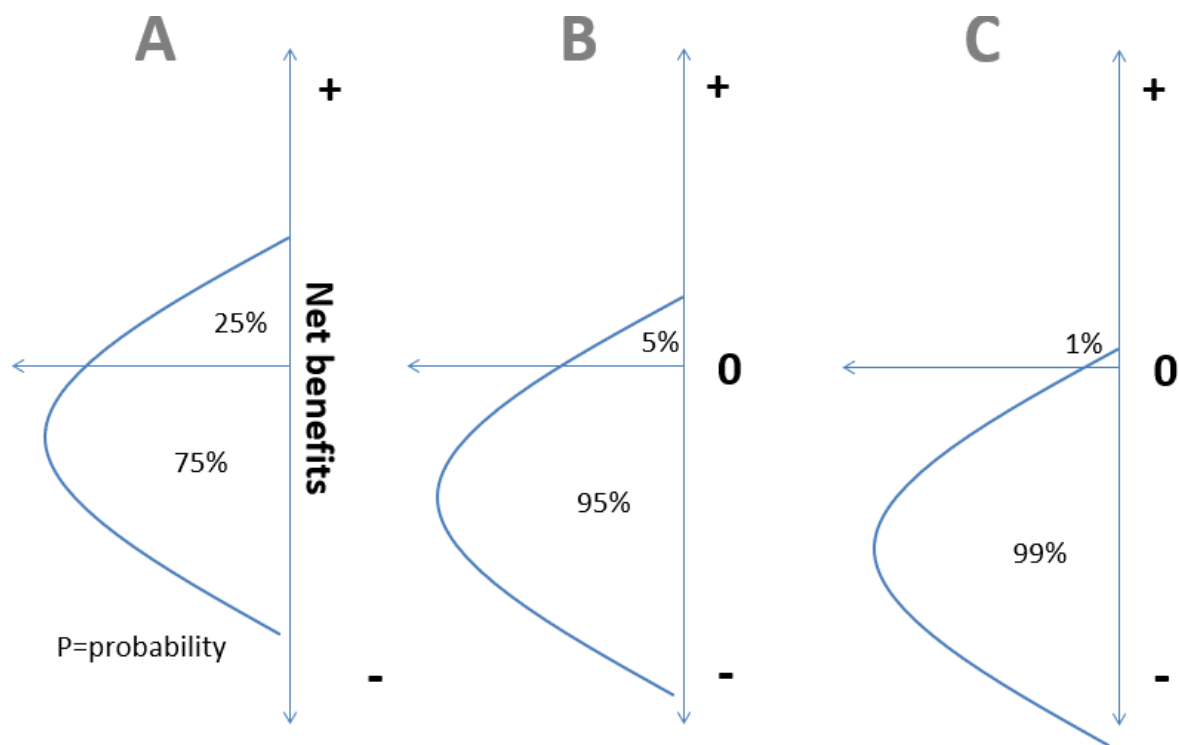


Figure A.18 - Example of confidence levels. *Source: own elaboration*

3. Qualitative communication of the confidence in ecosystem service model knowledge to policy-makers

The IPBES uses the following matrix to communicate confidence in scientific knowledge qualitatively (**Figure A.19**). Note that relatively **high agreement** on ecosystem service assessment science and relatively **robust evidence** can still be too **inconclusive** for operational decision-support.

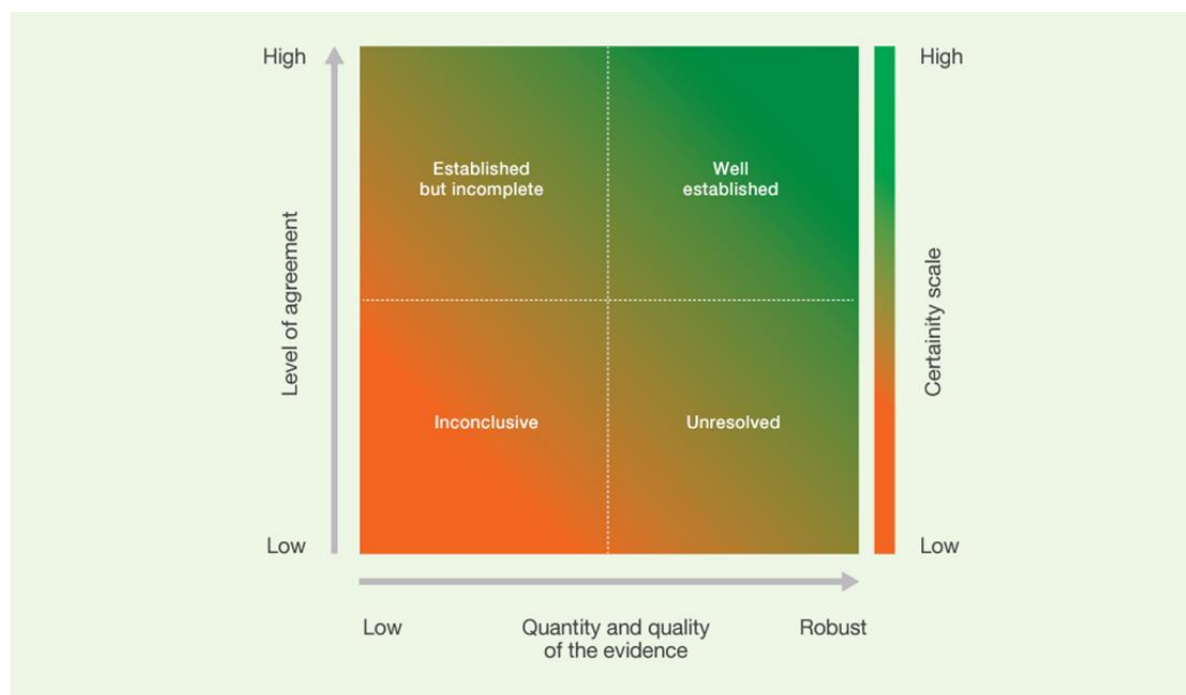


Figure A.19 - The four-box model for the qualitative communication of confidence. *Note: Confidence increases towards the top-right corner as suggested by the increasing strength of shading. “Well-established can be further subdivided into “very well established” and “virtually certain”. Source: IPBES Assessment Process (2016)*

4. Qualitative description of the confidence in models

Wageningen University uses a qualitative descriptions of the quality of models (Figure A.20). It can be applied to ecosystem services models as well.

Norms for quality; status A and AA			
Assuring and assessing the quality of a model, requires a definition of quality and norms that delineate specific quality levels. At WUR the quality of models is defined in 22 requirements, which are grouped according to 7 topics within 3 perspectives. For most of these requirements, norms are formulated at two levels: A and AA. Point-wise listing of the norms A and AA are provided in this folder, more elaborate descriptions are found on intranet.			
Science & Technology ST.1: description 1.1: <u>General description</u> A purpose * area of application * theoretical framework * paradigms 1.2: <u>Conceptual and formal model</u> A explicitly documented * assumptions * simplifications * embedded in literature AA motivated complexity * peer-reviewed scientific publication ST.2: Technical implementation 2.1: <u>Implementation</u> A Basic structure * flow diagram AA Code commenting * motivated (modular) design * code review 2.2: <u>Technical Environment</u> A Language * IDE * settings * limitations 2.3: <u>Tested</u> A Tests documented * protocol * untested components named AA Tests on schedule * periodic evaluation on completeness	ST.3: Parameters, variables, inputs and output 3.1: <u>Parameters and variables</u> A Quantities * units * default values * default source * description AA Range * Precision 3.2: <u>Calibration</u> A Procedure * results discussed 3.3: <u>Input & Output</u> A Structure * format * quantities * units * precision * description * link variables & parameters * version echo AA (Inter)national standards * input echo & timestamp 3.4: <u>Origin of data</u> A Data preparation pipeline * source * scripts tested AA Protocol for acquisition * periodically updated ST.4: Evaluation 4.1: <u>Sensitivity analysis</u> A Tailored to model/dataset type * documented * discussed AA Protocol * evaluated 4.2: <u>Uncertainty analysis</u> A Qualitative discussion AA Quantitative analysis * evaluated	4.3: <u>Validation</u> A Discussed * non-validated components named AA Protocol * evaluated 4.4: <u>Use monitoring</u> A Example studies listed AA Use & use(r) experience tracked * evaluated * documented 4.5: <u>General assessment of quality</u> A Relate goal to: test * sensitivity * uncertainty * validation * use AA Include reliability * precision * data used * external review Development & Organisation: DO.5: Planned development 5.1: <u>Development plan</u> A List of plans * progress reported * based on evaluation AA Further evaluation * periodically updated 5.2: <u>Version control</u> A Documented * acceptance criteria * (WUR) central archiving AA Protocol for documenting & code-commenting DO.6: Organisation 6.1: <u>The metadata</u> A Domain appropriate format AA FAIR	6.2: <u>Management plan</u> A Responsibilities: content * technical * next-in-line * ownership * financial cover AA Vision on future * periodically updated 6.3: <u>Dependencies</u> A Datasources * (third-party) use AA Tracked * Obligations * liabilities 6.4: <u>Formalised external use</u> A Conditions for use * User support AA User agreement * legally checked * financial paragraph Interpretation & Use: IU.7: User documentation 7.1: <u>Interpretation guidance</u> A Goal * area of application * theoretic framework * summary of evaluations * general public AA Reflection on goal, area of application, structure, complexity 7.2: <u>User manual</u> A Operation instructions * installation guide * summary of technical documentation * minimal system requirement * format of input & output * contact information
Self A AA			

Figure A.20 - Qualitative description of the quality of models. *Source:* [WUR guidelines on model management - Research@WUR](#)



5. Advanced Scoping Issue - the required accuracy of your ecosystem service assessment depends on the purpose.

Should an ecosystem service assessment always use ‘best available data’ and maximum accuracy? Because increasing the resolution of data is costly, that may not be a cost-effective strategy. A consideration of the purpose of the assessment, can help benchmark in qualitative terms how accurate the assessment needs to be. This is easiest to explain for a single metric, like the monetary value of ecosystem service.

In **Figure A.21** below we see examples of different assessments in coloured “chevrons” at the bottom of a gradient from low accuracy to high accuracy requirements. Accuracy is defined as a combination of precision and reliability.

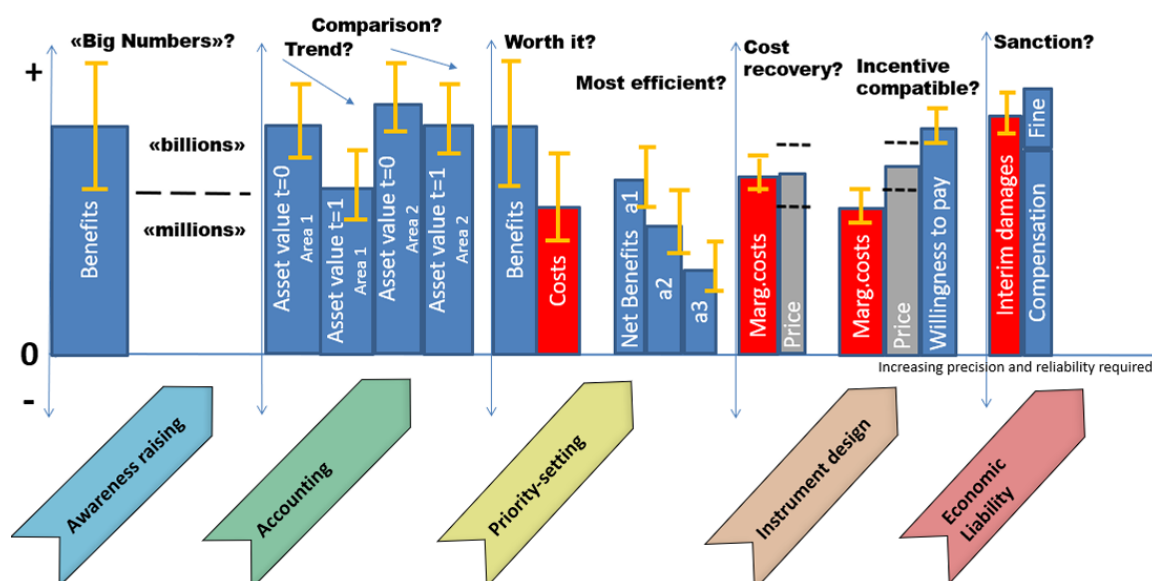


Figure A.21 - Decision support contexts of monetary valuation and conceptual differences in the requirements for precision and reliability. *Source: adapted from Barton et al. 2016*

- **Is the purpose of your ecosystem service assessment to INFORM?**

The least stringent accuracy requirements are for ES valuation for ‘**awareness raising**’. Awareness raising often aims to document large absolute values of ecosystem services.. The accuracy requirement can often be in the “ order of magnitudes” - “millions or billions?” The uncertainty documentation requirements can be qualitative.

The accuracy requirement for **ecosystem accounting** is greater than for awareness raising. The requirements for accounting are more than just “big numbers” because accounting’s purpose is to observe significant changes over time, or to compare differences between accounting areas. A comparison will always require more accuracy than just wanting ‘a big number’.



- **Is the purpose of your ES assessment to DECIDE?**

In benefit-cost analysis for project **screening** purposes, projects need to pass the test of “is it worth it?” For **priority-setting** – “what is more efficient?” – valuation methods need to be accurate enough to be able to rank alternative policies/projects.

- **Is the purpose of your ES assessment to DESIGN policy?**

For policy **instrument design**, the requirements may be for more or less accuracy than decisive purposes. It depends on the policy instrument being designed. For example with economic incentive instruments, there may be several pricing and incentive design principles in play. For example, in estimating a municipal fee for ecosystem services utilities, fees should recover costs of utility delivery only. Some margin of cost recovery error may be permitted on an annual basis and refunded to households. In another example, payments for ecosystem services (PES) valuation needs to be accurate enough to distinguish marginal willingness-to-pay from marginal cost of supply in order to determine a financially feasible payment level.

- **Are your ecosystem service assessment results to be used in a legal setting?**

This is not a frequent situation, but is useful as an example ‘at the other end of the accuracy scale’ from awareness raising with “big numbers”. For example, for economic **liability and compensation**, valuation methods need to be accurate enough to be used as evidence or “stand up in court”. For this example, accuracy needs to be sufficient for a court to calculate economic compensation for interim damages. The court needs to set a compensation amount that, with confidence, is not confounded with any additional fine the court imposes on the responsible party. The degree of accuracy may be smaller or greater than for instrument design, depending on the legal case.

In summary, the purpose of the ES assessment should provide a sense of the accuracy required, and by extension the amount of documentation needed from the practitioner carrying out the study.

Further readings:

https://seea.un.org/sites/seea.un.org/files/documents/EEA/discussion_paper_5.1_defining_values_for_erg_aug_2019.pdf

6. Advanced Scoping Issue - Balancing information needs and the costs of the study due to the accuracy requirements, scale and resolution

There are interlinkages between the accuracy requirements of the assessment purpose, the geographical scale and resolution and the number stakeholders concerned. Reducing this uncertainty is costly in terms of documenting / communicating uncertainty, increasing precision and aggregating across many affected users. Uncertainty assessment, documentation and mitigation has to trade-off between these and other factors (**Figure A.22**). This is context dependent – therefore there is not a single prescription, or sequence of actions, for addressing uncertainty. Without intending to be prescriptive, the rest of this document raises a number of uncertainty issues and possible actions.

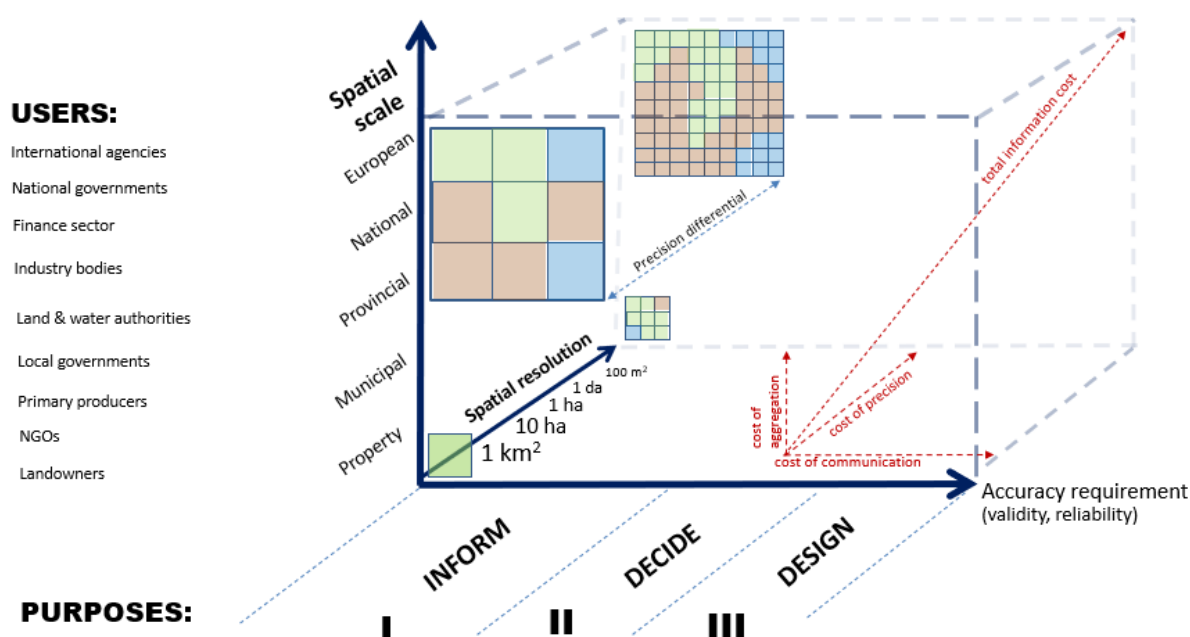


Figure A.22 – Contexts and purposes for ecosystem service (ES) assessments. The information requirements of ES assessments and their resource needs/costs are broadly assumed to increase with scale, resolution and purposes from (I) to inform, (II) to design, to decide (III) between interventions / actions. *Source:* NCAVES and MAIA (2022)

Further readings:

NCAVES and MAIA (2022). Monetary valuation of ecosystem services and ecosystem assets for ecosystem accounting: Interim Version 1st edition. United Nations Department of Economic and Social Affairs, Statistics Division, New York.

7. Advanced Methodology Issue - Cumulative uncertainty in a chain of models used to assess ecosystem services

Integrated ecosystem service appraisal, as exemplified by a benefit-cost analysis (BCA), links actions based on expected changes in ecosystem structure (extent, condition), to changes in ecosystem function, to changes in ecosystem services, to changes in benefits and values of those changes. Decision support is provided by comparing uncertain costs of alternative actions (CA) with uncertain monetary values (EV). Uncertainty is cumulative across the modeling chain required to do BCA. The accuracy of ecosystem service assessments decreases as the appraisal integrates across biophysical, socio-cultural and value heterogeneity. Reliability in ranking decision alternatives increases as more impact information is gathered at each model step.

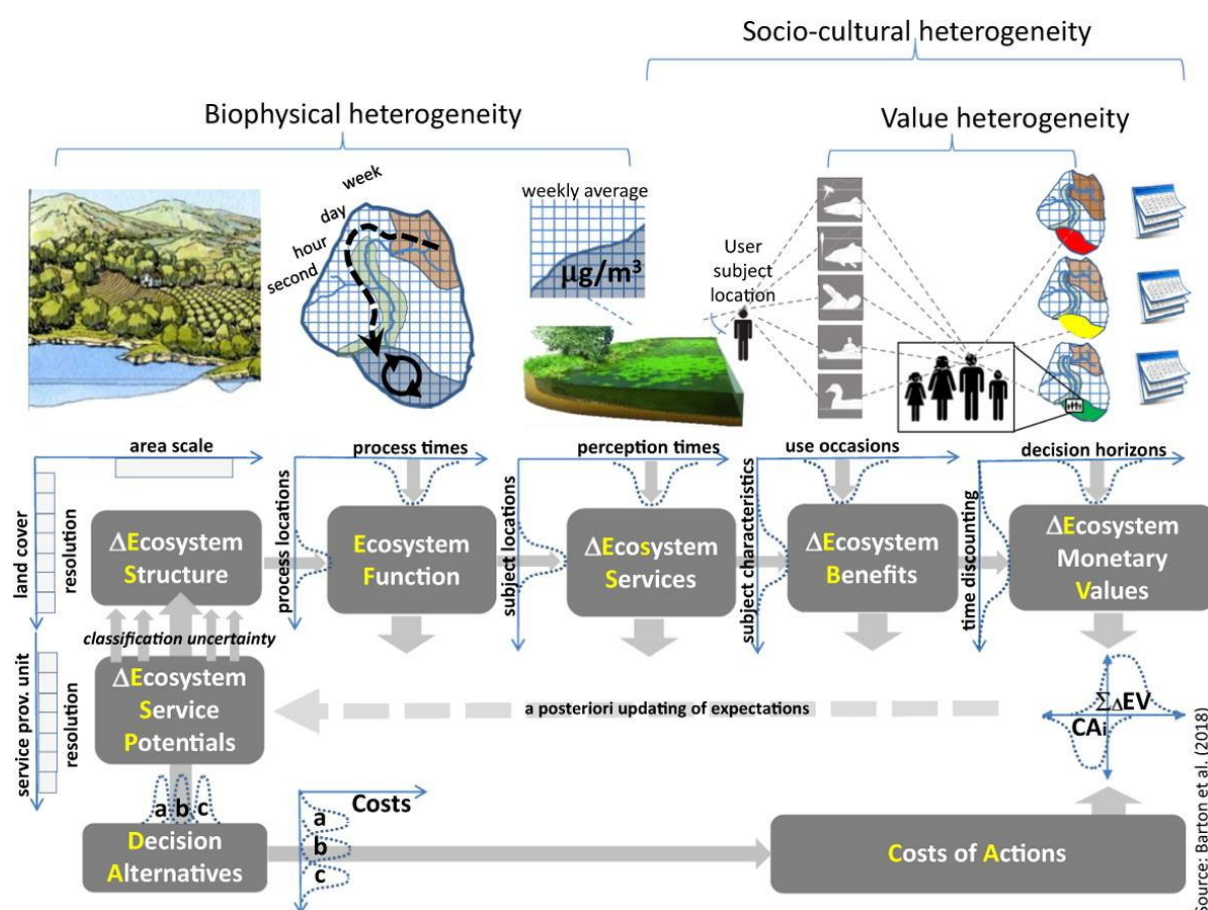


Figure A.23 - Accuracy decreases (uncertainty increases) across an ecosystem service assessment modelling chain, because errors and variability are cumulative. Source: Barton et al. 2018

Further readings:

Barton et al., 2018: <https://doi.org/10.1016/j.ecoser.2017.10.021>

8. A chain of models using Bayesian Network (BNs)

BNs can be used as a meta-modeling framework to link drivers-pressure-state-impact models and to use them for decision support by linking utilities to inputs/costs and outcomes/benefits (Figure A.24).

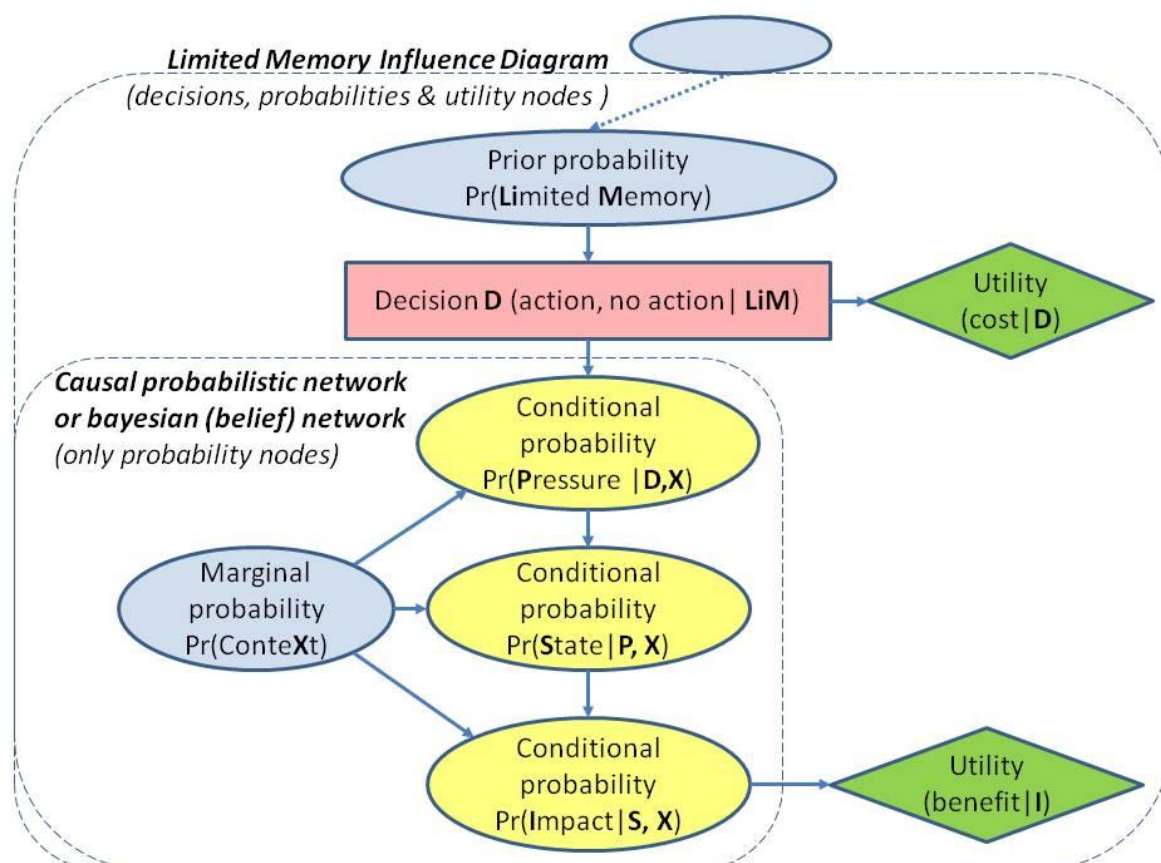


Figure A.24 – A causal probabilistic network–Bayesian network nested in a limited memory influence diagram, used for modelling expected net benefits of environmental management decisions in a driver-pressure-state-impact-response (DPSIR) conceptual framework. *Source:* Barton et al., 2012

Further readings:

Landuyt et al., 2013: <https://doi.org/10.1016/j.envsoft.2013.03.011>.

Grêt-Regamey et al., 2013: <https://doi.org/10.1016/j.jenvman.2012.07.028>.

Uusitalo et al., 2015: <https://doi.org/10.1016/j.envsoft.2014.09.017>.

7.2.6.7 Detailed questions on uncertainty analysis and documentation methods - a menu of further uncertainty questions the contractor may consider

CONTENT PRIMARILY FOR CONTRACTORS

The following typology of uncertainty methodology issues in **Figure A.25** are from Rounsevell et al. (2021). Ecosystem services practitioners - here contractors - are the intended audience. The guidance divides uncertainty methodology questions into scenario, model and decision uncertainty. This is further divided into subcategories and actions to address them.

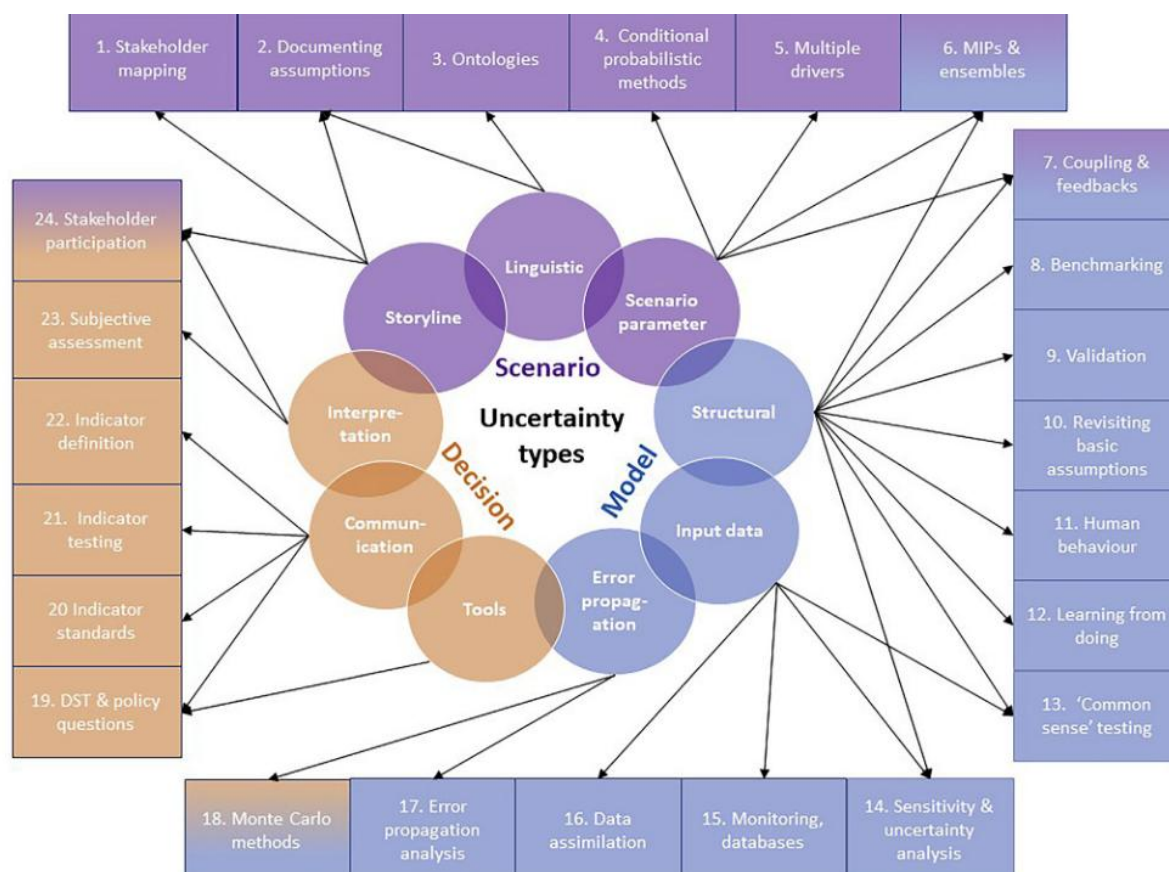


Figure A.25 - Visual summary of the types of uncertainties in scenarios and models of socio-ecological systems and ways of addressing them. *Source: Rounsevell et al., 2021.*

Further readings:

Rounsevell et al., 2021: <https://doi.org/10.1016/j.oneear.2021.06.003>

Based on the material in Rounsevell et al. (2021), below we have developed questions that contractors can use to think about the way they document uncertainty in their ecosystem service assessment in detail (**Table A.11**).



The list of questions can also be useful for commissioners who want a detailed list of issues to discuss with contractors when evaluating / auditing the uncertainty documentation of the ecosystem service assessment.

There is some redundancy with the advanced questions above, so the table on the next page should be seen as a menu of ideas that may be relevant depending on your context, rather than a checklist to be filled out.



Table A.11 - Detailed questions on Uncertainty analysis and documentation

Uncertainty	Diagnostic question	Answer	Action	Subtype of uncertainty addressed
General	Do you have resources available to analyse and document uncertainty?	Yes/no	Are the resources sufficient to....	
Scenario	Do you need to develop a qualitative, narrative storyline to describe a scenario in your ES assessment?	Yes/no	1. Conduct stakeholder mapping exercises to address uncertainty in participatory processes	Storyline
Scenario	Are there assumptions underlying the narrative storyline?	Yes/no	2. Explicitly state and document the assumptions that underpin a scenario narrative, and communicate these assumptions when reporting a scenario study	Storyline & Linguistic
Scenario	Is it likely that the terminology used in the describing the scenario could	Yes/no	3. Build a glossary to share terminology across difference knowledge domains held by stakeholders	Linguistic



	be ambiguous or vague for any of the stakeholders?			
Scenario	Does your purpose require a scenario that is modelled numerically?	Yes/no	4. Define credible scenario parameter ranges or using conditional probabilistic methods	Parameter
Scenario	Does your purpose require that you check the robustness of your ecosystem service model results to changes in circumstances?	Yes/no	5. Consider a wider range of socioeconomic and natural system drivers that go beyond a focus on single drivers alone, e.g., climate change	Parameter
Scenario & model	Are the mechanisms behind the ES uncertain? For example, are there several ES models that could be used for your purpose?	Yes/no	6. Model inter-comparison exercises and model ensembles	Parameter & Structural
Scenario & model	Can the social or economic impacts of using ecosystem services change future demand? Is it important to model dynamic changes over time ?	Yes/no	7. Develop scenarios and models that better account for the role of human behavioral processes in affecting ecological change; use coupled socio-ecological models	Parameter & Structural
Model	Does trust in the ES results require checking predictions against reality?	Yes/no	9. Validate the model against independent empirical data (data not used to set the model up /calibrate)	Structural
Model	Is there scientific disagreement about the	Yes/no	10. Go beyond the improvement of model components and details, by reevaluating the	Structural



	mechanisms of the ES model?		fundamental principles and assumptions of the model structure	
Model	Is it important for your purpose to improve ES model accuracy over time ?	Yes/no	12. Learn from uncertainty to guide future model improvement	Structural
Model	Is monitoring data lacking to do statistical validation of the ES model?	Yes/no	13. Qualitative "common sense" tests, where independent validation data are lacking	Structural & Input
Model	Do you need to know which variable you need to prioritise for data collection to increase ES model accuracy?	Yes/no	14. Use sensitivity and uncertainty simulation & analyses, including Monte Carlo methods	Structural & Input
Model	Is there too little data to independently verify ES model predictions?	Yes/no	15. Increase data access, e.g., developing high-quality monitoring systems (observations, instrumented sites, and remote-sensing sensors), data repositories, or citizen science	Input
Model	Is useful for the purposes to collect monitoring data on model inputs and update the ES model parameters over time?	Yes/no	16. Use d assimilation techniques, such as inverse modeling, e.g., approximate Bayesian computation	Input
Model	Are you using a chain of off-the-shelf models to estimate ES?	Yes/no	17. Conduct error propagation analysis through, for example, qualitative methods, formal numerical approaches, modeler interviews, and network analysis. Consider connecting the models in Bayesian belief network	Error propagation



Model	Are you using a chain of bespoke models that you can code yourself to estimate ES?	Yes/no	18. Consider doing simulation using Markov Chain Monte Carlo methods. This is a more statistically correct approach than 17.	Error propagation
Decision-making	Do you want to separate value judgements about the decision alternatives from uncertainty about the impacts of the decisions?	Yes/no	19. Apply decision support tools to policy questions, such as multi-criteria decision analysis	Tools & communication
Decision-making	Is the ES assessment part of a standardized methodology? (e.g. SEEA EA, IPBES, IPCC science-policy)	Yes/no	20. Follow the uncertainty communication protocol of the standard	Communication
Decision-making	Do you need to make decisions on which indicators to monitor to reduce model uncertainty cost-effectively?	Yes/no	21. Conduct systematic testing of the performance of indicators in capturing socio-ecological changes and associated uncertainty. Conduct value of information analysis.	Communication
Decision-making	Is there uncertainty about which indicators to use to define the ecosystem service?	Yes/no	22. Define indicators that are clear, concise, and responsive to different drivers	Communication
Decision-making	Are you concerned with identifying, structuring and reducing bias and subjectivity	Yes/no	23. Use improved and more comprehensive methods of accounting for subjectivity and uncertainty within nominally	Interpretation



	in your decision-making about ES ?		objective decision processes. E.g. Bayesian belief networks	
Decision-making	Do your ES modeling results need to be approved by stakeholders in order to be used in decision-making?	Yes/no	24. Co-create the ES model and decision criteria in a participatory setting that allows for interrogation of assumptions, representation, and outcomes by a range of stakeholders	Interpretation

7.2.6.8 Further readings and references

Barton D N, Kuikka S, Varis O, Uusitalo L, Henriksen H J, Borsuk M, de la Hera A, Farmani R, Johnson S, Linnel J D (2012). Bayesian Networks in Environmental and Resource Management. *Integrated Environmental Assessment and Management*: 8:3, 418–29. <https://doi.org/10.1002/ieam.1327>.

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Barton D N, Caparrós A, Conner N, Edens B, Piaggio M, Turpie J (2019). Discussion paper 5.1: Defining exchange and welfare values, articulating institutional arrangements and establishing the valuation context for ecosystem accounting. Paper drafted as input into the revision of the System on Environmental-Economic Accounting 2012–Experimental Ecosystem Accounting. [Link](#).

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7.3 Terms of Reference – Additional examples

What example would you like to look at?

[Agriculture and Forestry related ecosystem services](#)

[Hydrology and Water related ecosystem services](#)

[Air and Climate related ecosystem services](#)

[Recreation and Amenities related ecosystem services](#)

[Fishery, aquaculture and marine related ecosystem services](#)



7.3.1 Agriculture and Forestry related ecosystem services

7.3.1.1 Description of the example case

Box 2- Example case – Agriculture and Forestry

This example case focuses on assessing the ecosystem service “global climate regulation”, *i.e.* the amount of carbon sequestration provided by forests across Spain at the national scale. The primary objective is to quantify and spatially represent the carbon sequestration capacity of forest ecosystems using the most recent and highest-resolution biophysical data available. The assessment is designed to support the implementation of the Spanish National Strategy for Green Infrastructure by identifying forest areas that significantly contribute to achieve ‘global climate regulation’ objectives.

The results of this assessment will serve as a reference framework for Spain’s autonomous communities, enabling them to replicate the methodology and identify their own green infrastructure elements based on ecosystem service provision.

7.3.1.2 Terms of Reference obtained from the templates

This section shows an example of Terms of Reference that can be obtained by answering the three guidance templates. This example illustrates how the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference.

FRAME & SCOPE SECTION

1. CONTEXT AND PURPOSE

The results of this assessment will be primarily used by the commissioner to support the identification of green infrastructure elements based on the carbon sequestration service provided by forests in Spain. The assessment will serve as a national reference for regional replication and integration into spatial planning and green infrastructure policy. The primary objective is to quantify and spatially map carbon sequestration by forests using the most recent and highest-resolution data available, providing a replicable methodology for regional assessments.

Relevant policies to be considered in this assessment include the EU Green Infrastructure Strategy, Law 42/2007 on Natural Heritage and Biodiversity, Law 33/2015 (amending Law 42/2007), Order PCM/735/2021 establishing the National Strategy for Green Infrastructure, the National Climate Change Adaptation Plan, and the EU Nature Restoration Regulation. Spain is characterised by a diverse population distribution, with densely populated urban areas and sparsely inhabited rural regions, many of which are rich in forest cover. Forests play a crucial role in rural livelihoods, biodiversity conservation, and climate regulation, particularly in mountainous and Mediterranean regions.

The ecosystem service assessment should aim at providing recommendations within the decision-making and policy context. The assessment will provide technical

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recommendations for identifying forest areas with high carbon sequestration potential to inform green infrastructure planning.

2. INTENDED IMPACTS AND OUTPUTS

Uses and users

The results of this assessment will be primarily used by the commissioner to guide national and regional planning for green infrastructure by identifying forest areas with high carbon sequestration capacity. Results should also be made available and usable by regional governments (Autonomous Communities), environmental agencies, land-use planners, and research institutions. It is anticipated that these parties will primarily use the direct outputs of the assessment as a methodological reference for conducting regional assessments, a data source for integrating carbon sequestration into spatial and climate planning, a basis for monitoring and reporting under national and EU frameworks, and a foundation for further research and scenario modelling.

Intended impacts of the assessment

Outputs of the ecosystem service assessment are intended to directly impact evidence-based planning and prioritisation of forest conservation and restoration efforts. The outputs of the ecosystem service assessment are also intended to bring insights to national and EU policy-makers by identifying forest areas with high carbon sequestration potential. This will support the implementation of the National Strategy for Green Infrastructure, biodiversity conservation laws, and the EU Nature Restoration Regulation. Medium- and long-term impacts include improved integration of ecosystem services into planning, enhanced climate change mitigation through nature-based solutions, strengthened policy alignment across governance levels, and increased consistency in ecosystem service assessments nationwide.

Beyond the direct impacts mentioned above, the outcomes of this assessment should also act on regional administrations and technical institutions by facilitating harmonisation of ecosystem service assessments across Spain.

Formats of the deliverables

The specific deliverables required in this assessment are:

- An executive summary designed for policy-makers and non-technical audiences
- A technical report covering methodology, data sources, and results
- A presentation and / or briefing for institutional stakeholders
- A scientific publication covering methodology, data sources, and results
- Maps of carbon sequestration capacity and condition of forest across Spain
- Tables summarising forest carbon sequestration and condition metrics nationally and by Autonomous Communities.



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3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystem type(s) and service(s)

Ecosystem types of interest in this ecosystem service assessment include forests (natural and semi-natural forest types across Spain). Their definition can be found in national land cover classification systems and EUNIS habitat types. The ecosystem services that should be evaluated in this assessment are carbon sequestration, as defined in the Common International Classification of Ecosystem Services (CICES).

Spatial and temporal characteristics

The ecosystem service assessment is to be conducted in Spain at the national level. Within the geographical and spatial extent of this ecosystem service assessment, the results should be presented as fully spatially explicit and aggregated at the administrative scale of Autonomous Communities.

The ecosystem service assessment should be conducted using the most recent available data. The results should be reported on an annual basis if possible and should measure ecosystem service in biophysical terms.

Ecosystem modeling characteristics and valuation of services

The ecosystem service assessment should measure the supply of the ecosystem service carbon sequestration using relevant metrics. The assessment should also evaluate which ecosystem condition characteristics would need to be maintained to enable the sustainable supply of this service, to ensure long-term provision and to inform conservation priorities. It should also include a separate evaluation of the condition of the ecosystem(s) providing the service of interest.

The results of the assessment will be presented as (i) maps of carbon sequestration capacity and condition of forest across Spain, (ii) tables summarising forest carbon sequestration and condition metrics nationally and by region.

4. STAKEHOLDER ENGAGEMENT

No stakeholder engagement is expected in this specific assessment by the contractor.

METHODOLOGY SECTION

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Sustainability and ecosystem condition

The ecosystem service assessment should include analyses to highlight and understand the influence of ecosystem condition on the supply of the ecosystem service(s) of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used. The assessment shall identify and define sustainable supply levels for the ecosystem service(s) under assessment. This includes determining thresholds or reference values that reflect the levels at which the ecosystem service can be maintained over time. The assessment must clearly describe and justify the methodology that will be used to establish



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these levels and the data sources that will inform the analysis.

The evaluation of ecosystem condition in this assessment should encompass the following aspects: a general index of ecosystem condition, biotic indicators (species, structure, function), abiotic indicators (physical and chemical), and landscape-level characteristics.

Spatial and temporal characteristics

The assessment should evaluate the spatial variation in the condition of the ecosystems and the supply levels of carbon sequestration services over the spatial extent, scales, time period and temporal scale considered in this assessment. Results should provide recommendations for maintaining and / or enhancing the supply of the ecosystem service(s) of interest without negatively affecting ecosystem condition.

2. UNCERTAINTY

The ecosystem service assessment should evaluate and document uncertainty arising in it. The contractor should clearly present levels of uncertainty in the assessment and discuss the reliability of the methods and results. The discussion should include an interpretation about what the levels of uncertainty mean for the decision-making processes that would arise from any of the results of this assessment. When reporting uncertainties, the contractor should clearly explain and justify the choice of methods used. The preferred formats for reporting uncertainty include: an uncertainty section/report, visual summary, decision-relevant summary, and technical appendices.

3. VALIDATION

The ecosystem service assessment should validate the methodology used and the results of the assessment. The validation process should involve the commissioners. It should be carried out internally to the contractor's organisation. The potential contractor should clearly describe the validation process that they expect to put in place during the assessment.

The validation process of the ecosystem service assessment should notably include a comparison of the results with other key published data. The potential differences should be discussed and explained.

4. STAKEHOLDER ENGAGEMENT

No stakeholder engagement is expected in this specific assessment.

EVALUATION CRITERIA SECTION

1. FRAME & SCOPE

The proposals sent by the applicants will be evaluated according to its respect of the frame & scope defined in the call, as well as the approach(es) chosen to include the criteria of

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importance. In particular, high importance will be given to:

- The inclusion of actionable recommendations for decision-making and policy planning;
- The alignment with the specified ecosystem type (forests) and ecosystem service (carbon sequestration);
- The correspondence with the national geographic scope and administrative scale (Autonomous Communities);
- The use of biophysical metrics to quantify carbon sequestration;
- The inclusion of sustainability and ecosystem condition evaluations.

2. METHODOLOGY

The proposals will be evaluated based on how well they align with the methodological requirements defined in the call. The proposed methodological approach(es) to measure the methodological characteristics defined above including modelling methods, metrics and indicators should be clearly described and justified. Particular emphasis will be placed on:

Ecosystem condition

- The evaluation of how forest ecosystem condition influences carbon sequestration capacity.
- The identification of sustainable levels of carbon sequestration, determining how much carbon can be absorbed by the ecosystem over time without compromising its long-term condition or functions.
- The inclusion of relevant dimensions of ecosystem condition, including biotic (species, structure, function), abiotic (physical and chemical), and landscape-level indicators.

Spatial and temporal characteristics

- The analysis of spatial and temporal variations in carbon sequestration across Spain, using the most recent data available.
- The identification and justification of appropriate metrics and indicators to measure the above characteristics.

Uncertainty

Proposals should also clearly describe their approach to documenting and reporting uncertainties, especially in relation to the decision-making instances defined earlier in the Terms of Reference. Preferred formats include structured uncertainty sections, visual summaries, decision-relevant summaries, and technical appendices.

Validation

Validation of the methodology and results is essential. Proposals should outline a clear validation plan, including internal review processes and comparison with published reference data. Differences between the assessment results and reference data should be discussed and justified.

***Stakeholder engagement***

Stakeholder engagement is not required for this assessment and will not be considered in the evaluation.

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7.3.1.3 Frame & Scope template

Step 1- Selection of the questions

1. CONTEXT AND PURPOSE

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the example question	YES / ~~NO~~
1.b. Within this(these) purpose(s) decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the example question	YES / ~~NO~~
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the example question	YES / ~~NO~~

2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses		This question is relevant
2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?	Link to the example question	YES / ~~NO~~

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2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?	Link to the example question	YES / ~~NO~~
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the example question	~~YES~~ / NO
2.3. Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the example question	YES / ~~NO~~
3.3. Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.4. Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the example question	YES / ~~NO~~
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the example question	~~YES~~ / NO

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3.4.c. What aspects of ecosystem services should be measured?	Link to the example question	YES / ~~NO~~
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the example question	~~YES~~ / NO
3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the example question	~~YES~~ / NO
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the example question	YES / ~~NO~~
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the example question	YES / ~~NO~~
3.5. Scenarios		This question is relevant
3.5.a. Are future scenarios required in the ecosystem service assessment?	Link to the example question	~~YES~~ / NO

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the example question	~~YES~~ / NO
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the example question	~~YES~~ / NO
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the example question	~~YES~~ / NO

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Step 2- Answer the selected questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

To assess the carbon sequestration service provided by forests in Spain at the national level. The results will support the identification of green infrastructure elements based on ecosystem service provision and serve as a reference for autonomous communities.

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

To quantify and spatially map carbon sequestration by forests using the most recent and highest-resolution data available, providing a replicable methodology for regional assessments.

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

The EU Green Infrastructure Strategy.
Law 42/2007 on natural heritage and biodiversity.
Law 33/2015, an amendment of Law 42/2007, sets out the guiding principles for preserving biodiversity and the responsible use of Spain's natural heritage.
Order PCM/735/2021 establishes the guidelines and framework for developing and implementing the National Strategy for Green Infrastructure, Connectivity, and Ecological Restoration
National Climate Change Adaptation Plan (2021-2023)
Nature Restoration Regulation

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1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. These characteristics may include age distribution, cultural and ethnic composition, income levels, education, livelihood types etc.

While this assessment does not directly aim to analyse social or demographic impacts, it is important to acknowledge the broader context in which forest ecosystems and their carbon sequestration services operate. Spain is characterised by a diverse population distribution, with densely populated urban areas and sparsely inhabited rural regions, many of which are rich in forest cover. Forests play a crucial role in rural livelihoods, biodiversity conservation, and climate regulation, particularly in mountainous and Mediterranean regions.

The demographic trends of rural depopulation and land abandonment in some areas have implications for forest dynamics, including natural regeneration and fire risk. Additionally, regional disparities in economic development and land management capacity may influence how different autonomous communities engage with and benefit from ecosystem service assessments.

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yes, no, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

Yes – The assessment will provide technical recommendations for identifying forest areas with high carbon sequestration potential to inform green infrastructure planning.



2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

To guide national and regional planning for green infrastructure by identifying forest areas with high carbon sequestration capacity.

2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By “secondary user(s)” we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

- Regional governments (Autonomous Communities)
- Environmental agencies
- Land-use planners
- Research institutions

2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

Regional governments may adopt the national assessment methodology to conduct their own regional-scale evaluations, ensuring consistency in identifying and managing green infrastructure across Spain. The spatial data can also support regional climate action plans and biodiversity strategies.

Environmental agencies can integrate the findings into monitoring frameworks and reporting obligations under national and EU environmental directives. The data may also inform restoration priorities and conservation funding allocation.

Land-use planners can use the spatial outputs to incorporate carbon sequestration potential into zoning, development planning, and environmental impact assessments, helping to balance development with ecosystem service preservation.

Research institutions may use the data and methodology to conduct further studies, validate models, or explore synergies and trade-offs between carbon sequestration and other ecosystem services. The assessment can also serve as a baseline for scenario modelling.

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2.2. Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making step. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Improved evidence-based planning and prioritisation of forest conservation and restoration efforts.

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

The assessment will support the implementation of key national and EU policies by identifying forest areas with high carbon sequestration potential. At the national level, it will inform the National Strategy for Green Infrastructure (Order PCM/735/2021) and contribute to the goals of Law 42/2007 and its amendment Law 33/2015 by guiding biodiversity conservation and sustainable land use. Regionally, it will provide a replicable framework for autonomous communities to integrate ecosystem services into planning. At the EU level, it aligns with the Green Infrastructure Strategy and the Nature Restoration Regulation by supplying spatial data to prioritise restoration and climate mitigation efforts.

Medium- and long-term impacts include improved integration of ecosystem services into planning, enhanced climate change mitigation through nature-based solutions, strengthened policy alignment across governance levels, and increased consistency in ecosystem service assessments nationwide.

2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts of the assessment. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Answer in this box.

Skipped as not applicable

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2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should choosing this format?	Results should be presented like this
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / NO / MAYBE / ~~DON'T KNOW~~
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / NO / MAYBE / ~~DON'T KNOW~~
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / NO / MAYBE / ~~DON'T KNOW~~
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / NO / MAYBE / ~~DON'T KNOW~~
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / NO / MAYBE / ~~DON'T KNOW~~
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / NO / MAYBE / ~~DON'T KNOW~~
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / NO / MAYBE / ~~DON'T KNOW~~
Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / MAYBE / ~~DON'T KNOW~~
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / MAYBE / ~~DON'T KNOW~~
Other (specify)		YES / NO / MAYBE / ~~DON'T KNOW~~

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Forests (including natural and semi-natural forest types across Spain).

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the benefits that humans get from nature such as climate regulation, flood protection, pollination, timber and food provision etc.

Global climate regulation - Carbon sequestration.

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

Spain, national scale.



3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped into deciduous and coniferous forests. This is useful to understand the supply of ecosystem services across natural boundaries (e.g., carbon sequestration in a forest ecosystem depends among others on the species composition). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the ecological scale: Different forest types in Spain
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative units (e.g., municipality, county), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the administrative scale: Autonomous Communities



3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

From 2015 to 2025. Use the most recent available data; results should be presented annually if possible.

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes, no, maybe, or don't know. Valuing, or quantifying, ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Yes.

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. Valuing ecosystem services in monetary units is a measure of the contribution of the ecosystem service(s) to human well-being. It is recommended to first value ecosystem services in biophysical terms before valuing them in monetary terms. Valuing ecosystem services in monetary units may be measured in monetary units to facilitate direct comparison with the monetary values of other goods and services (e.g. for inclusion in decision-making tools such as cost-benefit analysis). It is recommended to first value ecosystem services in biophysical terms before valuing them in monetary terms.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).



3.4.c. What aspects of ecosystem services should be measured?

Select what applies

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (<i>i.e.</i> , what quantity is being supplied?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (<i>i.e.</i> , what quantity is being used?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i> , what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / MAYBE / DON'T KNOW

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits focus on improvements in people's quality of life. Equity goals focus on guaranteeing that ecosystem services are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified in terms of the availability and access to ecosystem services, reduction in inequalities, social inclusion, etc.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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3.4.e. Should the ecosystem services be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?

Answer yes, no, maybe, or don't know. Ecosystems are crucial to health, including the health dimension in an ecosystem service assessment. The assessment should take into account the wider impacts of changes in ecosystem health on human, animal, and plant health. The health scope will inform the selection of indicators, methodology, stakeholder engagement and reporting. The One Health approach is an approach that recognises the interconnection between people, animals, plants and their shared environment.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use and management measures.

Yes.

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

Yes.

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Answer yes, no, maybe, or don't know. Identify if the assessment needs to conduct the assessment while taking into account scenarios reflecting changes in policy, climate or other environmental conditions, changes in land use, or changes in technology. In modelling, future scenarios represent a range of potential future conditions that can be used to predict.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, organizations/institutions) who are interested in or are expected to be affected by the assessment of the ecosystem service assessment and / or its results.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, assessment, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder involvement means that key parties will be consulted during the development of the assessment and the evaluation of the results and deliverables.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and how have they been selected?

Identify the stakeholders who should be involved in the development of the assessment. This can be based on the assessment objectives or primary considerations that are important from the contractor's perspective.

Skipped as not applicable

Answer in this box.

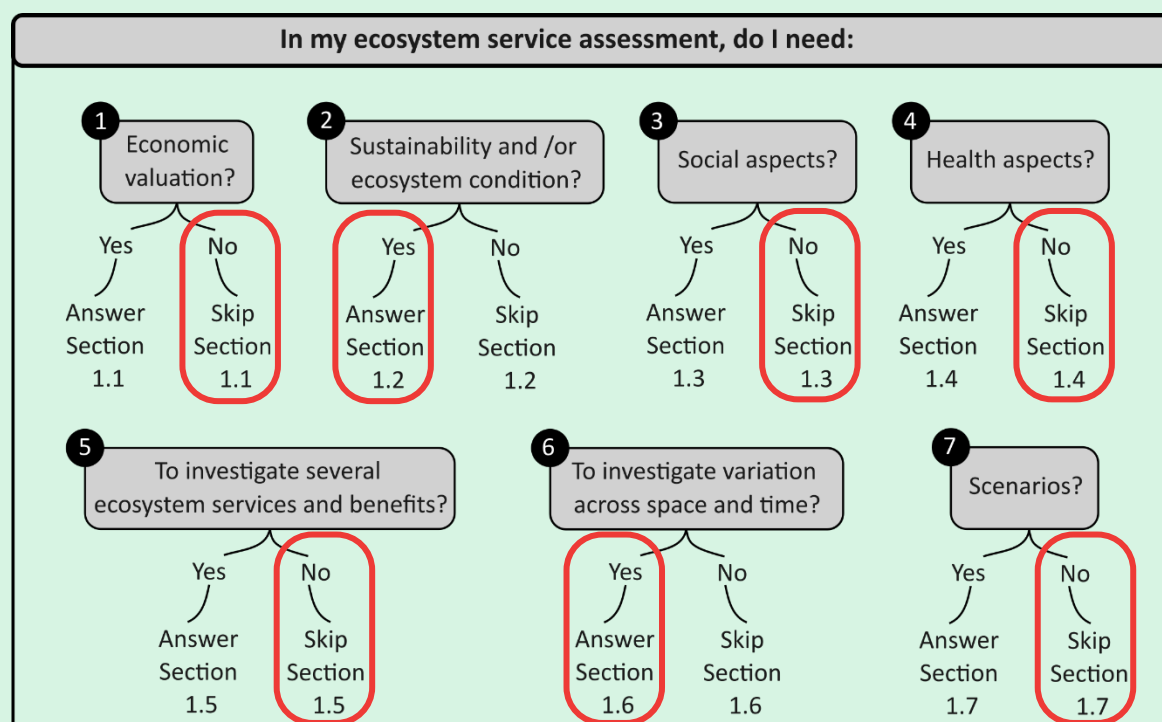
Step 3- Write the Frame & Scope section of the Terms of Reference using the preformatted text

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Step 1- Selection of the questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS



1.1. Economic valuation		This question is relevant
1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?	Link to the example question	YES / NO
1.1.b. Should the ecosystem service assessment include indicators of the contribution of ecosystem services to economic development, such as employment and growth?	Link to the example question	YES / NO
1.2. Sustainability and ecosystem condition		This question is relevant
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the example question	YES / ~~NO~~
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the example question	YES / ~~NO~~
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the example question	YES / ~~NO~~

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1.3. Social characteristics		This question is relevant
1.3.a. Should the ecosystem service assessment results be disaggregated by gender to better understand who benefits from ecosystem services?	Link to the example question	YES / NO
1.3.b. Should the ecosystem service assessment evaluate and report on the perceptions, and values of social groups towards ecosystem services?	Link to the example question	YES / NO
1.4. Health characteristics		This question is relevant
1.4.a. What aspects of health are you interested in?	Link to the example question	YES / NO
1.4.d. Should the results from service assessment include, perception and attitudes towards health-related issues?	Link to the example question	YES / NO
1.4.e. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the example question	YES / NO
1.5 Relationships between ecosystem services		This question is relevant
1.5.a. Should the assessment identify potential links between ecosystem services and the benefits they provide?	Link to the example question	YES / NO
1.6 Spatial and temporal characteristics		This question is relevant
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the example question	YES / ~~NO~~
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and the benefits they provide change over time?	Link to the example question	YES / ~~NO~~
1.7. Scenarios change		This question is relevant
1.7.a. What factors should be taken into account in the ecosystem service assessment?	Link to the example question	YES / NO

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2. UNCERTAINTY

		This question is relevant
2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the example question	YES / ~~NO~~

3. VALIDATION

		This question is relevant
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the example question	~~YES~~ / NO
4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?	Link to the example question	~~YES~~ / NO

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Step 2- Answer the selected questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1 Economic valuation

1.1.a. Which economic valuation method(s) are used in the ecosystem service assessment?

Select what applies. Choosing the valuation method(s) is voluntary, if the commissioners don't have sufficient information.

Skipped as not applicable

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g., flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ecosystem services can be obtained from markets or surveys of businesses and households. This approach is only applicable to ecosystem services that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ecosystem services as the cost of replacing it with a human-made service. It is only applicable to ecosystem services that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ecosystem services that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW



Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	YES / NO / MAYBE / DON'T KNOW
Net factor income	The net factor income method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	YES / NO / MAYBE / DON'T KNOW
Production function	The production function method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	YES / NO / MAYBE / DON'T KNOW
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	YES / NO / MAYBE / DON'T KNOW
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	YES / NO / MAYBE / DON'T KNOW
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ecosystem services through public surveys. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ecosystem services by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW



1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and if commissioners have the knowledge, they can specify the type of economic indicators. The economic importance of ecosystem services is often quantified through indicators such as the contribution to economic growth, the economy, or employment. These indicators can be useful for assessing the importance of ecosystem services to decision makers and the general public.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know). If yes, specify.

1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service(s) supply and use may vary depending on changes in condition of the ecosystem that provides the service. Ecosystem service(s) supply is the provision of service(s) by the ecosystem(s). Ecosystem service(s) use is the utilisation of service(s) by those who benefit from them.

Yes - The assessment should evaluate how forest condition influences carbon sequestration capacity.

1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

Yes – The assessment should define sustainable levels of carbon sequestration, considering forest health and resilience.

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1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Dimension of ecosystem condition	Description	This dimension should be measured in the assessment
Index of general ecosystem condition	This kind of index is an overarching measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem. It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the salinity and temperature of water. If affected,	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~



	they can have an impact on the supply of ecosystem services. Abiotic physical indicators include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution..	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. If the answer is yes, the assessment of ecosystem benefits from the ecosystem services guarantees that inequities are addressed. This approach highlights who benefits, who is excluded, and who is not. It helps to improve well-being and equity.

Answer in this box (yes, no, maybe, or don't know).

Skipped as not applicable

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1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. The assessment should investigate whether the ecosystem service assessment will document and report the attitudes, perceptions, value, and prioritize ecosystem services.

Answer in this box (yes, no, maybe, or don't know).

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits refers to goods or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., salutogenic environments, medicinal or medical resources) in an ecosystem service assessment is essential to improve public health. For example, urban green areas in cities can reduce stress and improve mental health, and reduce the spreading of some diseases such as obesity by encouraging physical activities.	YES / NO / MAYBE / DON'T KNOW
Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., consideration of specific diseases, accidents or disasters) in an ecosystem service assessment is essential to protect public health. For example, deforestation and land-use changes can reduce biodiversity and contribute to the density increase of disease-carrying organisms such as mosquitos, which in turn increase the spreading of disease such as malaria. Another example is the decrease of green spaces in cities which can lead to an increase in air pollution and the rise of respiratory diseases such as asthma, which in turn impact the public health sector finances.	YES / NO / MAYBE / DON'T KNOW
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., incidence or prevalence of positive or negative health status at varying population scales) in an ecosystem service assessment is essential to protect and / or improve public health. Contrary to health risks and benefits which refer to the way ecosystem types and /or	YES / NO / MAYBE / DON'T KNOW

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	services impact or improve health, health outcomes refer to the measurable effects of ecosystem types and / or services on health. In other words, health benefits and risks focus on how ecosystems and their services contribute to and impact health, while health outcomes focus on what the concrete result for health is. For example, there is a decrease in the prevalence of asthma in cities with higher urban green areas.	

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards relevant ecosystem services?

Answer yes, no, maybe, or don't know. *Whether the ecosystem service assessment will document how social groups perceive, value, and prioritize ecosystem services. These perceptions may include significance, recreational use, or economic reliance.*

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. *Whether the ecosystem service assessment will consider general health links with environmental compartments (e.g. air, water, soil, urban environment) and health, or aim to provide a more detailed understanding of health links with specific ecosystem types and / or their services on specific health issues.*

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.5. Relationships between ecosystem services

1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. *Whether the assessment identifies potential interrelationships between ecosystem services, between benefits, or between ecosystem services and benefits. Identifying interrelationships means that the services and / or benefits are related and can be understood in a number of ways ecosystems services and / or benefits can be related: dependencies, synergies, trade-offs...*

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

Yes – The assessment should evaluate spatial variation in carbon sequestration across Spain.

1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Yes – The assessment should evaluate temporal variation using the most recent data available.

1.7. Scenarios

1.7.a. What scenarios should be taken into account in the ecosystem service assessments?

Identify the previously chosen metrics for which a detailed analysis is required. List and describe the scenarios that should be considered. Provide a broad description of goals for which the scenarios are required. Future scenarios represent a range of potential futures that could occur.

Skipped as not applicable

Answer in this box.



2. UNCERTAINTY

2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Yes – Uncertainties should be assessed and documented.

2.b. What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Description	Uncertainties should be reported with this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / NO / MAYBE / DON'T KNOW
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	YES / NO / MAYBE / DON'T KNOW

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data are baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. Commissioners might want to list some key datasets or figures they would like the results to be comparable with. Alternatively, stakeholders can be consulted to identify these references.

Yes.

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4. STAKEHOLDER ENGAGEMENT

4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any organisation or individual who are interested in and / or will be affected by the ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Skipped as not applicable

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	Consult/participate: stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	Consult/participate: stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	Consult/participate: stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	Consult/participate: stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the	YES / NO / MAYBE / DON'T KNOW

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	inclusion of local knowledge in the assessment. Inform: provide updates and transparency on the progress of the assessment.	
Interpretation of the results	Consult/participate: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Communication and dissemination of the results	Consult/participate: stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved in the assessment. Who are any group, organisation or individual who are interested in the assessment? Who is affected by ecosystem services and any change made to their use? Who can help with the ecosystem service assessment, stakeholders notably include those who are directly affected by ecosystem services, those who try to regulate the use, the scientists, the policy makers, the private sector, the academia, the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Skipped as not applicable

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / MAYBE / DON'T KNOW
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / MAYBE / DON'T KNOW

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Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	YES / NO / MAYBE / DON'T KNOW
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / NO / MAYBE / DON'T KNOW
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	YES / NO / MAYBE / DON'T KNOW
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

Step 3- Write the Methodology section of the Terms of Reference using the preformatted text

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7.3.1.5 Evaluation Criteria template

Step 1- Complete the column “WRITING EVALUATION CRITERIA”

Step 2- Write the Evaluation Criteria section of the Terms of Reference using the preformatted text

Step 3- Evaluate proposals with the column “EVALUATING PROPOSALS”

1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making	X		X		
1.b. Correspondence with the requested format of the results	X		X		
1.c. Include the ecosystem types of interest	X		X		
1.d. Include the ecosystem services of interest	X		X		
1.e. Include the correct the spatial extent(s)	X		X		
1.f. Include the correct time period and temporal scale for the results	X		X		
1.g. Include the correct spatial scales for the results	X		X		
1.h. Quantify ecosystem services in biophysical terms	X		X		
1.i. Quantify ecosystem services in terms of their economic value in monetary terms		X		X	
1.k. Quantify ecosystem service supply , use , demand	X		X (Supply only)		

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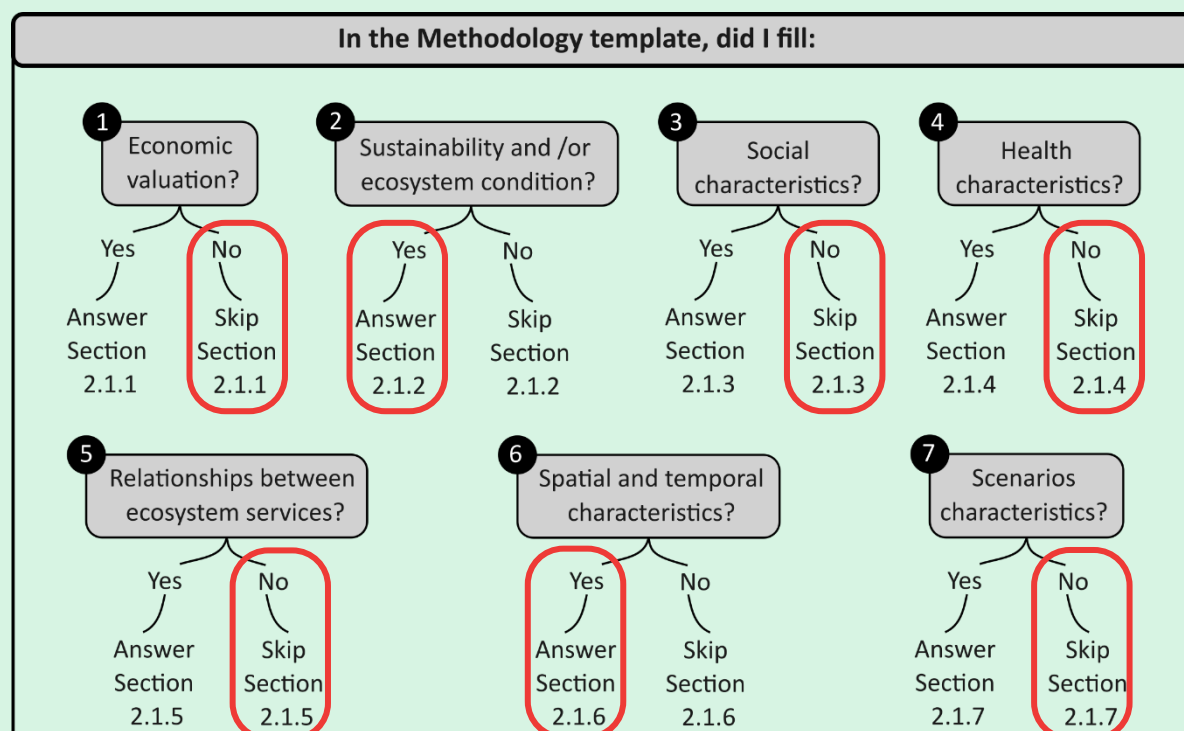
Criteria	YES	NO	YES	NO	DON'T KNOW
1.l. Include an evaluation of sustainable use and / or supply	X		X		
1.m. Include social aspects		X		X	
1.n. Include health aspects		X		X	
1.o. Include an evaluation of ecosystem condition	X		X		
1.p. Include a stakeholder analysis		X		X	
Qualitative appreciation of the proposal	The proposal demonstrates a strong alignment with the scope and objectives of the assessment. It clearly addresses spatial and temporal dimensions, sustainability, and ecosystem condition.				
	Qualitative score: 4.5 /5				

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2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation that will be used					
2.1.1.b. Consider the economic development					
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of <u>ecosystem condition</u> on ecosystem service supply	X		X		
2.1.2.b. Define and evaluate <u>sustainable levels</u> for the use and / or supply of ecosystem services	X		X		

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition	X		X		
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem service assessment by identifying					
2.1.3.b. Assess attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks					
2.1.4.b. Measure of health benefits					
2.1.4.c. Measure of health outcomes					
2.1.4.d. Assess attitudes, perceptions, and values of social groups towards health-relevant ecosystem services					
2.1.4.e. Establish health links with specific ecosystems and / or ecosystem services					
2.1.5 Relationship between ecosystem services					
2.1.5.a. Assess the interlinkages between ecosystem services and health					
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits	X		X		
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits	X		X		

Skipped as not applicable

Skipped as not applicable

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.7. Score					
2.1.7. Score					
Qualitative appreciation of the proposal	The methodology proposed is robust and well-structured, with a clear focus on ecosystem condition, sustainability, and spatial-temporal analysis.				
	Qualitative score: 4.5 /5				

Skipped as not applicable

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2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment	X		X		
2.2.b. Include a clear reporting format for uncertainties	X		X		
Qualitative appreciation of the proposal	The proposal includes a clear plan for a comprehensive uncertainty analysis with visual summaries and technical appendices.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment	X		X		
2.3.b. Involvement of stakeholders in the validation process of the ecosystem service assessment		X		X	
2.3.c. Validation of the results of the ecosystem service assessment includes comparison with published reference data	X		X		
Qualitative appreciation of the proposal	Validation process seems to be well addressed through a clear plan for internal review and comparison with reference data. Stakeholder involvement is not included, as expected.				
	Qualitative score:		4.5 /5		

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment		X		X	
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment		X		X	
Qualitative appreciation of the proposal					
Qualitative score:			/5		

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7.3.2 Hydrology and Water related ecosystem services

7.3.2.1 Description of the example case

Box 3- Example case – Hydrology and Water

The example case focuses on the ecosystem service assessment on the evaluation of the effects of restoration measures on the provision of hydrological ecosystem services in the Salzach river floodplain (Austria). The primary objective is to quantify the impacts of the already implemented restoration measures in the area, regarding flood protection capacity and groundwater recharge.

The results from this assessment will be used in three ways: 1) for monitoring and evaluation of the success of the restoration on the flood protection and groundwater recharge; 2) for ensuring that the restoration activities align with Natura 2000 objectives, and 3) for further communication of the benefits of the restoration measures to policy-makers, funders and the general public.

7.3.2.2 Terms of Reference obtained from the templates

This section shows an example of Terms of Reference that can be obtained by answering the three guidance templates. This example illustrates how the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference.

FRAME & SCOPE SECTION

1. CONTEXT AND PURPOSE

The primary objective of the ecosystem service assessment is to evaluate the effects of restoration measures on the provision of hydrological ecosystem services in the Salzach river floodplain, with a focus on flood regulation and groundwater recharge. As this assessment is needed primarily at the policy evaluation step (impact evaluation and decision-support guidance). It shows how restoration has (not) improved the provision of specific ecosystem services (ES). Insights can then be derived for adaptive management and funding decisions on future actions.

The floodplain area is a Natura 2000 site which was subject to an EU LIFE restoration project. Different aspects of the following policies could therefore be considered: Natura 2000 Management Plans; EU LIFE Program Guidelines; EU Water Framework Directive (WFD); Austrian Water Act and Biodiversity Strategy for Austria. Due to river regulation, the floodplain area has been under problematic ecological and hydrological conditions, which have caused flooding of the nearby municipalities in the past. Since the 2000s, several restoration measures have taken place in the area, intending to re-establish the natural hydrodynamic condition and the connectivity between the river, its tributaries and the groundwater regime. In that regard, the ES assessment aims to quantify the impacts of those measures regarding flood protection capacity and groundwater recharge.

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2. INTENDED IMPACTS AND OUTPUTS

Uses and users

The results of this assessment will be primarily used by the commissioner: i) to monitor and evaluate the success of restoration on flood protection and groundwater recharge, ii) to ensure that the restoration activities align with Natura 2000 objectives, and iii) to communicate the benefits of these measures to policymakers, funders, and the public.

Results should also be made available and usable by EU funders (e.g. LIFE program), local municipalities (Anthering, Weitwörth) and Universities. These parties are expected to primarily use the direct outputs of the assessment as for informing spatial planning and flood risk reduction strategies, as well as for advancing the scientific knowledge about floodplain restoration and its link to hydrological ecosystem service supply.

Intended impacts of the assessment

Outputs of the ecosystem service assessment are intended to directly impact the Department for Nature and Environmental Protection of the Federal State of Salzburg about the impacts (positive / negative) of the restoration measures that have been conducted in the area.

The outputs of the ecosystem service assessment are also expected to bring insights to: local spatial planning policy-makers by integrating the benefits of restored floodplain ecosystems into development plans; to regional policy-makers by standardizing hydrological ecosystem services mapping and assessment methods for other floodplain areas in Salzburg, and by supporting regional conservation policies; to national policy-makers by integrating hydrological ecosystem services into national ecosystem services accounts and updating Austria's water management strategies through providing replicable methods.

Formats of the deliverables

The specific deliverables required in this assessment are: executive summary, presentation/briefing, maps, tables, videos.

3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystem type(s) and service(s)

Ecosystem types of interest in this ecosystem service assessment (according Natura 2000 / Water Framework Directive):

Ecosystem types of interest in this ecosystem service assessment:

- Rivers and canals;
- Lakes and reservoirs;
- Forests and woodlands (softwood and hardwood riparian forests);
- Grasslands.

The ecosystem services that should be evaluated in this assessment are flood protection and groundwater recharge (defined by the latest version of CICES).



Spatial and temporal characteristics

The ecosystem service assessment is to be conducted in Salzach river floodplain (Natura 2000 area; UL: N 47°56'12" / E 12°56'24"; LR: N 47°52'17" / E 13°00'22"). The results of the ecosystem service assessment should be fully spatially explicit. The ecosystem service assessment should cover the period 2000–2025 and the results should be reported yearly.

Ecosystem modeling characteristics and valuation of services

The ecosystem service assessment should measure ecosystem service in biophysical terms, and should not measure the economic value of ecosystem service in monetary terms.

The ecosystem service assessment should only measure the supply and not use and demand of the ecosystem services of interest.

4. STAKEHOLDER ENGAGEMENT

Stakeholders are expected to be involved throughout the ecosystem service assessment. Key stakeholders who could be involved are local municipalities of Weitwörth, Anthering, and Oberndorf, the administration of the federal state of Salzburg, as well as the Austrian Federal Ministry for Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management (BMLUK).

METHODOLOGY SECTION

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Relationships between ecosystem services

The ecosystem service assessment should identify and quantify the strength of potential interrelationships between the flood regulation and groundwater recharge and the benefits they provide. In their proposal, the contractor will clearly describe and justify the methodology that will be used to identify and quantify these trade-offs.

Spatial and temporal characteristics

The assessment should evaluate the variations of supply of the ecosystem services of interest over the spatial scales considered in this assessment, and quantify trends (e.g., increases, decreases). In their proposal, the contractor will clearly describe and justify the methodology (including the metrics and indicators) that will be used.

The assessment should evaluate the variations of supply of the ecosystem services of interest over the time period and assessment frequency considered in this assessment. Results should highlight trends, identify key drivers of change, and provide recommendations for maintaining or enhancing these benefits. In their proposal, the contractor will clearly describe and justify the methodology (including the metrics and indicators) that will be used.



2. UNCERTAINTY

The ecosystem service assessment should evaluate and document uncertainty arising in the assessment. The contractor should clearly discuss the reliability of the methods and results in the context of their uncertainty and what it means for the decision-making that would arise from any of the results of this assessment. When reporting uncertainties (through uncertainty report/section and technical appendices), the contractor should clearly explain and justify the choice of methods used.

3. VALIDATION

The ecosystem services assessment requires a robust validation process, conducted internally by the contractor, considering both the methodology and results. The commissioner will be included in the validation process. The validation should be transparently documented with a report.

The validation process of the ecosystem services assessment should notably include a comparison of the results with other key published data and literature (if available). The potential differences should be discussed and explained.

4. STAKEHOLDER ENGAGEMENT

A clear strategy should be put in place to inform, consult and facilitate stakeholders' participation at different stages of the assessment including development of the methodology, data collection and at the stage of communication and dissemination of the results.

EVALUATION CRITERIA SECTION

1. FRAME & SCOPE

The proposals sent by the applicants will be evaluated according to its respect of the frame & scope defined in the call, as well as the approach(es) chosen to include the criteria of importance. Particular care should be given to:

- Inclusion of recommendations to decision-making;
- Ecosystem types of interest;
- Ecosystem services of interest;
- Geographical location and spatial extent(s);
- Quantification of ecosystem services in biophysical terms.

2. METHODOLOGY

The proposals sent by the applicants will be evaluated according to the following criteria:

- Methodological consistency as outlined in the call. The evaluation of the spatial and temporal distribution of the ecosystem services and their associated benefits is of particular importance.



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- Proposed methodological approach to measure the methodological characteristics defined above including modelling methods, metrics and indicators. Particular care should be given to justify the choice of the methodological approach;
- Assessment and clear reporting format for uncertainties arising in the ecosystem service assessment;
- A clear workplan and timeline for the validation of the scope, methodology, and / or results of the ecosystem service assessment;
- Assessment of the potential interrelationships between ecosystem services and the benefits they provide;
- Clearly defined involvement of stakeholders in the validation process of the ecosystem service assessment;
- Relevant modes of stakeholder involvement throughout the ecosystem service assessment.



7.3.2.3 Frame & Scope template

Step 1- Selection of the questions

1. CONTEXT AND PURPOSE

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the example question	YES / ~~NO~~
1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the example question	YES / ~~NO~~
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the example question	YES / ~~NO~~

2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses		This question is relevant
2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?	Link to the example question	YES / ~~NO~~

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2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?	Link to the example question	YES / ~~NO~~
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the example question	YES / ~~NO~~
2.3. Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the example question	YES / ~~NO~~
3.3. Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.4. Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the example question	YES / ~~NO~~
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the example question	YES / ~~NO~~

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3.4.c. What aspects of ecosystem services should be measured?	Link to the example question	YES / ~~NO~~
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the example question	YES / ~~NO~~
3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the example question	YES / ~~NO~~
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the example question	YES / ~~NO~~
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the example question	YES / ~~NO~~
3.5. Scenarios		This question is relevant
3.5.a. Are future scenarios required in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the example question	YES / ~~NO~~
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the example question	YES / ~~NO~~
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

Assessment is needed primarily at the policy evaluation step (impact evaluation and decision-support guidance). It shows how restoration has (not) improved the provision of specific ecosystem services. Insights can then be derived for adaptive management and funding decisions on future actions.

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

The primary objective of the ecosystem service assessment is to evaluate the effects of restoration measures on the provision of hydrological ES in the Salzach river floodplain, with a focus on flood regulation and groundwater recharge.

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

The floodplain area is a Natura 2000 site which was subject to an EU LIFE restoration project. Different aspects of the following policies could therefore be considered:

- Natura 2000 Management Plans
- EU LIFE Program Guidelines
- EU Water Framework Directive (WFD)
- Austrian Water Act
- Biodiversity Strategy for Austria

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1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. These characteristics may include age distribution, cultural and ethnic composition, income levels, education, livelihood types etc.

Due to river regulation, the floodplain area has been under problematic ecological and hydrological conditions, which have caused flooding of the nearby municipalities in the past. Since the 2000s, several restoration measures have taken place in the area, intending to re-establish the natural hydrodynamic condition and the connectivity between the river, its tributaries and the groundwater regime. The ecosystem service assessment aims to quantify the impacts of those measures regarding flood protection capacity and groundwater recharge.

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yes, no, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

No, but further operational actions and management plans could build on the assessment.

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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

The results will be used 1) to monitor and evaluate the success of restoration on flood protection and groundwater recharge, 2) to ensure that the restoration activities align with Natura 2000 objectives, and 3) to communicate the benefits of these measures to policymakers, funders, and the public.

2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By "secondary user(s)" we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

Secondary users include:

- EU funders (e.g. LIFE program)
- Local municipalities (Anthering, Weitwörth)
- Universities

2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

- Local municipalities: Informing spatial planning and flood risk reduction strategies
- Researchers: Advance scientific knowledge about floodplain restoration and its link to hydrological ecosystem service supply



2.2. Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making step. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

The assessment will inform the Department for Nature and Environmental Protection of the Federal State of Salzburg about the impacts (positive / negative) of the restoration measures that have been conducted in the area.

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Local

- inform local spatial planning by integrating the benefits of restored floodplain ecosystems into development plans

Regional

- standardize hydrological ES mapping and assessment methods for other floodplain areas in Salzburg
- support regional conservation policies

National

- integrate hydrological ES into national ES accounts
- update Austria's water management strategies by providing replicable methods

2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts that the results of the assessment are expected to have if they are used by stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

The assessment will empower local stakeholders with data-driven insights and raise public awareness, fostering community support for further actions.



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2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should choosing this format?	Results should be presented like this
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Ecosystem types include:

- Rivers and canals
- Lakes and reservoirs
- Forests and woodlands (softwood and hardwood riparian forests)
- Grasslands

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the benefits that humans get from nature such as climate regulation, flood protection, pollination, timber and food provision etc.

Services of interest include flood protection and groundwater recharge.

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

Salzach river floodplain (Natura 2000 area; UL: N 47°56'12" / E 12°56'24"; LR: N 47°52'17" / E 13°00'22").



3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped into deciduous and coniferous forests. This is useful to understand the supply of ecosystem services across natural boundaries (e.g., carbon sequestration in a forest ecosystem depends among others on the species composition). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the ecological scale:
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative units (e.g., municipality, county), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the administrative scale:



3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

The assessment should be conducted over the years 2000–2025. The reporting frequency is yearly.

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes, no, maybe, or don't know. Valuing, or quantifying, ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Yes.

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. Economic value is a measure of the contribution of the ecosystem service(s) to human wellbeing. It is generally measured in monetary units to facilitate direct comparison and aggregation with the values of other goods and services (e.g. for inclusion in decision support frameworks such as cost-benefit analysis). It is recommended to first value service in biophysical terms before valuing them in monetary terms.

No.

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3.4.c. What aspects of ecosystem services should be measured?

Select what applies

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (<i>i.e.</i> , what quantity is being supplied?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (<i>i.e.</i> , what quantity is being used?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i> , what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits are improvements in people's quality of life. Equity goals focus on guaranteeing that these are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified using metrics such as availability and access to ecosystem services, reduction in social vulnerabilities, social inclusion, etc.

No.



3.4.e. Should the ecosystem services be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?

Answer yes, no, maybe, or don't know. Ecosystem services are crucial to health, including the health dimension in an ecosystem service assessment allows to take into account the wider impacts of changes in ecosystem services on the society and the environment. The health scope will inform the selection of assessment methodology, stakeholder engagement and reporting. The One Health approach is an approach that recognises the interconnection between people, animals, plants and their shared environment.

No.

3.4.f Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use and management measures.

No.

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

No.

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Answer yes, no, maybe, or don't know. Identify if there is a need to conduct the assessment while taking into account scenarios reflecting a change in policy, climate or other environmental conditions, change in governance etc. In modelling, future scenarios represent a range of potential futures that one would like to predict.

No.

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, groups, organisations/institutions) who are interested in or are expected to have an impact on the process of the ecosystem service assessment and / or its results.

Maybe, this could be interesting.

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder engagement means that key parties will be consulted during the development of the assessment and the evaluation of the results and deliverables.

Yes, the stakeholders can be informed about the process and asked for support regarding data provision and reviewing.

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?

Identify the stakeholders who should be consulted during the development of the assessment. This can be based on an earlier stakeholder analysis or primary considerations that are important from the commissioners' perspective.

Stakeholders are expected to be involved throughout the ecosystem service assessment. Key stakeholders who could be involved are local municipalities of Weitwörth, Anthering, and Oberndorf, the administration of the federal state of Salzburg, as well as the Austrian Federal Ministry for Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management (BMLUK). Municipalities are engaged in integrating and disseminating information at the local level (e.g., to landowners), whereas the federal state and the ministry provide support on all necessary administrative and legal matters.

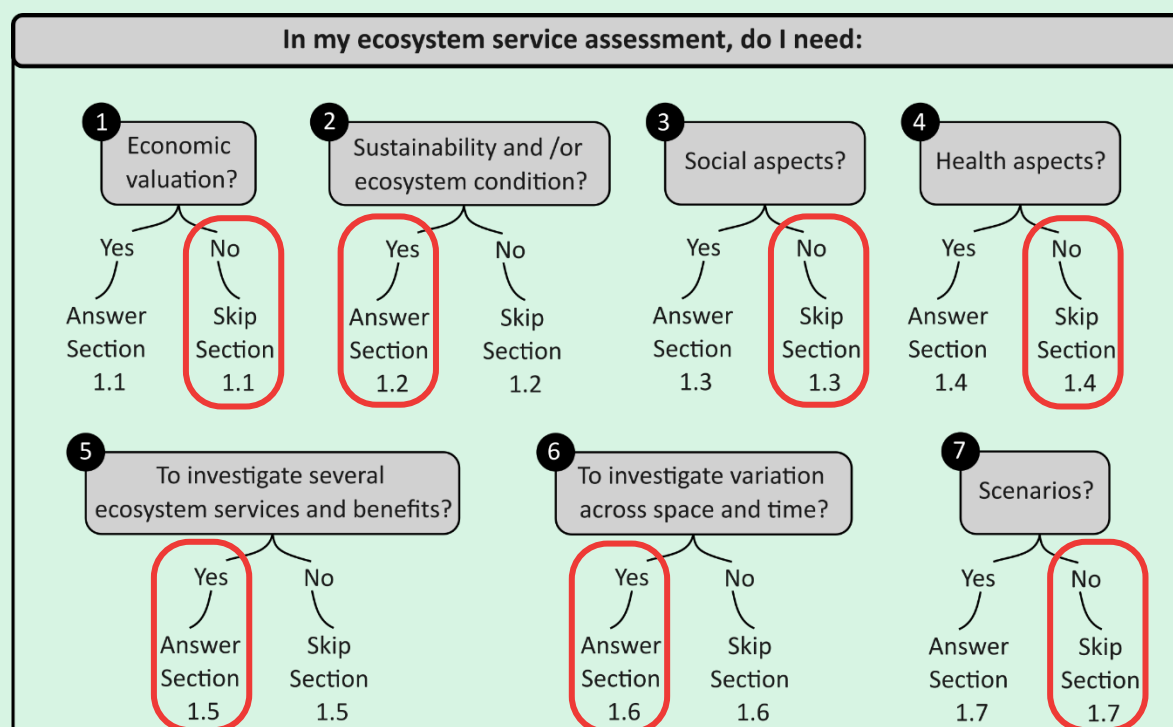
Step 3- Write the Frame & Scope section of the Terms of Reference using the preformatted text

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Step 1- Selection of the questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS



1.1 Economic valuation		This question is relevant
1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?	Link to the example question	YES / NO
1.1.b. Should the ecosystem service assessment include indicators of the contribution of ecosystem services to economic development, employment and growth?	Link to the example question	YES / NO
1.2. Sustainability and ecosystem condition		This question is relevant
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the example question	~~YES~~ / NO
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the example question	YES / ~~NO~~
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the example question	~~YES~~ / NO

Skipped as not applicable



1.3. Social characteristics		This question is relevant
1.3.a Should the ecosystem service assessment results be disaggregated by ecosystem types to better understand who benefits from ecosystem services?	Link to the example question	YES / NO
1.3.b Should the ecosystem service assessment evaluate and report on the perceptions, and values of society towards ecosystem services?	Link to the example question	YES / NO
1.4. Health characteristics		This question is relevant
1.4.a. What aspects of health are you interested in?	Link to the example question	YES / NO
1.4.d. Should the results of the ecosystem service assessment be used to inform policy, perception, and health-relevant actions?	Link to the example question	YES / NO
1.4.e. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the example question	YES / NO
1.5. Relationships between ecosystem services		This question is relevant
1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and / or the benefits they provide?	Link to the example question	YES / ~~NO~~
1.6. Spatial and temporal characteristics		This question is relevant
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the example question	YES / ~~NO~~
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?	Link to the example question	YES / ~~NO~~
1.7. Scenarios characterisation		This question is relevant
1.7.a. What scenarios should be taken into account in the ecosystem service assessment?	Link to the example question	YES / NO

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2. UNCERTAINTY

		This question is relevant
2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the example question	YES / ~~NO~~

3. VALIDATION

		This question is relevant
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the example question	YES / ~~NO~~
4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?

Select what applies. Choosing the type of valuation methods is voluntary, if the commissioners don't have sufficient information.

Skipped as not applicable

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g., flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ecosystem services can be obtained from markets or surveys of businesses and households. This approach is only applicable to ecosystem services that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ecosystem services as the cost of replacing it with a human-made service. It is only applicable to ecosystem services that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ecosystem services that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW



Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	YES / NO / MAYBE / DON'T KNOW
Net factor income	The net factor income method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	YES / NO / MAYBE / DON'T KNOW
Production function	The production function method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	YES / NO / MAYBE / DON'T KNOW
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	YES / NO / MAYBE / DON'T KNOW
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	YES / NO / MAYBE / DON'T KNOW
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ecosystem services through public surveys. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ecosystem services by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and if assessors have the knowledge, they can specify the type of economic indicators. The economic importance of ecosystem services is often quantified through indicators such as the contribution to economic growth, the economy, or employment. These indicators can be useful for assessing the importance of ecosystem services to decision makers and the general public.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know). If yes, specify.

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1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem service supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service supply and use may vary depending on changes in condition of the ecosystem. Ecosystem service(s) supply is the provision of service(s) by the ecosystem. Ecosystem service(s) use is the utilisation of service(s) by those who benefit from the ecosystem.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

Answer in this box (yes, no, maybe, or don't know).

1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Skipped as not applicable

Dimension of ecosystem condition	Description	This dimension should be measured in the assessment
Index of general ecosystem condition	This kind of indicator is a combining measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem. It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	YES / NO / MAYBE / DON'T KNOW



Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the salinity and temperature of water. If affected, they can have an impact on the supply of ecosystem services. Abiotic physical indicators include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution..	YES / NO / MAYBE / DON'T KNOW
Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of	YES / NO / MAYBE / DON'T KNOW



	ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. This approach highlights who benefits from the ecosystem services guarantees that inequities are not overlooked. This approach highlights who benefits, who is excluded, and who is not. This approach helps to improve well-being and equity.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. This approach investigate whether the ecosystem service assessment will document and report on how social groups perceive, value, and prioritize ecosystem services.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits refers to goods or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., salutogenic environments, medicinal or medical resources) in an ecosystem service assessment is essential to improve public health. For example, urban green areas in cities can reduce stress and improve mental health, and reduce the spreading of some diseases such as obesity by encouraging physical activities.	YES / NO / MAYBE / DON'T KNOW
Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., consideration of specific diseases, accidents or disasters) in an ecosystem service assessment is essential to protect public health. For example, deforestation and land-use changes can reduce biodiversity and contribute to the density increase of disease-carrying organisms such as mosquitos, which	YES / NO / MAYBE / DON'T KNOW

Skipped as not applicable

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	in turn increase the spreading of disease such as malaria. Another example is the decrease of green spaces in cities which can lead to an increase in air pollution and the rise of respiratory diseases such as asthma, which in turn impact the public health sector finances.	
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., incidence or prevalence of positive or negative health status at varying population scales) in an ecosystem service assessment is essential to protect and / or improve public health. Contrary to health risks and benefits which refer to the way ecosystem types and /or services impact or improve health, health outcomes refer to the measurable effects of ecosystem types and / or services on health. In other words, health benefits and risks focus on how ecosystems and their services contribute to and impact health, while health outcomes focus on what the concrete result for health is. For example, there is a decrease in the prevalence of asthma in cities with higher urban green areas.	YES / NO / MAYBE / DON'T KNOW

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards relevant ecosystem services?

Answer yes, no, maybe, or don't know. *Whether the ecosystem service assessment will document how social groups perceive, value, and prioritize ecosystem services. These perceptions may include cultural significance, recreational use, or economic reliance.*

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. *Whether the ecosystem service assessment will consider general environmental compartments (e.g. air, water, soil, urban environment) and health, or aim to provide a more detailed understanding of specific ecosystem types and / or their services on specific health issues.*

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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1.5. Relationships between ecosystem services

1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. Interrelationships between ecosystem services, between benefits, or between ecosystem services and their benefits means that the services and / or benefits are related and affect each other. There are a number of ways ecosystems services and / or benefits can be related such as interdependencies, synergies, trade-offs...

Yes.

1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

Yes.

1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Yes.

1.7 Scenarios

1.7.a. What scenarios should be taken into account in the ecosystem service assessments?

Identify the previously chosen metrics for which a scenario analysis is required. List and describe the scenarios that should be considered. A broad description of goals for which the scenarios are required. Future scenarios represent a range of potential futures that could occur.

Skipped as not applicable

Answer in this box.

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2. UNCERTAINTY

2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Yes.

2.b. What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Description	Uncertainties should be reported with this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / NO / MAYBE / DON'T KNOW
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	YES / NO / MAYBE / DON'T KNOW

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data are baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. Commissioners might want to list some key datasets or figures they would like the results to be comparable with. Alternatively, stakeholders can be consulted to identify these references.

Yes (if available).

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4. STAKEHOLDER ENGAGEMENT

4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	Consult/participate: stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	Consult/participate: stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	Consult/participate: stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	Consult/participate: stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the inclusion of local knowledge in the assessment.	YES / NO / MAYBE / DON'T KNOW



	Inform: provide updates and transparency on the progress of the assessment.	
Interpretation of the results	Consult/participate: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Communication and dissemination of the results	Consult/participate: stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

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	directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

Step 3- Write the Methodology section of the Terms of Reference using the preformatted text

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7.3.2.5 Evaluation Criteria template

Step 1- Complete the column “WRITING EVALUATION CRITERIA”

Step 2- Write the Evaluation Criteria section of the Terms of Reference using the preformatted text

Step 3- Evaluate proposals with the column “EVALUATING PROPOSALS”

1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making	X		X		
1.b. Correspondence with the requested format of the results		X		X	
1.c. Include the ecosystem types of interest	X		X		
1.d. Include the ecosystem services of interest	X		X		
1.e. Include the correct the spatial extent(s)	X		X		
1.f. Include the correct time period and temporal scale for the results		X		X	
1.g. Include the correct spatial scales for the results	X		X		
1.h. Quantify ecosystem services in biophysical terms	X		X		
1.i. Quantify ecosystem services in terms of their economic value in monetary terms		X		X	
1.k. Quantify ecosystem service supply , use , demand		X		X	

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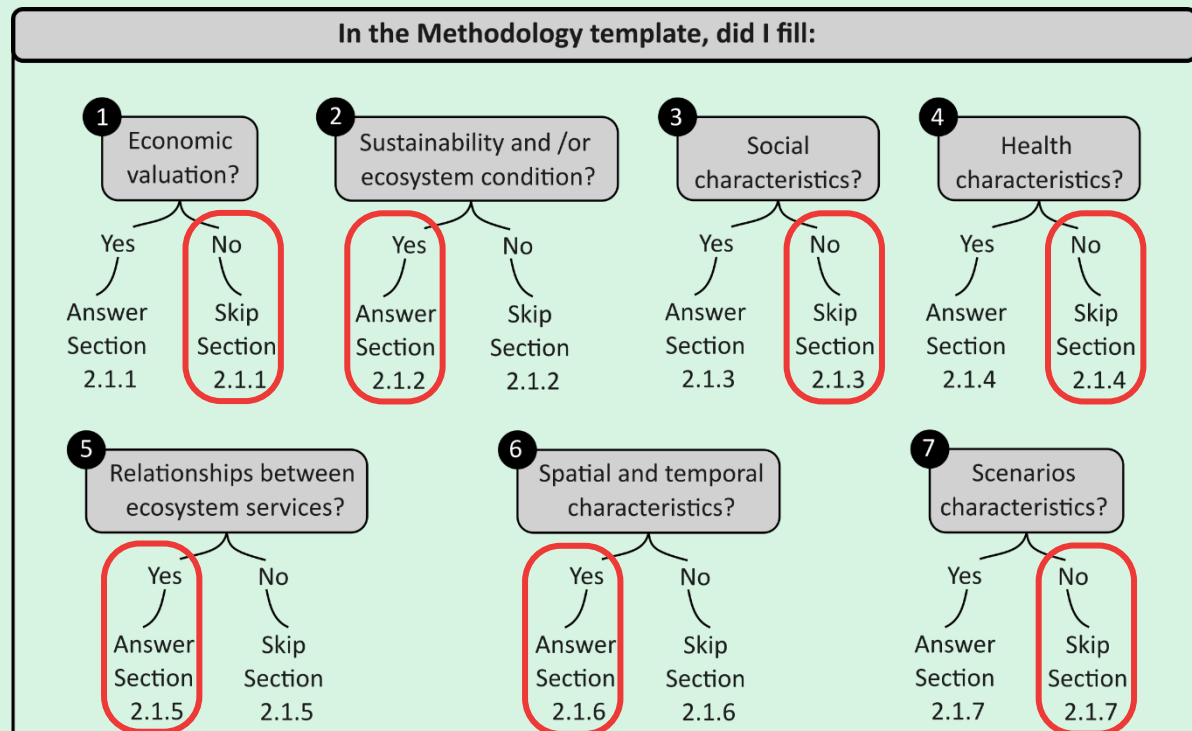
Criteria	YES	NO	YES	NO	DON'T KNOW
1.l. Include an evaluation of sustainable use and / or supply		X		X	
1.m. Include social aspects		X		X	
1.n. Include health aspects		X		X	
1.o. Include an evaluation of ecosystem condition		X		X	
1.p. Include a stakeholder analysis		X		X	
Qualitative appreciation of the proposal	The proposal demonstrates a strong alignment with the scope and objectives of the assessment. It clearly addresses spatial and temporal dimensions of the ecosystem services of interest.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation that will be used					
2.1.1.b. Consider the economic system services and economic development					
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of <u>ecosystem condition</u> on ecosystem service supply		X		X	
2.1.2.b. Define and evaluate <u>sustainable levels</u> for the use and / or supply of ecosystem services		X		X	

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition		X		X	
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem services assessment to identify					
2.1.3.b. Assess attitudes, values, and values of social groups towards ecosystem services					
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks					
2.1.4.b. Measure of health benefits					
2.1.4.c. Measure of health outcomes					
2.1.4.d. Assess attitudes, values, and values of social groups towards health-relevant ecosystem services					
2.1.4.e. Establish health links with specific ecosystems and / or ecosystem services					
2.1.5 Relationships between ecosystem services					
2.1.5.a. Identify potential interrelationships between ecosystem services and the benefits they provide		X		X	
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits	X		X		
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits	X		X		

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1	Skipped as not applicable				
2.1.1 scen					
Qualitative appreciation of the proposal	The applicant proposal addresses all the methodological requirements specified in the Call for Tender.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment	X		X		
2.2.b. Include a clear reporting format for uncertainties	X		X		
Qualitative appreciation of the proposal	The applicant's proposal includes adequate uncertainty reporting formats.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment	X		X		
2.3.b. Validation of the results of the ecosystem service assessment includes comparison with published reference data		X		X	
2.3.c. Involvement of stakeholders in the validation process of the ecosystem service assessment	X		X		
Qualitative appreciation of the proposal	The applicant's proposal includes a validation plan, although the validation of the results of ecosystems service assessment might not include published reference data, in those data is not available.				
	Qualitative score: 4.5 /5				

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment		X		X	
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment	X		X		
Qualitative appreciation of the proposal	The applicant's proposal does not include a stakeholder engagement plan, but their involvement in the assessment would be done via several engagement channels.				
	Qualitative score: 4.5 /5				

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7.3.3 Air quality and Climate related ecosystem services

7.3.3.1 Description of the example case

Box 4- Example case – Air quality and Climate

This example case addresses aboveground carbon sequestration by forests and heathlands of São Miguel island, Azores, with the primary goal of develop SEEA EA aligned seasonal carbon sequestration accounts by forests and heathlands with the highest temporal and spatial resolution allowed by open earth observation data. This assessment will support the relevant policies at regional scale, dealing with: supplying accurate data for the issuance of credible carbon credits and identifying eligible forest projects; enhancing certification credibility and strengthening sustainable forest management practices; identification and classification of forest and heathland species and habitats that play a significant role in carbon storage; while also aligning with the EU's legally binding targets to restore degraded ecosystems, particularly those with high carbon sequestration potential. Collectively, this assessment integrates carbon accounting into regional forest management, aligning with international standards, and reinforcing policies aimed at ecological sustainability and climate resilience in the Azores.

7.3.3.2 Terms of Reference obtained from the templates

This section shows an example of Terms of Reference that can be obtained by answering the three guidance templates. This example illustrates how the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference.

FRAME & SCOPE SECTION

1. CONTEXT AND PURPOSE

This ecosystem service assessment on forests and heathlands carbon sequestration will be used for informing forest management practices related to timber production, replantation of production forest, and optimizing restoration/conservation efforts according to the carbon sequestration capacity of native and exotic species.

The primary objective of the assessment is to develop seasonal carbon sequestration accounts by forests and heathlands with the highest temporal and spatial resolution allowed by open earth observation data. These accounts should be aligned with the System of Environmental Economic Accounting – Ecosystem Accounting developed by the UN.

Relevant policies which should be considered for this assessment include the EU Nature Restoration Regulation, Regional Legislative Decree (DLR) n.º 6/98/A, de 13 de abril (Protection of the regional forest heritage), DLR n.º 27/2022/A, de 28 de novembro (Legal framework for the classification of trees of public interest in the Autonomous Region of the Azores), DL n.º 4/2024, de 5 de janeiro (Establishes the voluntary carbon market and sets the rules for its operation), DLR n.º 15/2012/A, de 2 de abril (Legal framework for nature conservation and biodiversity protection) and DLR n.º 4/2024/A, de 10 de julho - Action

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7.2.18 (A0249) - Maintenance of the Certification System for the Forest Perimeter and Regional Woodlands.

The ecosystem service assessment should aim at providing recommendations within the outlined decision-making and policy context.

2. INTENDED IMPACTS AND OUTPUTS

Uses and users

This assessment will be used by the commissioner to guide forest management practices to optimize carbon sequestration capacity of forests and heathlands of São Miguel island.

The ensuing results should be usable for the Regional Directorate of Forest Resources and Spatial Planning for updating their forest inventory and managing the plantation forests within the Forest Perimeter and Regional Woodlands areas. Meanwhile, the Regional Secretariat for the Environment and Climate Action of the Government of the Azores, may use the results to guide restoration/conservation efforts according to the carbon sequestration capacity of native and exotic species. Research institutions might delve deeper into validating models and exploring synergies and trade-offs with other ecosystem services.

Intended impacts of the assessment

The main intended impacts of the ecosystem service assessment at the level of the outlined relevant policies at the regional scale are as follows:

- Supplying spatial data to prioritize restoration and climate mitigation under the Nature Restoration Regulation.
- Under DL No. 4/2024, it provides accurate carbon data to support the issuance of credible credits, improve validation and market trust, inform official methodologies, guide fair pricing, and design financial incentives for broader participation.
- Under DLR No. 4/2024/A (Action 7.2.18), it ensures forest management practices, including timber harvesting and replantation, meet FSC standards, strengthening forest certification and sustainable policies.
- For DLR No. 15/2012/A, it quantifies carbon storage to guide sustainable forestry that maintains biodiversity and supports climate mitigation.
- Under DLR No. 27/2022/A, it supports the classification of trees, species, and habitats of public interest by providing carbon sequestration data, enhancing conservation efforts.

Formats of the deliverables

The deliverables of this assessment should include:

- Non-technical executive summary.
- Detailed technical report with methodology, data sources and results.
- Presentation / briefing for stakeholders.
- Training materials for user capacity building.

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- Scientific publication based on the technical report.
- Maps of forest and heathland condition and carbon sequestration.
- Tables summarising carbon sequestration and condition indicators.

3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystem type(s) and service(s)

Ecosystem types of interest in this assessment include all EUNIS level 3 forest and heathland habitats existing in São Miguel island, while the ecosystem service of interest is carbon sequestration, as defined in the Common International Classification of Ecosystem Services (CICES).

Spatial and temporal characteristics

The assessment is to be conducted at the regional level, covering the whole island of São Miguel, with fully spatially explicit results aggregated at the ecological scale from 2022 onwards. Seasonal updating is required.

Ecosystem modeling characteristics and valuation of services

The assessment should measure carbon sequestration in biophysical terms. No economic valuation is necessary.

The assessment should focus on the supply of carbon sequestration while evaluating condition features necessary for enabling its sustainable use. A separate evaluation of forests and heathlands condition should also be done.

The results of the assessment will be presented as maps of carbon sequestration capacity and condition of forests and heathlands in São Miguel island and tables summarising forest and heathland carbon sequestration and condition metrics in the same area.

4. STAKEHOLDER ENGAGEMENT

No stakeholder engagement is expected in this specific assessment by the contractor.

METHODOLOGY SECTION

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Sustainability and ecosystem condition

The ecosystem service assessment should include analyses to highlight and understand the influence of ecosystem condition on the supply of the ecosystem service of interest. In their proposal, the contractor will clearly describe and justify the methodology that will be used. The assessment shall identify and define sustainable supply levels for the ecosystem service under assessment. This includes determining thresholds or reference values that reflect the levels at which the ecosystem service can be maintained over time. The assessment must clearly describe and justify the methodology that will be used to establish these levels and the data sources that will inform the analysis.

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The evaluation of ecosystem condition in this assessment should include a general index of ecosystem condition, biotic indicators (species, structure, function) and landscape-level characteristics.

Spatial and temporal characteristics

The assessment should evaluate the spatial variation in the condition of the ecosystems and the supply levels of carbon sequestration services over the spatial extent, scales, time period and temporal scale considered in this assessment. Results should provide recommendations for maintaining and / or enhancing the supply of the ecosystem service of interest without negatively affecting ecosystem condition.

2. UNCERTAINTY

The ecosystem service assessment should evaluate and document uncertainty arising in it. The contractor should clearly present levels of uncertainty in the assessment and discuss the reliability of the methods and results. The discussion should include an interpretation about what the levels of uncertainty mean for the decision-making processes that would arise from any of the results of this assessment. When reporting uncertainties, the contractor should clearly explain and justify the choice of methods used. The preferred formats for reporting uncertainty include: an uncertainty section/report, visual summary, decision-relevant summary, and technical appendices.

3. VALIDATION

The ecosystem service assessment should validate the methodology used and the results of the assessment. The validation process should involve the commissioners. It should be carried out internally to the contractor's organisation. The potential contractor should clearly describe the validation process that they expect to put in place during the assessment.

4. STAKEHOLDER ENGAGEMENT

No stakeholder engagement is expected in this specific assessment.

EVALUATION CRITERIA SECTION

1. FRAME & SCOPE

The proposals sent by the applicants will be evaluated according to its respect of the frame & scope defined in the call, as well as the approach(es) chosen to include the criteria of importance. In particular:

- Recommendations for decision-making for the relevant policies / legislation outlined in the call;
- Target the ecosystem types (forests and heathlands) and ecosystem service of interest (carbon sequestration);

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- Evaluate the condition of these ecosystem types;
- Correspond to the specified spatial scale, spatial extent and temporal scale;
- Quantify carbon sequestration in biophysical terms;
- Quantify carbon sequestration supply and evaluate its sustainability.

2. METHODOLOGY

The proposals will be evaluated based on how well they align with the methodological requirements defined in the call. The proposed methodological approach(es) to measure the methodological characteristics defined above including modelling methods, metrics and indicators should be clearly described and justified. Particular emphasis will be placed on:

Ecosystem condition

- Forest and heathland ecosystem condition, influencing the carbon sequestration capacity, should be evaluated.
- Sustainable levels of carbon sequestration should be identified in relation to timber harvesting and replanting cycles without compromising its long-term condition or functions.
- Biotic (species, structure, function) and landscape-level indicators should be included for assessing ecosystem condition.

Spatial and temporal characteristics

- Spatial and temporal (seasonal) variations in carbon sequestration should be determined with high resolution from 2022 onwards.

Scenarios

Proposals should consider the alternative scenario defined in the call.

Uncertainty

Proposals should clearly describe their approach to documenting and reporting uncertainties under the format of structured uncertainty sections/reports, visual summaries, decision-relevant summaries, scenario-based documentation and technical appendices.

Validation

Proposals should include a clear workplan and timeline for the internal validation of the scope, methodology, and / or results of the ecosystem service assessment.

Stakeholder engagement

Stakeholder engagement is not required for this assessment and is not be considered in the evaluation

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7.3.3.3 Frame & Scope template

Step 1- Selection of the questions

1. CONTEXT AND PURPOSE

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the example question	YES / ~~NO~~
1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the example question	YES / ~~NO~~
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the example question	~~YES~~ / NO
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the example question	YES / ~~NO~~

2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses		This question is relevant
2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?	Link to the example question	YES / ~~NO~~

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2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?	Link to the example question	YES / ~~NO~~
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the example question	~~YES~~ / NO
2.3. Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) the geographical locations and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the example question	YES / ~~NO~~
3.3. Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.4. Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the example question	YES / ~~NO~~
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the example question	~~YES~~ / NO

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3.4.c. What aspects of ecosystem services should be measured?	Link to the example question	YES / ~~NO~~
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the example question	~~YES~~ / NO
3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the example question	~~YES~~ / NO
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the example question	YES / ~~NO~~
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the example question	YES / ~~NO~~
3.5. Scenarios		This question is relevant
3.5.a. Are future scenarios required in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the example question	YES / NO
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the example question	YES / NO
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the example question	YES / NO

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Step 2- Answer the selected questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

To assess the carbon sequestration provided by aboveground biomass of forests and heathlands in São Miguel island, aiding in forest management practices related to timber production, replantation of production forest, and optimizing restoration/conservation efforts according to the carbon sequestration capacity of native and exotic species.

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

To develop seasonal carbon sequestration accounts by forests and heathlands with the highest temporal and spatial resolution allowed by Copernicus derived datasets and other open earth observation data. The accounts should be aligned with the System of Environmental Economic Accounting – Ecosystem Accounting.

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

- EU Nature Restoration Regulation
- Regional Legislative Decree (DLR) n.º 6/98/A, de 13 de abril (Protection of the regional forest heritage)
- Regional Legislative Decree n.º 27/2022/A, de 28 de novembro (Legal framework for the classification of trees of public interest in the Autonomous Region of the Azores)
- Legislative Decree n.º 4/2024, de 5 de janeiro (Establishes the voluntary carbon market and sets the rules for its operation)
- Regional Legislative Decree n.º 15/2012/A, de 2 de abril (Legal framework for nature conservation and biodiversity protection).
- Regional Legislative Decree n.º 4/2024/A, de 10 de julho - Action 7.2.18 (A0249) - Maintenance of the Certification System for the Forest Perimeter and Regional Woodlands (Initiative aligning with international standards, like the Forest Stewardship Council (FSC), to promote sustainable forest management practices).

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1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. Characteristics may include age distribution, cultural and ethnic composition, education, livelihood types etc.

Skipped as not applicable

Answer in this box.

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yes, no, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

Yes – The assessment will provide guidance and recommendations for measuring and seasonally updating the carbon sequestration capacity of forests and heathlands to inform forest management practices.

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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

Guide forest management practices to optimize carbon sequestration capacity of forests and heathlands of São Miguel island.

2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By “secondary user(s)” we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

- Regional Directorate of Forest Resources and Spatial Planning (DRRF)
- Regional Secretariat for the Environment and Climate Action of the Government of the Azores (SRAAC)
- Research institutions

2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

- DRRF will use the intermediate forest structure and biomass mapping for updating their forest inventory for São Miguel island, while the results on carbon sequestration will feed into managing the plantation forests within the Forest Perimeter and Regional Woodlands areas.
- SRAAC will use the results to guide restoration/conservation efforts according to the carbon sequestration capacity of native and exotic species.
- Research institutions may use the data and methodology to conduct further studies, validate models, or explore synergies and trade-offs between carbon sequestration and other ecosystem services.

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2.2. Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on the decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making step. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Guide forest management practices through carbon sequestration accounts in forest and heathlands of São Miguel with high spatial and temporal resolution.

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

- Nature Restoration Regulation: Supplying spatial data to prioritise restoration and climate change mitigation efforts.
- Regional Legislative Decree n.º 4/2024, de 5 de janeiro (Establishes the voluntary carbon market and sets the rules for its operation): Providing accurate data for the issuance of credible carbon credits and identifying eligible forest projects. It underpins independent validation and verification processes, enhances transparency and market trust, and informs the development of official methodologies aligned with international standards. Additionally, it supports fair carbon credit pricing and helps design financial incentives, encouraging broader participation in certified forest carbon projects and reinforcing climate policy objectives.
- Regional Legislative Decree n.º 4/2024/A, de 10 de julho - Action 7.2.18 (A0249) - Ensuring that forest management practices, including sustainable timber provision and replantation of harvested areas, meet FSC standards, enhancing certification credibility and strengthening sustainable forest policies in the Azores.
- Regional Legislative Decree n.º 15/2012/A, de 2 de abril (Legal framework for nature conservation and biodiversity protection): providing precise data on carbon storage, it quantifies ecosystem services and informs sustainable forest management practices — including timber harvesting and replantation — that maintain habitat integrity and species diversity. This ensures that forestry activities contribute simultaneously to climate change mitigation and biodiversity conservation
- Regional Legislative Decree n.º 27/2022/A, de 28 de novembro (Legal framework for the classification of trees of public interest in the Autonomous Region of the Azores): carbon accounting assessments can support the identification and



classification of forest and heathland species and habitats that play a significant role in carbon storage. By quantifying their carbon sequestration potential, these assessments provide scientific data that can justify their classification as species/habitats of public interest with significant ecological value, thereby enhancing their protection and contributing to conservation goals.

2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts of the assessment. Results of the assessment are expected to have if they are used. Impacts refer to any positive or negative medium and long term effects. Results of an ecosystem service assessment, for example when used for policy development, or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Skipped as not applicable

Answer in this box.

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2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should choosing this format?	Results should be presented like this
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Forests and heathlands (all existing level 3 subclasses of the EUNIS classification).

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the benefits that humans get from nature such as climate regulation, flood protection, pollination, timber and food provision etc.

Global climate regulation - Carbon sequestration.

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location and total area(s) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

São Miguel island (Regional / island-wide).

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3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped into deciduous and coniferous forests. This is useful to understand the supply of ecosystem services across natural boundaries (e.g., carbon sequestration in a forest ecosystem depends among others on the species composition). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the ecological scale:
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative units (e.g., municipality, county), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the administrative scale:

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3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

From 2022 onwards with seasonal updating.

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes, no, maybe, or don't know. Valuing, or quantifying, ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Yes.

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. For example, a measure of the contribution of the ecosystem service(s) to human well-being can be measured in monetary units to facilitate direct comparison and aggregation with the values of other goods and services (e.g. for inclusion in decision support tools such as cost-benefit analysis). It is recommended to first value services in biophysical terms before valuing them in monetary terms.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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3.4.c. What aspects of ecosystem services should be measured?

Select what applies

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (<i>i.e.</i> , what quantity is being supplied?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (<i>i.e.</i> , what quantity is being used?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i> , what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / MAYBE / DON'T KNOW

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits focus on improvements in people's quality of life. Equity goals focus on guaranteeing that benefits are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified in terms of the access, reduction in social vulnerabilities, social inclusion, etc.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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3.4.e. Should the ecosystem services be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?

Answer yes, no, maybe, or don't know. Ecosystem services are crucial to health, including the health dimension in an ecosystem. The assessment needs to take into account the wider impacts of changes in ecosystem health on human, animal, and plant health. The health scope will inform the selection of indicators, methodology, stakeholder engagement and reporting. The One Health approach is an approach that recognises the interconnection between people, animals, plants and their shared environment.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

3.4.f. Is the ecosystem service assessment interested in evaluating the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use, management and conservation measures.

Yes.

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

Yes.

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Answer yes, no, maybe, or don't know. Identify if there is a need to conduct the assessment while taking into account scenarios reflecting a change in policy, climate or other environmental conditions, change in governance etc. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Yes.

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, organizations/institutions) who are interested in or are expected to be affected by the ecosystem service assessment and / or its results.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, assessment, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder involvement means that key parties will be consulted during the development, assessment, and the evaluation of the results and deliverables.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why were they selected?

Identify the stakeholders who should be consulted during the development of the assessment. This can be based on the assessment's scope, objectives or primary considerations that are important to the assessment's perspective.

Skipped as not applicable

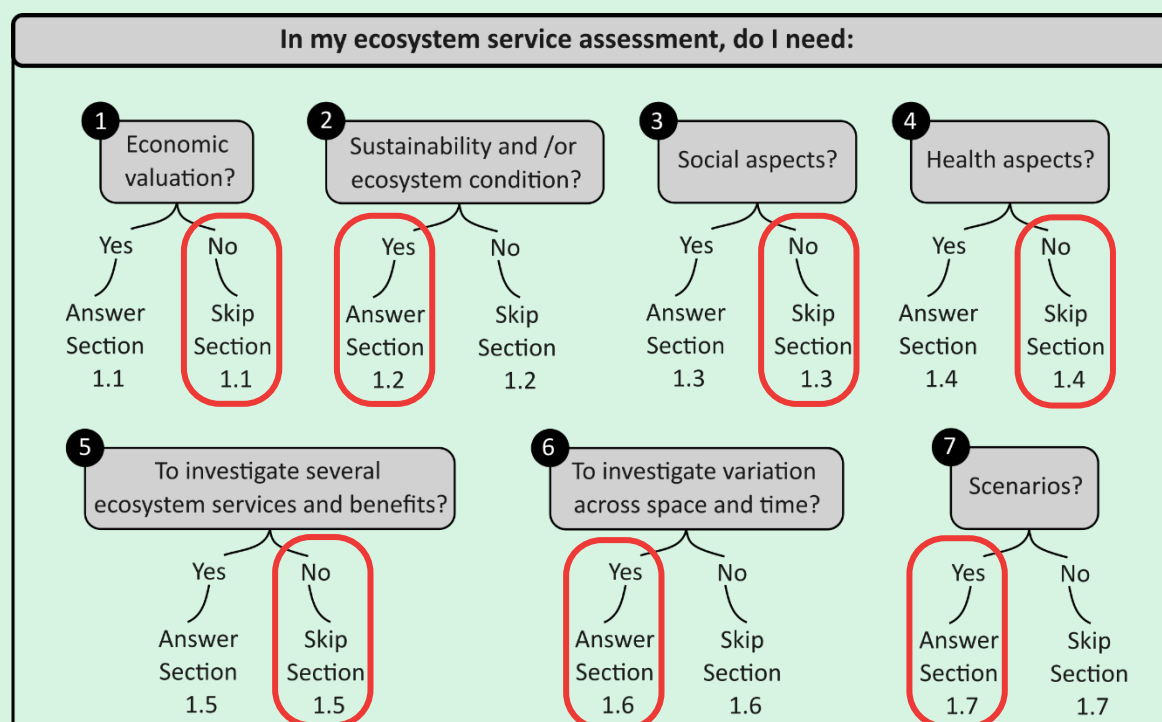
Answer in this box.

Step 3- Write the Frame & Scope section of the Terms of Reference using the preformatted text

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Step 1- Selection of the questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS



1.1 Economic valuation		This question is relevant
1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?	Link to the example question	YES / NO
1.1.b. Should the ecosystem service assessment include indicators of the contribution of ecosystem services to economic development, such as employment and growth?	Link to the example question	YES / NO
1.2. Sustainability and ecosystem condition		This question is relevant
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the example question	YES / ~~NO~~
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the example question	YES / ~~NO~~
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the example question	YES / ~~NO~~

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1.3. Social characteristics		This question is relevant
1.3.a Should the ecosystem service assessment results be disaggregated by ... to better understand who ... in services?	Link to the example question	YES / NO
1.3.b Should the ecosystem service assessment evaluate and ... , perceptions, and values of ... towards ecosystem services?	Link to the example question	YES / NO
1.4. Health characteristics		This question applies to me
1.4.a. What aspects of health are you interested in?	Link to the example question	YES / NO
1.4.b. Should the results of the ecosystem service assessment evaluate ... , perceptions ... towards health-rele...	Link to the example question	YES / NO
1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the example question	YES / NO
1.5. Relationship between ecosystem services		This question is relevant
1.5.a. Should the ecosystem service assessment identify potential relationships between ecosystem services and the benefits they provide?	Link to the example question	YES / NO
1.6. Spatial and temporal characteristics		This question is relevant
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the example question	YES / ~~NO~~
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?	Link to the example question	YES / ~~NO~~
1.7. Scenarios characteristics		This question is relevant
1.7.a. What scenarios should be taken into account in the ecosystem service assessments?	Link to the example question	YES / ~~NO~~

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2. UNCERTAINTY

		This question is relevant
2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the example question	YES / ~~NO~~

3. VALIDATION

		This question is relevant
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the example question	~~YES~~ / NO

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the example question	YES / ~~NO~~
4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment

Select what applies. Choosing the type of valuation methods is voluntary, if the commissioners don't have sufficient information.

Skipped as not applicable

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g., flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ecosystem services can be obtained from markets or surveys of businesses and households. This approach is only applicable to ecosystem services that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ecosystem services as the cost of replacing it with a human-made service. It is only applicable to ecosystem services that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ecosystem services that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW



Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	YES / NO / MAYBE / DON'T KNOW
Net factor income	The net factor income method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	YES / NO / MAYBE / DON'T KNOW
Production function	The production function method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	YES / NO / MAYBE / DON'T KNOW
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	YES / NO / MAYBE / DON'T KNOW
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	YES / NO / MAYBE / DON'T KNOW
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ecosystem services through public surveys. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ecosystem services by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and assessors have the knowledge, they can specify the type of economic indicator. The economic importance of ecosystem services is often quantified through indicators such as the contribution to economic growth, the economy, or employment. These indicators can be useful for assessing the importance of ecosystem services to decision makers and the general public.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).. If yes, specify.

1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service(s) supply and use may vary depending on changes in condition of the ecosystem that provides the service. Ecosystem service(s) supply is the provision of service(s) by the ecosystem(s). Ecosystem service(s) use is the utilisation of service(s) by those who benefit from them.

Yes. The assessment must evaluate how the condition of forest and heathlands of São Miguel influences carbon sequestration capacity.

1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

Yes. The assessment should define sustainable levels of carbon sequestration in accordance with timber harvesting and replanting cycles.

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1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Dimension of ecosystem condition	Description	This dimension should be measured in the assessment
Index of general ecosystem condition	This kind of index is an overarching measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	YES / NO / MAYBE / ~~DON'T KNOW~~
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem. It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	YES / NO / MAYBE / ~~DON'T KNOW~~
Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / NO / MAYBE / ~~DON'T KNOW~~
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / NO / MAYBE / ~~DON'T KNOW~~
Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the salinity and temperature of water. If affected, they can have an impact on the supply of ecosystem services. Abiotic physical indicators	YES / NO / MAYBE / ~~DON'T KNOW~~



	include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution..	YES / NO / MAYBE / DON'T KNOW
Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	YES / NO / MAYBE / DON'T KNOW

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. If the answer is yes, the assessment of ecosystem benefits from the ecosystem services guarantees that inequities are addressed. This approach highlights who benefits, who is excluded, and who is not. It helps to improve well-being and equity.

Answer in this box (yes, no, maybe, or don't know).

Skipped as not applicable

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1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. The assessment should investigate whether the ecosystem service assessment will document and report the attitudes, perceptions, value, and prioritize ecosystem services.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits refers to ecosystem types or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., salutogenic environments, medicinal or medical resources) in an ecosystem service assessment is essential to improve public health. For example, urban green areas in cities can reduce stress and improve mental health, and reduce the spreading of some diseases such as obesity by encouraging physical activities.	YES / NO / MAYBE / DON'T KNOW
Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., consideration of specific diseases, accidents or disasters) in an ecosystem service assessment is essential to protect public health. For example, deforestation and land-use changes can reduce biodiversity and contribute to the density increase of disease-carrying organisms such as mosquitos, which in turn increase the spreading of disease such as malaria. Another example is the decrease of green spaces in cities which can lead to an increase in air pollution and the rise of respiratory diseases such as asthma, which in turn impact the public health sector finances.	YES / NO / MAYBE / DON'T KNOW
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., incidence or prevalence of positive or negative health status at varying population scales) in an ecosystem service assessment is essential to protect and / or improve public health. Contrary to health risks and benefits which refer to the way ecosystem types and /or services impact or improve health, health outcomes refer to the measurable effects of ecosystem types	YES / NO / MAYBE / DON'T KNOW

Skipped as not applicable



	and / or services on health. In other words, health benefits and risks focus on how ecosystems and their services contribute to and impact health, while health outcomes focus on what the concrete result for health is. For example, there is a decrease in the prevalence of asthma in cities with higher urban green areas.	

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards relevant ecosystem services?

Answer yes, no, maybe, or don't know. This helps determine whether the ecosystem service assessment will document how social groups perceive, value, and prioritize ecosystem services. These perceptions can be related to their significance, recreational use, or economic reliance.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. This helps determine whether the ecosystem service assessment will consider general or specific environmental compartments (e.g. air, water, soil, urban environment) and health, or aim to provide a more detailed understanding of the health links between ecosystem types and / or their services on specific health issues.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.5. Relationships between ecosystem services

1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should identify potential interrelationships between ecosystem services, between benefits, or between ecosystem services and benefits. Identifying interrelationships between ecosystem services and / or benefits are related and can be used to understand a number of ways ecosystems services and / or benefits can be related (e.g., dependencies, synergies, trade-offs...).

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

Yes.

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1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Yes.

1.7 Scenarios

1.7.a What scenarios should be taken into account in the ecosystem service assessments?

Identify the previously chosen metrics for which a scenario analysis is required. List and describe the scenarios that should be taken into account. Even a broad description of goals for which the scenarios are required is sufficient. In modelling, future scenarios represent a range of potential futures that one would like to predict.

A scenario should be considered in which the woodland plantations with exotic cedar trees are progressively replaced with native species with highest carbon sequestration potential in areas of difficult access for timber harvesting and replanting. The difference in carbon sequestration supply should be determined between the business-as-usual scenario (continue replanting with exotic trees) and the alternative scenario (replace with native species).

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2. UNCERTAINTY

2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Yes.

2.b What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Description	Uncertainties should be reported with this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data can be baseline or benchmark datasets or already published figures that can be used to compare the results of the ecosystem service assessment. Commissioners can also identify key datasets or figures they would like the results to be compared to. Alternatively, stakeholders can be consulted to identify these references.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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4. STAKEHOLDER ENGAGEMENT

4.a At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any organisation or individual who are interested in and / or will be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Skipped as not applicable

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	Consult/participate: stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	Consult/participate: stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	Consult/participate: stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	Consult/participate: stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the	YES / NO / MAYBE / DON'T KNOW

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	inclusion of local knowledge in the assessment. Inform: provide updates and transparency on the progress of the assessment.	
Interpretation of the results	Consult/participate: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Communication and dissemination of the results	Consult/participate: stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

4.b What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved in the assessment. Stakeholders are any group, organisation or individual who are interested in, affected by ecosystem services and any change made to their ecosystem service assessment, stakeholders notably include those who directly benefit from the service, those who try to regulate the use, the users of the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Skipped as not applicable

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / MAYBE / DON'T KNOW
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / MAYBE / DON'T KNOW

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Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	YES / NO / MAYBE / DON'T KNOW
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / NO / MAYBE / DON'T KNOW
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	YES / NO / MAYBE / DON'T KNOW
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

Step 3- Write the Methodology section of the Terms of Reference using the preformatted text

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7.3.3.5 Evaluation Criteria template

Step 1- Complete the column “WRITING EVALUATION CRITERIA”

Step 2- Write the Evaluation Criteria section of the Terms of Reference using the preformatted text

Step 3- Evaluate proposals with the column “EVALUATING PROPOSALS”

1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making	X		X		
1.b. Correspondence with the requested format of the results	X		X		
1.c. Include the ecosystem types of interest	X		X		
1.d. Include the ecosystem services of interest	X		X		
1.e. Include the correct the spatial extent(s)	X		X		
1.f. Include the correct time period and temporal scale for the results	X		X		
1.g. Include the correct spatial scales for the results	X		X		
1.h. Quantify ecosystem services in biophysical terms	X		X		
1.i. Quantify ecosystem services in terms of their economic value in monetary terms		X		X	
1.k. Quantify ecosystem service supply , use , demand	X		X (supply only)		

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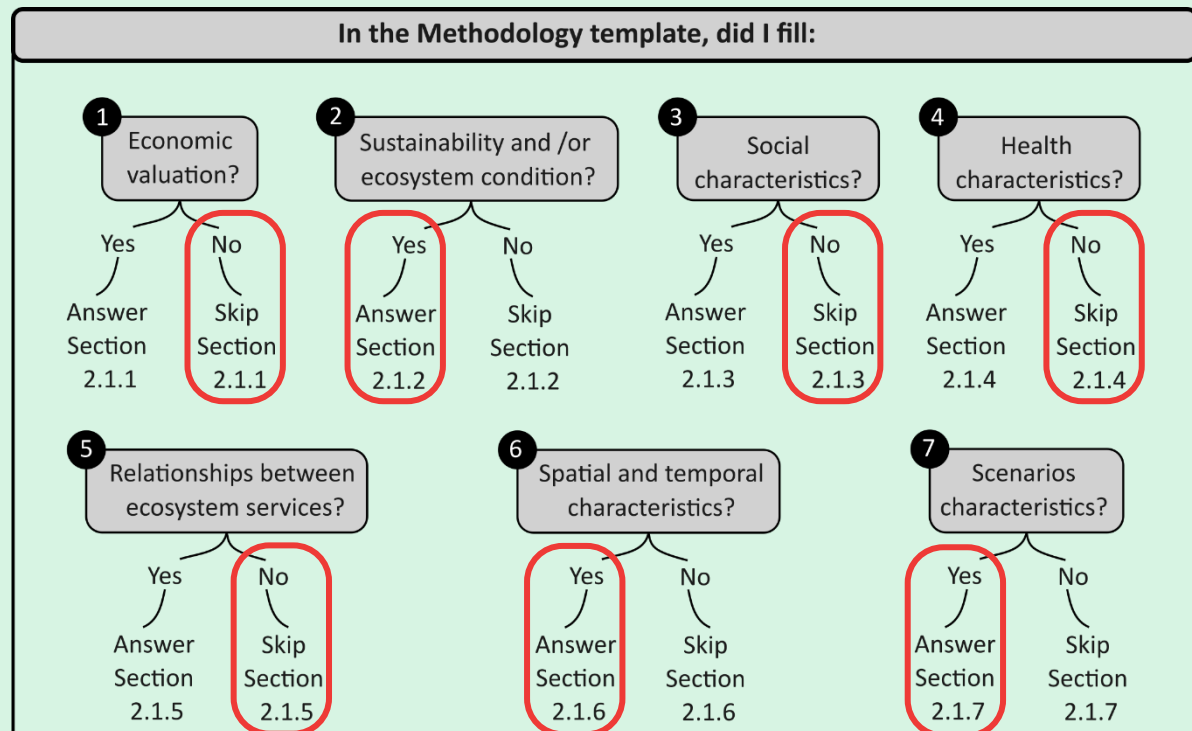
Criteria	YES	NO	YES	NO	DON'T KNOW
1.l. Include an evaluation of sustainable use and / or supply	X		X		
1.m. Include social aspects		X		X	
1.n. Include health aspects		X		X	
1.o. Include an evaluation of ecosystem condition	X		X		
1.p. Include a stakeholder analysis		X		X	
Qualitative appreciation of the proposal	The proposal demonstrates a strong alignment with the scope and objectives of the assessment, addressing the spatial and temporal dimensions, sustainability, and ecosystem condition of the ecosystem types of interest.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation that will be used					
2.1.1.b. Consider the economic system services and economic development					
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of <u>ecosystem condition</u> on ecosystem service supply	X		X		
2.1.2.b. Define and evaluate <u>sustainable levels</u> for the use and / or supply of ecosystem services	X		X		

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition	X		X		
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem service assessment by identifying relevant dimensions, attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.3.b. Disaggregate results of the ecosystem service assessment by identifying relevant dimensions, attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks					
2.1.4.b. Measure of health benefits					
2.1.4.c. Measure of health outcomes					
2.1.4.d. Disaggregate results of the ecosystem service assessment by identifying relevant dimensions, attitudes, perceptions, and values of social groups towards health-relevant ecosystem services					
2.1.4.e. Establish health links with specific ecosystems and / or ecosystem services					
2.1.5 Relationship between ecosystem services					
2.1.5.a. Disaggregate results of the ecosystem service assessment by identifying relevant dimensions, attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.5.b. Disaggregate results of the ecosystem service assessment by identifying relevant dimensions, attitudes, perceptions, and values of social groups towards ecosystem services					
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits	X		X		
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits	X		X		

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.7. Scenarios					
2.1.7.a. Include relevant scenarios	X		X		
Qualitative appreciation of the proposal	The methodology is robust and appropriate for the assessment, focusing on ecosystem condition, sustainability, and spatial-temporal analysis.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment	X		X		
2.2.b. Include a clear reporting format for uncertainties	X		X		
Qualitative appreciation of the proposal	The proposal offers and uncertainty assessment with visual summaries and technical appendices, addressing also the scenario analysis.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment	X		X		
2.3.b. Involvement of stakeholders in the validation process of the ecosystem service assessment		X		X	
2.3.c. Validation of the results of the ecosystem service assessment includes comparison with published reference data		X		X	
Qualitative appreciation of the proposal	The proposal includes a well described internal validation of the assessment. Stakeholder involvement is not included, as expected.				
Qualitative score:			5 /5		

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment		X		X	
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment		X		X	
Qualitative appreciation of the proposal					
Qualitative score:			/5		

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7.3.4 Recreation and Amenities related ecosystem services

7.3.4.1 Description of the example case

Box 5- Example case – Recreation and Amenities

Thematic recreation service accounts for outdoor recreation areas in a municipality within the greater metropolitan area. Accounts are aimed at providing information on changes in total recreation activity levels in the recreation areas of the municipality by population over time. The ecosystem service assessment exemplified in the templates below will also assess the health impacts and economic value outcomes of changes in activity levels for the purpose of raising awareness about the importance of protection and maintenance of the greenbelt for the urban population. Accessibility of populations to a spectrum of recreation opportunities will address environmental justice, social impact dimensions associated with the accounts. For operational purposes, thematic recreation accounts provide a municipality-wide monitoring of combined effects of policies and planning on overall use of recreation areas. Providing knowledge about the importance of recreation areas for public health and the economy is aimed at supporting increased funding for recreation establishment and maintenance.

7.3.4.2 Terms of Reference obtained from the templates

This section shows an example of Terms of Reference that can be obtained by answering the three guidance templates. This example illustrates how the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference.

FRAME & SCOPE SECTION

1. CONTEXT AND PURPOSE

The primary objective of the ecosystem service assessment is to produce a thematic outdoor recreation service - public health account for the municipality of the capital city. The overall motivation is combined strategic-operational: to demonstrate how recreation area mapping, thematic accounting with economic and health outcomes can support municipal operational funding of recreation area maintenance. This purpose is supported by the following context.

The National Environment Agency provided guidance for municipalities to mapping and value their recreation areas using participatory methods. Since then the Municipality's Urban Environment Agency, Building and Planning Agency, in collaboration with recreation organisations, has mapped and scored over 1400 recreation areas inside and outside the built zone. In 2026 municipalities are expected to update their mapping and valuation of recreation areas, using a revised national guidance.

Municipal budgets in the current administrative period have been reduced. Municipalities have frozen recruiting due to budget shortfalls. Recreation area management is being rationalized. Participatory updating with civil society of the recreation area mapping is human resource intensive.

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The Municipal agencies in charge of mapping and managing recreation areas need statistics to document the importance of recreation areas, as support for continued funding of mapping, monitoring and management of the areas.

The capital city is a national “front runners” in mapping and valuation of recreation areas and municipal green accounts, using the Environment Agency Guidance on Recreation Area Mapping and Valuation.

The country is currently preparing to report its first ecosystem accounts at a national level to EUROSTAT (regulation 691/2011) in 2026 (for the year 2024). The first round of reporting does not include outdoor recreation services. Outdoor recreation services have been shown to be the most economically valuable ecosystem services in national accounts in the UK (reference). Public health and equal access of local populations to recreation areas are potential strong policy motivations that have not been sufficiently connected to recreation area management. The Public Health Agency has developed guidance on impact assessment of health in projects which has the potential to be linked to ecosystem accounts.

The UN System of Environmental Economic Accounting – Ecosystem Accounting Chapter 13 suggests using thematic accounts to support policy sectors, in ways that are not necessarily compatible with national accounts. There are potential synergies for municipalities in connecting recreation area mapping and accounting to economic, health and social accessibility indicators.

County municipal agencies have the responsibility to support municipalities in common planning methodologies. Therefore, the municipality is calling on proposal to demonstrate how thematic recreation accounts can be leveraged to support municipal mapping, monitoring and management of recreation areas, also demonstrating the relevance for national level ecosystem accounting efforts

2. INTENDED IMPACTS AND OUTPUTS

Uses and users

The results of this assessment are produced for the municipal administrations to monitor physical recreation activity by recreation area and estimate contribution of recreation areas to outdoor physical exercise and public health outcomes.

Results will be made available and usable by municipalities, the county, the Region Recreation Council County administrations, Environment Agency - Recreation, Geodata, Environmental Economics units, National Statistics Office

Expected uses for municipalities include:

- demonstrating that the mapping of recreation areas by municipalities is a basis for outdoor recreation accounting at county/national level; and
- putting recreation and health benefits “on the map” to support municipal budgets

At national level the project aims to support the National Statistics Office by demonstrating a method for including everyday recreation in national accounts. The project results may also be used by the National environment agency: to report on meeting targets of the National Biodiversity and Strategy Action Plan:

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- target 1# land use planning that respects the right of local communities
- target# 3 protect areas important for biodiversity and ecosystem services.

Potential other users of the outcomes of the assessment include local and national media.

Intended impacts of the assessment

The immediate impacts of the assessment results are expected at several levels:

- At county level the assessment will demonstrate a standardised mapping and accounting guidance to municipalities for recreation areas. At municipal level the assessment is expected to put public outdoor recreation area values “on the planning map”, increasing their protection in the planning process, and to increase funding for public recreation area management.
- At national level the results are expected to contribute to changing national ecosystem accounting standards, with a method to identify everyday recreation value in satellite/thematic national accounts.

Beyond the results of the report the outcomes of this assessment should have impacts in providing map and accounting data to empower civil society local communities to be actively involved in municipal planning.

3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystem type(s) and service(s)

Ecosystem services in the thematic account is limited to outdoor physical recreation activity. Activity will be accounted for by recreation area type and an aggregate for physical activity outside mapped recreation areas. Recreation areas are defined by the National Guidance on mapping and valuing recreation areas.

Ecosystem types of interest include all types found within mapped recreation areas of the municipality

- Settlements and other artificial areas
- Croplands
- Grasslands
- Forests and woodlands
- Sparsely vegetated areas
- Inland wetlands
- Rivers and canals
- Lakes and reservoirs
- Marine inlets and transitional waters
- Coastal beaches, dunes and wetlands

Since recreation areas do not coincide with ecosystem boundaries, the approach of thematic accounts has been chosen.

Qualitative and quantitative characteristics

The thematic recreation service accounts are quantitative.

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Spatial and temporal characteristics

The ecosystem service assessment is to be conducted for the municipality. As maps are an expected output format, the assessment should be spatially explicit.

Ecosystem services are to be assessed yearly over the period 2019-2023 with aggregates for the whole four year accounting period.

Ecosystem modeling characteristics

Ecosystem condition account metrics are to be identified, but sustainability of use is not to be taken into account in this assessment.

Valuation of ecosystem services

Recreation service accounts are expected to be measured in physical and monetary terms. An attribution of health outcomes to physical activity data is to be tested by recreation area type. The potential of using the spatial mapping of the distribution of physical outdoor recreation activity in relation to socio-demographic-economic household characteristics at city district level is to be discussed as part of the assessment.

Formats of the deliverables

Three main formats for the outputs are envisaged:

- a report documenting the methodology for thematic recreation accounts
- map of outdoor recreation areas their physical use, economic values and health attributions;
- tables recording: provision of recreation services per recreation area, and physical use by recreation area, physical activity not in recreation area. The reporting tables should be compared to the format.

Additionally, the contractor will be expected to:

- produce a short video explaining the importance of outdoor recreation for environmental justice, health and the economy for diffusion on social media;
- run a workshop explaining the methodology to municipalities in the County;
- produce an electronic publication on the commissioner's website for public information.

4. STAKEHOLDER ENGAGEMENT

Specific engagements with stakeholders is expected during the development of the ecosystem service assessment. The contractor is expected to do a stakeholder analysis to identify key stakeholders (apart from the Commissioner of this Tender) who should be engaged in the assessment.

These stakeholders should notably include - Environment and Planning Agencies of the Municipality, the County, and the National Environment Agency, Units responsible for Geodata and Recreation

Consultation with the stakeholders would be relevant at different stages of the ecosystem service assessment to ensure its relevance. For example, the above mentioned stakeholders could advise on the data selection, validation of methodology and results.

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1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Monetary valuation

Monetary valuation of recreation should be carried out for the purposes of awareness raising of the inhabitants and the city council about the magnitude of economic value of time spent in recreation areas and the economic value of health benefits that can be ascribed to outdoor recreation areas. The change in outdoor recreation activity over time in total for the municipality (last 4 years) should be estimated. In estimating monetary values of change the alternative or counterfactual scenario for the population of lacking access to outdoor recreation should be defined.

The Consultant should compare different valuation methods to provide more robust arguments for the economic value of recreation in the municipality. Discuss the distribution of monetary use value for public budgets compared to private households. Provide justification for the use of monetary valuation methods relative to the different purposes outline above, making clear what the pros and cons are of each method.

Sustainability and ecosystem condition

Ecosystem condition assessments are based on the evaluation of the levels of ecosystem properties. The properties of the ecosystem will, in turn, determine the levels of ecosystem services supply and use. Degraded ecosystems may have lost their capacity to supply ecosystem services. Maintaining ecosystems in good condition is central to sustainability.

The Contractor should identify which indicators can be used to (i) monitor ecosystem condition for recreation users, and (ii) monitor recreation impacts on habitat condition for biodiversity, (iii) compatibility of condition indicators with the criteria in the national guidance method for mapping recreation areas.

Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use and supply of ecosystem services above which the ecosystem condition and ability to deliver services for future generations is maintained.

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment. In proposing condition indicators the Contractor should justify choices based on the ability to measure site degradation and congestion due to recreation. The Contractor should discuss the possibilities of using the chosen condition indicators to specify site visitation management objectives. Indicators chosen should consider recreation impacts on habitat condition for biodiversity. Recommendations for Key Performance Indices should be differentiated for peri-urban, semi-natural recreation areas. Compatibility with the national guidance on recreation area quality mapping criteria should be discussed.

Social characteristics

Understanding who benefits from the ecosystem services guarantees that inequities are

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identified and addressed. This approach highlights who benefits, who is excluded, and how interventions can improve well-being and equity. The Contractor should identify recreation benefits for children and youth. Furthermore, the Contractor should identify the representativity of each recreation assessment method relative to the population (e.g. children). Recreation services depend on how different social groups perceive, value, and prioritise ecosystem services. The Contractor should identify any time series on inhabitants' qualitative perceptions of outdoor recreation areas from population surveys, that can be used in parallel with quantitative accounting outcomes.

Health characteristics

Health benefits include goods or services which promote good health or offer avenues for positive health interventions. The Consultant should identify health benefits for children and youth, as priority social groups for policy in the municipality. Discuss what data is needed to quantify these benefits. Report any available population survey questions from previous studies that explicitly identify health perception. Ecosystem service assessment will aim to provide a more detailed understanding of the impact of recreation areas on health. The Contractor should identify the proportion of physical outdoor recreation that can be ascribed to recreation areas.

Spatial and temporal characteristics

Visitation / recreation activity levels of individual recreation areas should be estimated.

The Contractor should discuss whether annual accounting data on recreation is available and useful for the purposes described above. Discuss advantages/disadvantages of less frequent 4-yearly periods.

Scenarios

The Contractor should define any benchmark or counterfactual scenarios for modelling and valuation of outdoor recreation in the urban area. Discuss benchmarks which will be used to do economic valuation and estimate health benefits of outdoor recreation areas.

2. UNCERTAINTY

Uncertainty is present in all ecosystem service assessments. It is essential that both the contractors is conscious of the types of uncertainty that matter for the purpose discussed above. The Contractor should provide assessment and documentation of uncertainties pertaining to the results above. For documentation of uncertainty the Contract should consider the following formats for reporting uncertainty (not limited to):

- Uncertainty section/report: this is a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models;
- Visual summary: report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability;



- Decision-relevant summary: executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts;
- Scenario-based documentation: see above;
- Technical appendices: detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.

3. VALIDATION

There are no obvious independent data sources for recreation accounts compiled at the level of the city. Validation will take place qualitatively through stakeholder engagement. See below.

4. STAKEHOLDER ENGAGEMENT

Stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any group, organisation or individual who are interested in and / or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders.

The Contractor should make proposals covering the following engagement methods:

- Validation of the scope: stakeholders can help with making the scope fit their needs and perspectives. This increases the visibility, use, and credibility of the assessment. It also ensures better-defined objectives, realistic expectations, and a clearer understanding of potential barriers;
- Validation of the methodology: propose how to involve stakeholders with key technical expertise to quality assure that the methodology meets the minimum technical requirements for the objective(s) of the assessment;
- Validation of the results: stakeholders with specific and different sources of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s);
- Data collection: propose how stakeholders can directly participate in data collection as i.a. respondents, citizen scientists, experts, and / or can help disseminating the means of collecting data such as surveys. This notably facilitates the inclusion of local knowledge in the assessment;
- Interpretation of the results: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. Propose how they can support a sense of ownership of the results of the assessment;
- Communication and dissemination of the results: outline how stakeholders can directly participate in the co-creation and dissemination of the key messages from

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the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience;

- Newsletters or email updates: the Contractor should produce a newsletter quarterly to inform stakeholders of project progress;
- Websites: the Contractor should establish a storymap disseminating the main results from the assessment;
- Webinars and stakeholder events: The Contractor should inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results;
- The Contractor should establish an Advisory board to obtain feedback from the stakeholders throughout the assessment process.

EVALUATION CRITERIA SECTION

1. FRAME & SCOPE

The Proposal by the Contractor will be evaluated according to the following scope (what to include in the proposal): (30% importance)

- Requested format of the results;
- Ecosystem types of interest;
- Ecosystem services of interest;
- Geographic location and spatial scale(s);
- Temporal aggregation of results;
- Ecosystem services in physical terms;
- Ecosystem services in terms of their economic value in monetary terms;
- Ecosystem service use metrics;
- Social aspects - recreation activity across demographics;
- Health aspects - health benefits of outdoor recreation relative to a counterfactual;
- Ecosystem condition metrics determining recreation activity choice.

2. METHODOLOGY

The Proposal by the Contractor will be evaluated according to the following methodological requirements: (70% importance)

Economic valuation

- Comparison of different valuation methods;
- Discussion of assumptions, pros and cons of methods.

Ecosystem condition

- Quantify relevant dimensions of ecosystem condition.

Social characteristics

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- Disaggregate results of the ecosystem service assessment by social groups to identify beneficiaries;
- Assess and report the attitudes, perceptions, and values of social groups towards ecosystem services;
- Health characteristics;
- Measure of health benefits;
- Measure of health outcomes.

Spatial and temporal characteristics

- Evaluate the spatial distribution of ecosystem service(s) and / or benefits;
- Evaluate the temporal distribution of ecosystem service(s) and / or benefits;
- Include relevant scenarios.

Uncertainty

- Assess and document uncertainties arising in the ecosystem service assessment;
- Include a clear reporting format for uncertainties.

Validation

- Include a clear workplan and timeline for the validation of the scope, methodology, and / or results of the ecosystem service assessment;
- Involvement of stakeholders in the validation process of the ecosystem service assessment.

Stakeholder engagement

- Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment;
- Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment.

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7.3.4.3 Frame & Scope template

Step 1- Selection of the questions

1. CONTEXT AND PURPOSE

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the example question	YES / ~~NO~~
1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the example question	YES / ~~NO~~
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the example question	YES / ~~NO~~

2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses		This question is relevant
2.1.a How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.b Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.c How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?	Link to the example question	~~YES~~ / NO

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2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?	Link to the example question	YES / NO
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the example question	YES / NO
2.3. Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the example question	YES / NO

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / NO
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / NO
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the example question	YES / NO
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the example question	YES / NO
3.3 Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the example question	YES / NO
3.4. Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the example question	YES / NO
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the example question	YES / NO

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3.4.c. What aspects of ecosystem services should be measured?	Link to the example question	YES / ~~NO~~
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the example question	YES / ~~NO~~
3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the example question	YES / ~~NO~~
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the example question	~~YES~~ / NO
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the example question	YES / ~~NO~~
3.5. Scenarios		This question is relevant
3.5.a. Are future scenarios required in the ecosystem service assessment?	Link to the example question	~~YES~~ / NO

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the example question	~~YES~~ / NO
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the example question	YES / ~~NO~~
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

Agenda setting - first accounting period
Implementation - repeated accounting periods

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

Agenda setting has the purpose to inform municipal politicians of the health and economic importance of recreation areas in the municipality

Implementation through repeated accounting periods has the purpose of support municipal operational funding of recreation area maintenance.

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

Policies which provide justification for this ecosystem service assessment:

- Planning and Building, Nature and Public Health Acts
- National Biodiversity Action Plan
- Environment Agency Guidance on Recreation Area Mapping and Valuation
- Public Health Agency guidance on project impact assessment
- UN System of Environmental Economic Accounting – Ecosystem Accounting Chapter 13 Thematic accounts

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1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. These characteristics may include age distribution, cultural and ethnic composition, income levels, education, livelihood types etc.

The population living within the boundaries of the municipality. Most of the population is located within the built zone of the municipality. Populations from neighbouring municipalities in the metropolitan use the green belt and some central city parks. Tourists visiting the capital city using outdoor recreation areas. Different socio-economic groups have different levels of access to urban green spaces.

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yes, no, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

Yes.

Recommendations to maintain/increase funding for management of outdoor recreation areas. Recommendations for increasing access by socio-economic groups with less than benchmark accessibility (e.g., <30% blue-greenspace coverage at city district level, >350 meters to nearest greenspace)



2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

Municipality

- to monitor physical recreation activity by recreation area in the County
- estimate contribution of recreation areas to outdoor physical exercise
- demonstrate the mapping of recreation areas by municipalities as a basis for outdoor recreation accounting
- put recreation and health benefits “on the map” to support municipal budgets

2.1.b. Who is(are) the secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By “secondary user(s)” we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

Secondary users:

- local and national media
- Region Recreation Council
- municipality
- Environment Agency - Recreation, Geodata, Environmental Economics units
- National Statistics Organisation

2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

County:

- to monitor physical recreation activity by recreation area in the County

Regional Recreation Council:

- to estimate contribution of recreation areas to outdoor physical exercise and public health outcomes in the County

Municipalities :

- to demonstrate that the mapping of recreation areas by municipalities is a basis for outdoor recreation accounting at county/national level
- to put recreation and health benefits “on the map” to support municipal budgets

National statistics agency:

- to demonstrate a method for including everyday recreation in national accounts

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National environment agency:

- to meet targets of the National Biodiversity and Strategy Action Plan: target 1# landuse planning that respects the right of local communities and target# 3 protect areas important for biodiversity and ecosystem services

2.2 Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making step. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Municipal planning:

- put public outdoor recreation area values "on the map" in planning processes and development permitting.
- increasing their protection in the planning process increase funding for public recreation area management

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

County:

- standardise mapping and accounting guidance to municipalities for recreation areas

National:

- change national ecosystem accounting standards, with a method to integrate recreation value in national accounts

2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts that the results of the assessment are expected to have if they are used by stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

Results will also empower decision-makers and local communities actively involved in municipal planning.

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2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should choosing this format?	Results should be presented like this
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / NO / MAYBE / DON'T KNOW
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / NO / MAYBE / DON'T KNOW
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / NO / MAYBE / DON'T KNOW
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / NO / MAYBE / DON'T KNOW
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / NO / MAYBE / DON'T KNOW
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / NO / MAYBE / DON'T KNOW
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / NO / MAYBE / DON'T KNOW
Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / MAYBE / DON'T KNOW
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / MAYBE / DON'T KNOW
Other (precise)	Electronic publication on the commissioner's website	YES / NO / MAYBE / DON'T KNOW

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3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Ecosystem types of interest include all types found within mapped recreation areas in the municipality

- Settlements and other artificial areas
- Croplands
- Grasslands
- Forests and woodlands
- Sparsely vegetated areas
- Inland wetlands
- Rivers and canals
- Lakes and reservoirs
- Marine inlets and transitional waters
- Coastal beaches, dunes and wetlands

Outdoor recreation areas are defined by the national Guidance on mapping and valuing recreation areas.

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the benefits that humans get from nature such as climate regulation, flood protection, pollination, timber and food provision etc.

outdoor physical recreation activity

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

Recreation area within the boundaries of the municipality



3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped by riparian forests. . This is particularly useful to understand the supply of ecosystem services across natural boundaries (e.g., watershed). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the ecological scale:
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative unit (e.g., <i>municipality, county</i>), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	~~YES~~ / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the administrative scale: municipality & county

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3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

Recreation accounts should produce annual statistics, and a 4-year summary to coincide with the current municipal electoral period 2022-2026.

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes, no, maybe, or don't know. Valuing ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Yes.

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. Economic value is a measure of the contribution of the ecosystem service(s) to human wellbeing. It is generally measured in monetary units to facilitate direct comparison and aggregation with the values of other goods and services (e.g. for inclusion in decision support frameworks such as cost-benefit analysis). It is recommended to first value service in biophysical terms before valuing them in monetary terms.

Yes.

3.4.c. What aspects of ecosystem services should be measured?

Select what applies

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (i.e., what quantity is being supplied?). It can be further valued in terms of their economic value in monetary units (i.e., how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / NO / MAYBE / DON'T KNOW
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (i.e., what quantity is being used?). It can be further valued	YES / NO / MAYBE / DON'T KNOW

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	in terms of their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i>, what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i>, how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / MAYBE / DON'T KNOW

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits are improvements in people's quality of life. Equity goals focus on guaranteeing that these are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified using metrics such as access, reduction in social vulnerabilities, social inclusion, etc.

Yes.

Accessibility to recreation area of different neighbourhoods is a relevant equity goal for the assessment

3.4.e. Should the ecosystem services be valued in terms of their relevance to health?

If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?

Answer yes, no, maybe, or don't know. Ecosystem services are crucial to health, including the health dimension in an ecosystem service assessment allows to take into account the wider impacts of changes in ecosystem services on the society and the environment. The health scope will inform the selection of assessment methodology, stakeholder engagement and reporting. The One Health approach is an approach that recognises the interconnection between people, animals, plants and their shared environment.

Yes.

Evidence of physical and mental health impacts should be included where available.

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3.4.f. Is the ecosystem service assessment interested in evaluating the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use and management measures.

Yes.

Map user density by recreation area type should be included. Discuss congestion perception where data is available.

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

Yes.

Using recreation site quality criteria from the national guidance.

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Identify if there is a need to conduct the assessment while taking into account scenarios reflecting a change in policy, climate or other environmental conditions, change in governance etc. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Yes.

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, groups, organisations/institutions) who are interested in or are expected to have an impact on the process of the ecosystem service assessment and / or its results.

Yes.

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder engagement means that key parties will be consulted during the development of the assessment and the evaluation of the results and deliverables.

Yes.

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?

Identify the stakeholders who should be consulted during the development of the assessment. This can be based on an earlier stakeholder analysis or primary considerations that are important from the commissioners' perspective.

Stakeholders that should be consulted in the development of the assessment:

- Environment and Planning Agencies of Municipality, because they are responsible for producing the city's green accounts
- National Environment Agency, because it is responsible for national guidance on mapping and valuing recreation areas

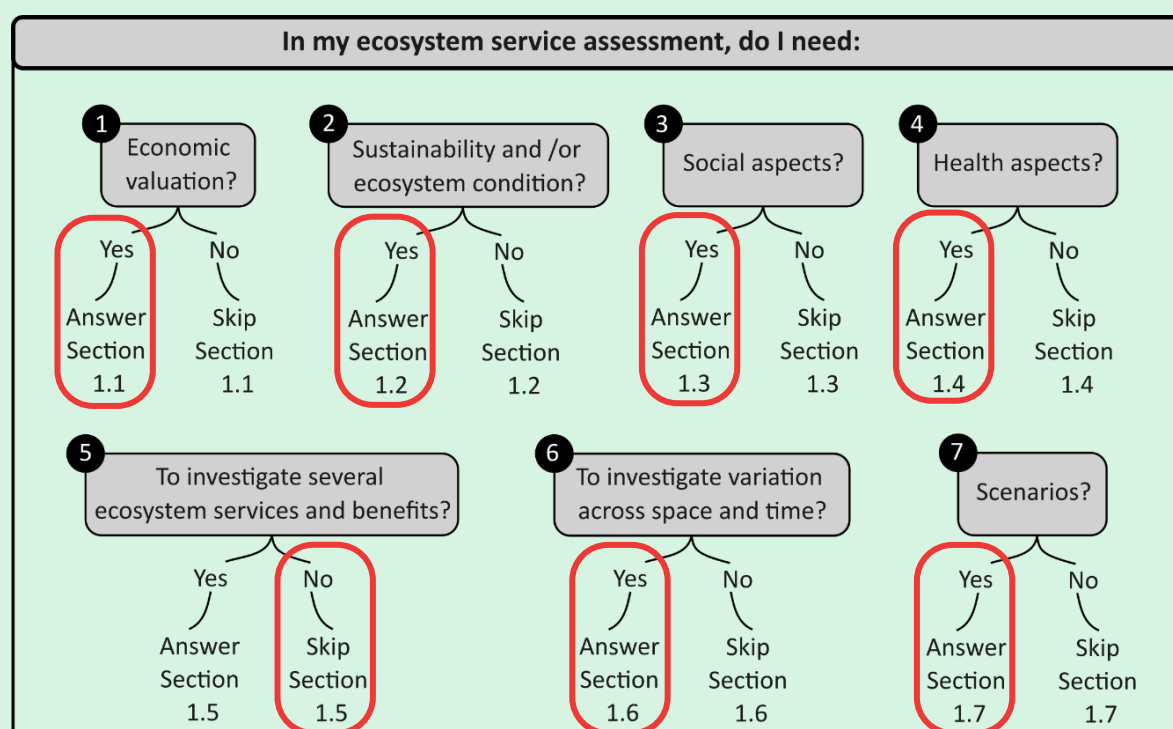
Step 3- Write the Frame & Scope section of the Terms of Reference using the preformatted text

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Step 1- Selection of the questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS



1.1. Economic valuation		This question applies to me
1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?	Link to the example question	~~YES~~ / NO
1.2. Sustainability and ecosystem condition		This question applies to me
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the example question	YES / ~~NO~~
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the example question	~~YES~~ / NO
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the example question	YES / ~~NO~~

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1.3. Social characteristics		This question applies to me
1.3.a Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?	Link to the example question	YES / ~~NO~~
1.3.b Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?	Link to the example question	YES / ~~NO~~
1.4. Health characteristics		This question applies to me
1.4.a. What aspects of health are you interested in?	Link to the example question	YES / ~~NO~~
1.4.b. Should the results of the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services?	Link to the example question	YES / ~~NO~~
1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the example question	YES / ~~NO~~
1.5. Relationships between ecosystem services		This question applies to me
1.5.a. Should the ecosystem service assessment identify potential links between ecosystem services and the benefits they provide?	Link to the example question	YES / NO
1.6. Spatial and temporal characteristics		This question applies to me
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the example question	YES / ~~NO~~
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?	Link to the example question	YES / ~~NO~~
1.7. Scenarios characteristics		This question applies to me
1.7.a. What scenarios should be taken into account in the ecosystem service assessments?	Link to the example question	YES / ~~NO~~

Skipped as not applicable

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2. UNCERTAINTY

		This question applies to me
2.a. Should the uncertainties arising in the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the example question	YES / ~~NO~~

3. VALIDATION

		This question applies to me
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question applies to me
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the example question	YES / ~~NO~~
4.b. How should the stakeholders be informed, consulted, or participate in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?

Select what applies. Choosing the type of primary valuation methods is not mandatory if the commissioners don't have sufficient knowledge.

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g. flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ES can be obtained from markets or surveys of businesses and households. This approach is only applicable to ES that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ES as the cost of replacing it with a human-made service. It is only applicable to ES that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ES that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW



Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Net factor income	The net factor income method estimates the value of ES that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Production function	The production function method estimates the value of ES that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ES through public surveys. This method can be applied to value all ecosystem services.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ES by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and if commissioners have the knowledge, they can specify the type of economic indicator of interest.

The economic importance of ecosystem services can be quantified through indicators such as the contribution to economic development, sectors of the economy, or employment. These indicators can be useful for communicating the importance of ecosystem services to decision makers and the general public.

Yes. Include estimates of municipal spending on recreation area maintenance, including estimates of current employment in greenspace maintenance.

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1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service(s) supply and use may vary depending on changes in condition of the ecosystem that provides the service. Ecosystem service(s) supply is the provision of service(s) by the ecosystem(s). Ecosystem service(s) use is the utilisation of service(s) by those who benefit from them.

Yes. The Contractor should identify which indicators can be used to (i) monitor ecosystem condition for recreation users, and (ii) monitor recreation impacts on habitat condition for biodiversity, (iii) compatibility of condition indicators with the criteria in the national guidance method for mapping recreation areas.

1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

No. The identification of condition indicators needs to be done first. Sustainable levels also depend on the expectations of recreation users relative to the type of recreation activities that can be carried out. This requires a follow-up project due to its complexity.

1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Dimension of ecosystem condition	Description	This dimension should be measured in the assessment
Index of general ecosystem condition	This kind of index is an overarching measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

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	It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	
Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / NO / MAYBE / DON'T KNOW
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the salinity and temperature of water. If affected, they can have an impact on the supply of ecosystem services. Abiotic physical indicators include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution.	YES / NO / MAYBE / DON'T KNOW



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Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. Understanding who benefits from the ecosystem services guarantees that inequities are identified and addressed. This approach highlights who benefits, who is excluded, and how interventions can improve well-being and equity.

Yes. Identify recreation benefits for children and youth. (Identify the representativity of each recreation assessment method relative to the population)

1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. This allows to investigate whether the ecosystem service assessment will document how different social groups perceive, value, and prioritize ecosystem services.

Yes. Identify any time series of inhabitants qualitative perceptions of outdoor recreation areas for population surveys, that can be used in parallel with quantitative accounting outcomes.

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits include goods or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., salutogenic environments, medicinal or medical resources) in an ecosystem service assessment is essential to improve public health. For example, urban green areas in cities can reduce stress and improve mental health, and reduce the spreading of some diseases such as obesity by encouraging physical activities.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

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Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., consideration of specific diseases, accidents or disasters) in an ecosystem service assessment is essential to protect public health. For example, deforestation and land-use changes can reduce biodiversity and contribute to the density increase of disease-carrying organisms such as mosquitos, which in turn increase the spreading of disease such as malaria. Another example is the decrease of green spaces in cities which can lead to an increase in air pollution and the rise of respiratory diseases such as asthma, which in turn impact the public health sector finances.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., incidence or prevalence of positive or negative health status at varying population scales) in an ecosystem service assessment is essential to protect and / or improve public health. Contrary to health risks and benefits which refer to the way ecosystem types and /or services impact or improve health, health outcomes refer to the measurable effects of ecosystem types and / or services on health. In other words, health benefits and risks focus on how ecosystems and their services contribute to and impact health, while health outcomes focus on what the concrete result for health is. For example, there is a decrease in the prevalence of asthma in cities with higher urban green areas.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services?

Answer yes, no, maybe, or don't know. Investigate whether the ecosystem service assessment will document how different social groups perceive, value, and prioritize ecosystem services. These perceptions may include cultural significance, recreational use, or economic reliance.

Yes. Report any available population survey questions from previous studies that explicitly identify health perception.

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1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. This determines whether the ecosystem service assessment will consider general relationships between environmental compartments (e.g. air, water, soil, urban environments, rural landscapes etc.) and health, or aim to provide a more detailed understanding of the impact of defined ecosystems types and / or their services on specific health issues.

Yes. Recreation services provided by mapped recreation areas. Identify the proportion of physical outdoor recreation that can be ascribed to recreation areas.

1.5. Relationships between ecosystem services

1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. This determines whether the assessment should identify potential interrelationships between ecosystem services, between benefits, or between ecosystem services and benefits. Identifying interrelationships means that the services and / or benefits are related and can be assessed together. This can include a number of ways ecosystems services and / or benefits can be related: dependencies, synergies, trade-offs...

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

Yes. Visitation/Recreation activity levels of individual recreation areas estimated.

1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Yes, Consider annual accounting data. Discuss advantages/disadvantages of less frequent 4-yearly periods.

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1.7 Scenarios

1.7.a What scenarios should be taken into account in the ecosystem service assessments?

Answer yes, no, maybe, or don't know. Identify the previously chosen metrics for which a scenario analysis is required. List and describe the scenarios that should be taken into account. Even a broad description of goals for which the scenarios are required is sufficient. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Yes. Counterfactual scenario to outdoor recreation in the urban area.

Discuss benchmarks which will be used to do economic valuation and estimate health benefits of outdoor recreation areas.

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2. UNCERTAINTY

2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Yes. Discuss the biases in the data and models qualitatively. Discuss possibilities to estimate confidence bounds for recreation activity levels per recreation area, given data availability per recreation area.

2.b What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Description	Uncertainties should be reported with this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW

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Other (specify)		~~YES / NO / MAYBE /~~ ~~DON'T KNOW~~



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3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / NO / MAYBE / DON'T KNOW
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	YES / NO / MAYBE / DON'T KNOW

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data are baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. Commissioners might want to list some key datasets or figures they would like the results to be comparable with. Alternatively, stakeholders can be consulted to identify these references.

No, the thematic recreation account uses available data. There are no obvious independent data sources at this aggregate level.

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4. STAKEHOLDER ENGAGEMENT

4.a At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	Consult/participate: stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	Consult/participate: stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	Consult/participate: stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	Consult/participate: stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the	YES / NO / MAYBE / DON'T KNOW

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	inclusion of local knowledge in the assessment. Inform: provide updates and transparency on the progress of the assessment.	
Interpretation of the results	Consult/participate: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Communication and dissemination of the results	Consult/participate: stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

4.b What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / MAYBE / DON'T KNOW
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / MAYBE / DON'T KNOW

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Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

Step 3- Write the Methodology section of the Terms of Reference using the preformatted text

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7.3.4.5 Evaluation Criteria template

Step 1- Complete the column “WRITING EVALUATION CRITERIA”

Step 2- Write the Evaluation Criteria section of the Terms of Reference using the preformatted text

Step 3- Evaluate proposals with the column “EVALUATING PROPOSALS”

1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making		X		X	
1.b. Correspondence with the requested format of the results	X		X		
1.c. Include the ecosystem types of interest	X		X		
1.d. Include the ecosystem services of interest	X		X		
1.e. Include the correct the spatial extent(s)	X		X		
1.f. Include the correct time period and temporal scale for the results	X		X		
1.g. Include the correct spatial scales for the results	X				X
1.h. Quantify ecosystem services in biophysical terms	X		X		
1.i. Quantify ecosystem services in terms of their economic value in monetary terms	X		X		
1.k. Quantify ecosystem service supply , use , demand	X		X		

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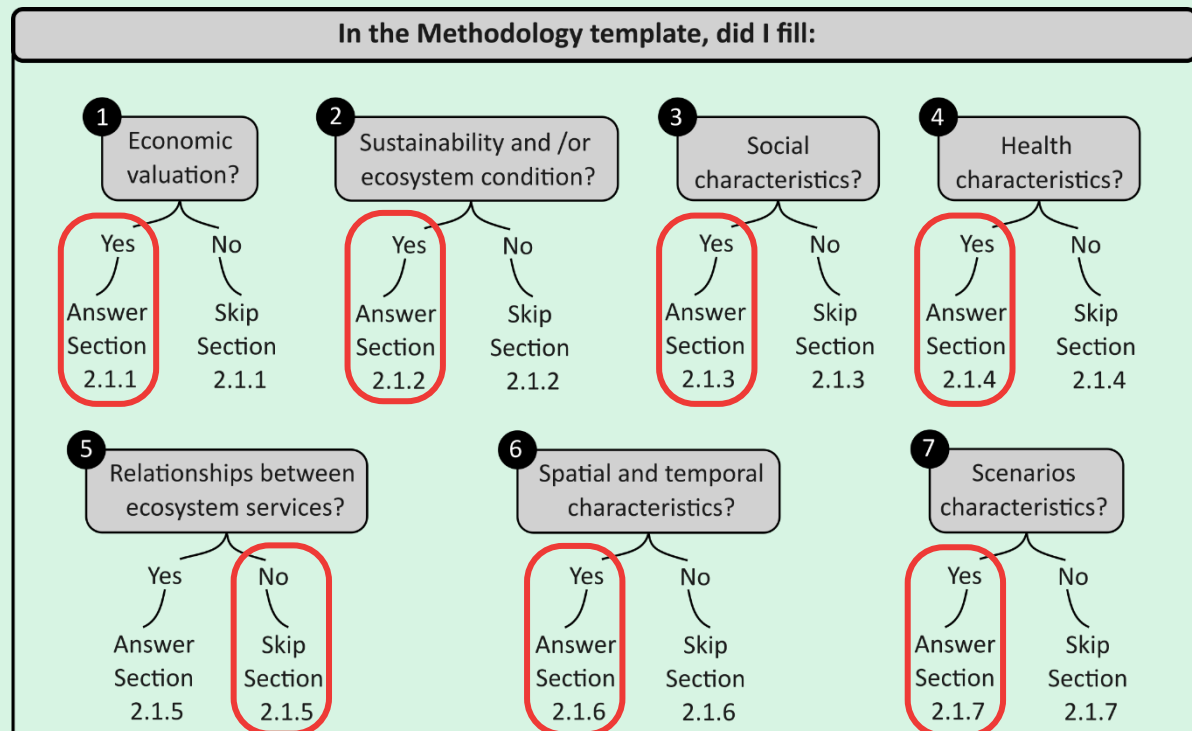
Criteria	YES	NO	YES	NO	DON'T KNOW
1.l. Include an evaluation of sustainable use and / or supply		X		X	
1.m. Include social aspects	X		X		
1.n. Include health aspects	X		X		
1.o. Include an evaluation of ecosystem condition	X		X		
1.p. Include a stakeholder analysis	X		X		
Qualitative appreciation of the proposal	The Contractor has responded to all the points requested in the call for tender, with the exception of the assessment frequency. The Contractor proposes that recreation accounts not be assessed annually because of (i) lacking political relevance relative to election cycle of city council (ii) low confidence in detecting change from year to year (iii) increasing change detection statistical power				
Qualitative score:			5 /5		

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2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation methods that will be used	X		X		
2.1.1.b. Quantify indicators of the contribution of ecosystem service(s) to economic development	X		X		
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of ecosystem condition on ecosystem service supply		X		X	
2.1.2.b. Define and evaluate sustainable levels for the use and / or supply of ecosystem services		X		X	

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition	X		X		
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem service assessment by social groups to identify beneficiaries	X		X		
2.1.3.b. Assess and report the attitudes, perceptions, and values of social groups towards ecosystem services	X		X		
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks		X		X	
2.1.4.b. Measure of health benefits	X		X		
2.1.4.c. Measure of health outcomes	X		X		
2.1.4.d. Assess and report the attitudes, perceptions, and values of social groups towards health-relevant ecosystem services		X		X	
2.1.4.e. Establish health links with specific ecosystems and / or ecosystem services		X		X	
2.1.5 Relationship between ecosystem services					
2.1.5.a. Integrate the benefits of ecosystem services					
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits	X		X		
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits	X		X		

Skipped as not applicable



Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.7. Scenarios					
2.1.7.a. Include relevant scenarios	X		X		
Qualitative appreciation of the proposal	The Contractor’s proposal addresses all the methodological requirements specified in the Call for Tender, with the exception of specification of relevant scenarios. The Contractor does not describe how the counterfactual scenarios will be specified in order to quantify health benefits of recreation activity in outdoor recreation areas (we expected some definition of alternative indoor recreation substitutes and / or “no activity” assumption). The countarfactual assumptions plays a large role in defining potential benefits.				
	Qualitative score: 4 /5				

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2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment	X			X	
2.2.b. Include a clear reporting format for uncertainties	X		X		
Qualitative appreciation of the proposal	The Contractor's proposal includes adequate reporting formats. However, lacking methodology for defining counterfactual assumptions for economic valuation and health benefit assessment is a weakness relative to the Call for Tender. We consider documentation of assumptions in the methods to be part of reporting on uncertainty.				
	Qualitative score: 4 /5				

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment	X		X		
2.3.b. Involvement of stakeholders in the validation process of the ecosystem service assessment	X			X	
2.3.c. Validation of the results of the ecosystem service assessment includes comparison with published reference data		X		X	
Qualitative appreciation of the proposal	The Contractor's proposal includes a validation plan. However, the proposal for including stakeholders to validate recreation accounting outcomes is incomplete. Including the National Statistical Office and Environment Agency is a necessary, but not sufficient stakeholder validation process. Representatives of local community recreation interests in the municipality should be included in validation, in accordance with recommendations by national guidance on mapping and valuation of outdoor recreation areas and (ii) plural valuation with IPLCs as recommended in the Summary for Policy Makers by the IPBES Values Assessment. See stakeholder involvement below.				
Qualitative score:			4 /5		

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment	X		X		
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment	X			X	
Qualitative appreciation of the proposal	The Contractor's proposal includes a stakeholder engagement plan. However, stakeholders representatives of local community recreation interests in the municipality should be included in validation activities (see above) and should be reflected in the stakeholder engagement plan.				
	Qualitative score: 4/5				

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7.3.5 Fishery, Aquaculture and Marine related ecosystem services

7.3.5.1 Description of the example case

Box 6- Example case – Fishery, Aquaculture and Marine

This example illustrates the assessment of the **wild fish provisioning ES** supplied by the marine and coastal ecosystems within Latvian waters of the Baltic Sea. The primary objective of the ES assessment is to produce a spatially and temporally explicit evaluation of the commercially significant fish provisioning ES in the marine and coastal waters of the Baltic Sea and the Gulf of Riga, Latvia. The example focuses on the biophysical assessment approach to ES supply, using fishery activity measured by fish landings.

As fishery activity also depends on the condition and extent of regulating ES, this example additionally includes an assessment of the maintenance of nursery and spawning areas in the Baltic Sea.

The ecosystem service assessment results are intended for use by the Ministry responsible for Spatial Planning in Latvia. The results will contribute at different stages of national scale Maritime Spatial Planning (MSP), such as characterizing and assessing the current status and trends of ecosystem services; developing strategic goals and priorities for MSP; identifying optimal spatial planning solutions; and evaluating the impacts of planning solutions on ecosystems and their services during the strategic environmental assessment process.

7.3.5.2 Terms of Reference obtained from the templates

This section shows an example of Terms of Reference that can be obtained by answering the three guidance templates. This example illustrates how the preformatted Terms of Reference text can be used and further adapted to obtain a tailored Terms of Reference.

FRAME & SCOPE SECTION

1. CONTEXT AND PURPOSE

The primary objective of the ecosystem service assessment is to produce spatially and temporally explicit assessment of the wild fish provisioning ES in the marine and coastal waters of the Baltic Sea and the Gulf of Riga Latvia.

The ecosystem service assessment shall support the implementation of the ecosystem-based approach in Maritime Spatial Planning (MSP) for Latvia. The assessment results shall be used at various stages of MSP development, including:

- Characterizing and assessing the current status of ecosystem and ecosystem services (ES). The stocktaking of existing information and knowledge is the first step in MSP;
- Developing strategic goals and priorities for MSP. The ES results support the development of goals and priorities when balancing nature conservation interests

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with socio-economic development needs;

- Identifying spatial planning solutions. The ES assessment results guide sea use toward areas that contribute most to human well-being, provide various benefits, and at the same time highlight the most valuable areas for biodiversity conservation and sustainable resource use. They also support conducting trade-off analyses to identify optimal solutions;
- Assessing the impacts of planning solutions on ecosystems and their services. The MSP should undergo a strategic environmental impact assessment, which can be enriched by incorporating ES analysis.

This purpose of the ES assessment is supported by the following policy and legislative context:

- EU Maritime Spatial Planning Directive 2014/89/EU requires to implement ecosystem-based approach in MSP;
- Latvian Marine Environment Protection and Management Law, article 14 requires that ecosystem approach shall be applied in the maritime spatial planning process;
- Latvian Governmental regulations No 740 "Procedures for the Development, Implementation and Monitoring of the Maritime Spatial Plan" explicitly requires to include assessment results of the ecosystem services (point 14.7).

The assessment of the wild fish provisioning services will also support the knowledge base for the implementation of such EU policies/legislation: Marine Strategy Framework Directive 2008/56/EC; EU Nature Restoration Law (2022/869/EU); EU Biodiversity Strategy 2030.

Further on, the information and knowledge is needed during the implementation of the MSP - in the licensing process for assessing development proposals for particular sea use (*e.g.*, offshore wind park, aquaculture).

2. INTENDED IMPACTS AND OUTPUTS

Uses & users

The results of this assessment are prepared for the Spatial Planning Department of the Ministry of Smart Administration and Regional Development of Latvia, which serves as the Maritime Spatial Planning authority for the country.

Results will be made available and usable by other relevant stakeholders, *e.g.*, Water resource department of the Ministry of Climate and Energy; Energy department of the Ministry of Climate and Energy Fishery Department of the Ministry of agriculture; Nature Conservation Agency; Regional planning authorities.

Any other public authority which is involved in the licensing process of economic activities in the marine environment can use the results in assessing trade-offs and impacts.

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Expected impacts of the assessment

The immediate impacts of the assessment results are expected to address the following themes:

- Increased knowledge on wild fish ES spatial and temporal distribution;
- Enhanced spatial designations considering the important areas for wild fish ES provisioning;
- Mitigation of Spatial Conflicts by preserving important areas for wild fish ES provisioning;
- Awareness raising of stakeholders on the spatial important areas for wild fish provision / fishery sector;
- Research policies, indicating the need for data on fishery, fish population;
- Impact assessment process on projects / development proposals, during the implementation of MSP.

The ES assessment results could potentially inform fishery policy that shapes coastal fishery regulations including preparing the ecosystem overview (ICES). These results could also be linked to nature conservation policy, such as establishing protected areas or no-go zones to safeguard critical habitats for wild fish, particularly in coastal waters, from economic activities. The marine policy has different spatial needs compared to MSP, yet some knowledge could be uptaken for establishing a programme of measures.

Formats of outputs

The following main formats for the outputs are envisaged:

- The Report, including Executive summary, documenting the methodology of the assessment;
- The Maps of fish landing and essential fish habitats by commercial fish species is important;
- Tables to show the annual trends in the wild fish provisioning. Also to demonstrate the total economic, social values;
- Presentations given at stakeholder meetings or other publicity events;
- The geospatial data files should be provided as ArcGIS database (results files).

3. GENERAL METHODOLOGICAL CHARACTERISTICS

Ecosystem type(s) and service(s)

Ecosystem type of interest: Marine and coastal ecosystems.

Ecosystem services of interest (according to [CICES v5.2 classification](#)):

- 1.1.6.1 Wild animals (terrestrial and aquatic) used for nutritional purposes (CICES V5.2);

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- 1.1.6.1 Fish landing (tons/year) is a core “use” indicator to be used for the ES assessment;

Additionally, the assessment is required for the 2.2.2.3 Maintenance of nursery and spawning areas.

Qualitative and quantitative characteristics

1.1.6.1. Fish landing (tons/year) are quantitative.

2.2.2.3 Maintenance of nursery and spawning areas are semi-quantitative (relative values)

Spatial and temporal characteristics

The ecosystem service assessment is to be conducted for marine and coastal waters of the Baltic Sea of Latvia. As maps are an expected output format, the assessment should be spatially explicit.

The assessment shall cover the following time periods:

- 1.1.6.1. Fish landing (tons/year), the annual trend data (statistics) since 2004; spatial data for the last 6 years' period to be linked to the HELCOM HOLAS assessment periods;
- Maintenance of nursery and spawning areas- the information could be status quo, available depending on the recent up-dates of habitat map.

Ecosystem modeling characteristics and valuation of services

Ecosystem condition metrics need to be identified. Recently, some studies conducted in the country have explored the relationships between fish stock parameters and factors such as salinity and temperature. The findings from these studies could be integrated into the assessment of provisioning services. However, the high level of uncertainty in the modeling results should be carefully considered.

Sustainability of use should be taken into account in this assessment through maximum sustainable yield (MSY) indicator.

Valuation of ecosystem services

Assessment of wild fish provisioning services are expected to be measured in biophysical terms.

4. STAKEHOLDER ENGAGEMENT

The MSP and Coastal Planning Coordination Group, established by the Commissioner, will be involved in discussions on the ecosystem service assessment results.

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

Ecosystem conditions and sustainability

Ecosystem condition relates to the quality of an ecosystem as well as quality of its components. The assessment shall include fish stock assessment of single commercial species (Baltic herring, sprat, Baltic flounder and cod) per subbasin (open Baltic Sea and the Gulf of Riga). Stock assessment is carried out according to ICES methodology and includes

a range of biotic species and structure indicators such as the Fishing Mortality Rate, the Spawning Stock Biomass, the age and size distribution of individuals in the populations of commercially exploited species, and Recruitment. The status of nursery and spawning areas is assessed in a qualitative manner for the whole marine area.

MSFD also conducts a nationwide assessment on the state of the environment (Descriptor 3), which includes the same indicators as the ICES methodology. This should be taken into account.

The ecosystem service assessment shall include sustainable levels for the supply and / or use of ecosystem services. This fish stock assessment serves as the basis for establishing scientific advice on Maximum Sustainable Yield (tons/year) which is used to establish Total Allowable Catch. These indicators help to define a balance between supply and use of ES.

Spatial and temporal characteristics

The ecosystem service (ES) assessment of fish provisioning shall cover all marine and coastal waters of the Latvian part of the Baltic Sea. There are different spatial units and scales to be used for ES:

- for marine waters: the results for the open sea fish landing assessment shall be presented using spatial units of the grid network (2.8x3 km or 0.05° longitude × 0.025° latitude);
- for the coastal waters: the results shall be presented according to the established fishery units for coastal waters, *i.e.*, municipal level;
- the assessment of nursery and spawning habitat maintenance shall be based on environmental suitability parameters and visualized using available data.

Trend data to assess ES supply and use should be presented at an aggregated level (national scale).

For temporality of the results, they also differ depending on the ES:

- Wild fish provisioning in terms of landing shall be presented on an annual basis per commercial species.
- Maintenance of nursery and spawning habitats, the information could be available depending on up-dates of habitat mapping for different species (commercial and protected species);

The Contractor should note that the first ES assessment of fishery covered the period of 2004-2013; the updated assessment: 2014-2022. It would be important to link the assessment periods to HELCOM HOLAS assessment and MSFD cycle - 6 year period.

2. UNCERTAINTY

A brief summary on uncertainties in ES assessments, tailored for decision-makers and stakeholders, should be produced. The Commissioner may request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis.

3. VALIDATION

External validation of the results

The validation process will involve stakeholders, particularly from the fisheries sector. Dedicated stakeholder events or expert meetings should be organized to support this process.

Validation of the results with published reference data

It is recommended that the results are compared with studies conducted within the HELCOM framework or other international projects carrying out similar research. The assessment needs to be coherent with the information from other countries, to have an ecosystem approach, to ensure upscaling needs. Cooperation on ICES assessments should be considered to facilitate an international evaluation.

4. STAKEHOLDER ENGAGEMENT

The Commission has identified the stakeholders to be involved in the ecosystem service (ES) assessment process. The MSP and Coastal Planning Coordination Group, established by the Commissioner, will participate in the following steps of the ES assessment: validation of results, interpretation of results, and communication and dissemination of findings. The primary form of engagement will be through consultation and / or the provision of information.

Stakeholder engagement is expected to be organized through a range of activities, including stakeholder events such as forums, coordination group meetings, and expert group meetings.

EVALUATION CRITERIA SECTION

1. FRAME & SCOPE

The Proposal by the Contractor will be evaluated according to the following scope (what to include in the proposal): (30% importance)

- Requested format of the results;
- Ecosystem types of interest;
- Ecosystem services of interest;
- Spatial extent and scale(s);

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- Temporal scale and time periods;
- Ecosystem services in biophysical terms;
- Ecosystem service supply and use;
- Evaluation of sustainability;
- Evaluation of ecosystem condition.

2. METHODOLOGY

The Proposal by the Contractor will be evaluated according to the following methodological requirements: (70% importance):

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Sustainability and ecosystem condition

- Quantify the impact of ecosystem condition on ecosystem service supply;
- Define and evaluate sustainable levels for the use and / or supply of ecosystem services;
- Quantify relevant dimensions of ecosystem condition.

Spatial and temporal characteristics

- Evaluate the spatial distribution of ecosystem service(s);
- Evaluate the temporal distribution of ecosystem service(s).

Uncertainty

- Assess and document uncertainties arising in the ecosystem service assessment to be made available upon request by the Commissioner.

Validation

- Include a clear workplan and timeline for the validation results of the ecosystem service assessment;
- Involvement of stakeholders in the validation process of the ecosystem service assessment.

Stakeholder engagement

- Include a clear workplan and timeline to inform and consult stakeholders in the ecosystem service assessment;
- Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment.



7.3.5.3 Frame & Scope template

Step 1- Selection of the questions

1. CONTEXT AND PURPOSE

		This question is relevant
1.a. What is(are) the purpose(s) of the ecosystem service assessment? If it is part of a decision-making process, at which step(s) of this process is the assessment needed?	Link to the example question	YES / ~~NO~~
1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
1.c. Which relevant policies should be considered for the ecosystem service assessment, given the decision-making step and primary objective?	Link to the example question	YES / ~~NO~~
1.d. What is the social / demographic context of the ecosystem service assessment?	Link to the example question	~~YES~~ / NO
1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?	Link to the example question	YES / ~~NO~~

2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses		This question is relevant
2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
2.2. Intended impacts		This question is relevant
2.2.a. What are the main intended impacts of the ecosystem service assessment on the decision-making?	Link to the example question	YES / ~~NO~~



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2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?	Link to the example question	YES / ~~NO~~
2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?	Link to the example question	YES / ~~NO~~
2.3 Formats of the deliverables		This question is relevant
2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)		This question is relevant
3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2. Spatial characteristics		This question is relevant
3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?	Link to the example question	YES / ~~NO~~
3.3 Temporal characteristics		This question is relevant
3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~
3.4 Valuation of ecosystem services		This question is relevant
3.4.a. Should the ecosystem service(s) be measured in biophysical terms?	Link to the example question	YES / ~~NO~~
3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?	Link to the example question	~~YES~~ / NO

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3.4.c. What aspects of ecosystem services should be measured?	Link to the example question	YES / ~~NO~~
3.4.d. Should the ecosystem service assessment address social benefits and equity goals?	Link to the example question	~~YES~~ / NO
3.4.e. Should the ecosystem service(s) be valued in terms of their relevance to health? If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?	Link to the example question	~~YES~~ / NO
3.4.f. Should the ecosystem service assessment evaluate the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?	Link to the example question	YES / ~~NO~~
3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?	Link to the example question	YES / ~~NO~~
3.5. Scenarios		This question is relevant
3.5.a Are future scenarios required in the ecosystem service assessment?	Link to the example question	~~YES~~ / NO

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. Should the contractor conduct a stakeholder analysis?	Link to the example question	~~YES~~ / NO
4.b. Is it anticipated that any stakeholder(s) will be involved at any stage(s) of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?	Link to the example question	YES / ~~NO~~
4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. CONTEXT AND PURPOSE

1.a. What is(are) the purpose(s) of the ecosystem service assessment?

If it is part of a decision-making process, at which step(s) of this process is the assessment needed?

Identify the purpose of the assessment: what will the results of the assessment help you achieve? If part of a decision-making process, identify the step(s) for which you require this assessment: what will the results of this assessment help you achieve in terms of decision-making?

The ecosystem service assessment shall support the implementation of the ecosystem-based approach in Maritime Spatial Planning (MSP) for Latvia. The assessment results shall be used at various stages of MSP development, including:

- Characterizing and assessing the current status of ecosystem services;
- Developing strategic goals and priorities for MSP;
- Identifying spatial planning solutions;
- Assessing the impacts of planning solutions on ecosystems and their services.

1.b. Within this(these) purpose(s) or decision-making step(s), what is the primary objective of the ecosystem service assessment?

Identify and describe the primary objective of the assessment.

The primary objective of the ecosystem service assessment is to produce spatially and temporally explicit assessment of the wild fish provisioning ES in the marine and coastal waters of the Baltic Sea and the Gulf of Riga Latvia.

1.c. Which relevant policies should be considered for the ecosystem service assessment given the decision-making step and primary objective?

Identify the international and national policies that should be considered in the ecosystem service assessment.

EU relevant policies/regulations which provide justification for this ecosystem service assessment:

- Maritime Spatial Planning Directive 2014/89/EU.
- National policies/legislation which provide justification for this ecosystem service assessment:
- Governmental regulations No 740 "Procedures for the Development, Implementation and Monitoring of the Maritime Spatial Plan".
- Marine Environment Protection and Management Law, article 14.

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1.d. What is the social / demographic context of the ecosystem service assessment?

Identify the key social and demographic characteristics of the area and / or populations interacting with the ecosystems to be assessed. Characteristics may include age distribution, cultural and ethnic composition, education, livelihood types etc.

Skipped as not applicable

Answer in this box.

1.e. Should the ecosystem service assessment aim at providing recommendations within the decision-making and policy context?

Answer yes, no, maybe, or don't know. Providing recommendations means identifying and describing actionable suggestions to improve or bridge an existing gap of a strategy or situation.

Yes.

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2. INTENDED IMPACTS AND OUTPUTS

2.1. Intended users and uses

2.1.a. How will the commissioner primarily use the result(s) of the ecosystem service assessment?

Identify the uses that the results of the ecosystem service assessment will have. What use(s) justifies the sponsoring of the call for tender?

The Commissioner - Maritime Spatial Planning authority (Ministry of the Smart Administration and Regional Development of Latvia, Spatial Planning Department)

The Commissioner will primarily use the results of the ecosystem service assessment at various stages of Maritime Spatial Planning (MSP), including:

- Characterizing and assessing the current status of ecosystem and ecosystem services (ES). The stocktaking of existing information and knowledge is the first step in MSP.
- Developing strategic goals and priorities for MSP. The ES results support the development of goals and priorities when balancing nature conservation interests with socio-economic development needs.
- Identifying spatial planning solutions. The ES assessment results guide sea use toward areas that contribute most to human well-being, provide various benefits, and at the same time highlight the most valuable areas for biodiversity conservation and sustainable resource use. They also support conducting trade-off analyses to identify optimal solutions.
- Assessing the impacts of planning solutions on ecosystems and their services. The MSP should undergo a strategic environmental impact assessment, which can be enriched by incorporating ES analysis.

Secondary uses include:

- Supporting the licensing process by providing information for impact assessments.

2.1.b. Who is(are) the anticipated secondary user(s) of the results of the ecosystem service assessment?

Identify the additional stakeholders who will be using the outputs of the assessment. By “secondary user(s)” we mean stakeholder(s) who might be interested in directly and actively utilising the outputs of the assessment.

Secondary users:

- Water resource department of the Ministry of the Climate and Energy
- Energy department of the Ministry of the Climate and Energy
- Fishery Department of the Ministry of Agriculture
- Nature Conservation Agency
- Regional planning authorities
- Any other public authority which is involved in the licensing process of economic activities in the marine environment

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2.1.c. How will secondary users potentially use the result(s) of the ecosystem service assessment?

Identify the uses that the outputs of the ecosystem service assessment will have for other stakeholders than the commissioner of the assessment.

Other stakeholders could use the information in their policy planning tasks:

- water management department for planning marine protection measures,
- nature conservation agency for nature conservation measures;
- regional planning authorities to develop maritime development strategies
- fishery department for communicating on fishery policy measures
- fishery policies, potentially for allocating quota, if the ES assessment is included in scientific advice.
- energy department for planning offshore wind energy

2.2. Intended impacts

2.2.a. What are the main intended impacts of the ecosystem service assessment on the decision-making?

Identify and describe the main intended impacts of the assessment on the decision-making step. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

It is essential information for ensuring ecosystem-based Maritime Spatial Planning (MSP), as it supports the consideration of ecosystems and their services in maritime planning decisions.

2.2.b. What are the main intended impacts of the ecosystem service assessment on relevant policies at various spatial scales (e.g., national, regional, local)?

Identify and describe the main intended impacts on policy formulation or implementation due to the results of the assessment, assuming they are used by the other stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

- Increased knowledge of the spatial and temporal distribution of wild fish ecosystem services (ES)
- Improved spatial designations that consider key areas for wild fish ES provisioning
- Support for mitigation of spatial conflicts by preserving areas important for wild fish ES provisioning
- Incorporation of these aspects into the impact assessment process for projects and development proposals during the implementation of Maritime Spatial Planning (MSP)

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2.2.c. Are there any other impacts that are intended by the ecosystem service assessment? If yes, which ones?

Identify and describe any other intended impacts that the results of the assessment are expected to have if they are used by stakeholders. "Impacts" refer to any positive or negative medium and long term effects or influences that the results of an ecosystem service assessment, for example when used to inform policy or design practical interventions, will have upon a decision-making context, society, and / or help to address societal challenges.

- Awareness raising of stakeholders on the spatial important areas for wild fish provision/fishery sector
- Research policies, indicating the need for data on fishery, fish population.

2.3. Formats of the deliverables

2.3.a. What is(are) the expected format(s) for the deliverables of the ecosystem service assessment?

Select all the formats that apply.

Possible formats	Why should I choose this format?	I would like this format
Executive summary	Executive summary can be relevant if the key users are non-expert and need to grasp quickly the essential findings and implications without going through the technical details. They are very useful tools to ensure that key messages are communicated clearly and effectively.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Technical report(s)	Technical reports are important tools for users requiring detailed data-driven insights, or if the methodology is a key result of the assessment.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Presentation / Briefing	Presentations and briefings are very user-friendly and allow to have an overview of the results by the contractors themselves. They are the opportunity for the commissioners to ask questions and clarification with the contractor, ensuring that they understand the work and that the fundings will meet their needs.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Training material	Requesting training material should be particularly considered when there is an objective of capacity building from users. Training can be both made for trainers and trainees.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Tool(s)	Asking for the development of a special tool particularly useful if the results of the assessment should be operationalised so the users can reproduce the analyses with different data or over time. A tool ensures accessibility, standardization, replicability and reproducibility.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Scientific publication	Publishing in the scientific community allows to reach a wider audience and contribute to the development of knowledge in ecosystem services. It can be relevant to aim for a scientific publication to provide more credibility and authority to the results of the ecosystem service assessment.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Maps	Maps are ideal deliverables to see spatial patterns, trends and relationships. They are also very intuitive and easily understandable by a wide range of users.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

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Tables	Tables allow to easily summarise and structure data and results. In some contexts such as looking at the provision of ecosystem services across time, or ecosystem accounting, they are a key format to request.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Videos	Videos are powerful tools especially when it comes to communicating the results to a broader audience. They are easy to understand and can more easily popularize complex concepts through storytelling. They are also very useful to represent dynamic environmental/ecological processes and changes.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)	The geospatial data as ArcGIS database.	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

3. GENERAL METHODOLOGICAL CHARACTERISTICS

3.1. Ecosystem type(s) and service(s)

3.1.a. What ecosystem type(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem type(s) that should be focused on in the assessment. Ecosystem types refer to different environments where living things interact with each other and their surroundings. Examples of ecosystem types include forests, city parks, wetlands, sand dunes etc.

Marine and coastal water ecosystems

3.1.b. What ecosystem service(s) is(are) of interest in the ecosystem service assessment?

Identify and define the ecosystem service(s) that should be focused on in the assessment. Ecosystem services are the benefits that humans get from nature such as climate regulation, flood protection, pollination, timber and food provision etc.

According to CICES 5.2. version classification:

- Wild fish provisioning (1.1.6.1); indicator to be used - *Fish landing (tons/year)*
- Maintenance of nursery and spawning areas (2.2.2.3)

3.2. Spatial characteristics

3.2.a. What is(are) the geographical location(s) and total area(s) (i.e., spatial extent) of the ecosystem service assessment?

Identify the geographical location(s) and total area(s) in which the assessment should be conducted. The geographical location and the total area (e.g., continental, national, regional, local) form the spatial extent.

Marine and coastal waters of the Baltic Sea of Latvia – National scale

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3.2. Spatial characteristics

3.2.b. At which spatial scale(s) should the results of the ecosystem service assessment be presented (e.g., results aggregated to administrative scales such as regions and counties)?

Select what applies. The spatial scales apply within the geographical location and spatial extent chosen of the ecosystem service assessment.

Possible level of spatial representation	Description	Results should be presented like this
Fully spatially explicit	A fully spatially explicit ecosystem service assessment does not aggregate the results. It displays ecosystem types and services with fine-grained spatial detail. This is useful to capture fine-scale spatial patterns and interactions that influence ecosystem services, and to inform site-specific management actions or interventions. Use when you need detailed analyses that account for spatial heterogeneity and variability. Careful, it usually requires more time and resources and data availability may be a limiting factor.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Aggregation at ecological scale	In this option, results aggregate ecosystem types and services by groups that are ecologically meaningful, presenting one averaged figure. For example, forests can be grouped into deciduous and coniferous forests. This is useful to understand the supply of ecosystem services across natural boundaries (e.g., carbon sequestration in a forest ecosystem depends among others on the species composition). Use when the natural boundaries of the ecosystem processes are more relevant than administrative divisions. Particularly useful for ecosystem service dependent on ecological units, such as hydrological services, nutrient cycling, or habitat connectivity.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the ecological scale:
Aggregation at administrative scale	In this option, results for ecosystem types and services are aggregated by administrative units (e.g., municipality, county), presenting one averaged figure. This is useful to align ecosystem service assessments with decision-making frameworks and administrative jurisdictions that manage resources and implement policies. Use when the focus is on governance, policy-making, or management actions that are implemented at administrative levels or on integrating ecosystem service assessments into planning and policy processes.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~ If YES, precise the administrative scale: National or municipal depending on the ecosystem service

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3.3. Temporal characteristics

3.3.a. What is the time period and temporal scale(s) to be considered in the ecosystem service assessment?

Identify the total time period (or interval) for which the ecosystem service assessment is to be conducted. It may also be a single (e.g., annual) assessment without repetition. Then specify the temporal scale, in which you need the results reported. The temporal scale represents the unit of time in which the results should be presented (aggregated if needed) such as by year, by quarter, by month, etc.

Wild fish provisioning in terms of landing shall be presented on an annual basis per commercial species. For maintenance of nursery and spawning habitats, the information could be available depending on up-dates of habitat mapping for different species (commercial and protected species).

Background info for the Contractor: The first ES assessment of fishery covered the period of 2004-2013; the updated assessment: 2014-2022. It would be important to link the ES assessment periods to the HELCOM HOLAS assessment and MSFD cycle - 6 year period.

3.4. Valuation of ecosystem services

3.4.a. Should the ecosystem service(s) be measured in biophysical terms?

Answer yes, no, maybe, or don't know. Valuing, or quantifying, ecosystem services in biophysical terms means that the assessment measures the physical quantity of the ecosystem service (e.g., tonnes of crops produced, tonnes of carbon sequestered, number of recreational visitors).

Yes.

3.4.b. Should the ecosystem service(s) be measured in terms of their economic value in monetary units?

Answer yes, no, maybe, or don't know. Ecosystem services measured in monetary units to facilitate direct comparison and integration with other goods and services (e.g., for inclusion in decision support tools such as cost-benefit analysis). It is recommended to first value services in biophysical terms before valuing them in monetary terms.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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3.4.c. What aspects of ecosystem services should be measured?

Select what applies

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Ecosystem service supply	The supply of ecosystem services is the measure in biophysical units of the contribution of ecosystems to the economy or society more generally (<i>i.e.</i> , what quantity is being supplied?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this supply represent in the economy?). We recommend the supply to be assessed and reported together with the use of the ecosystem service.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Ecosystem service use	The use of ecosystem services refers to the measure in biophysical units of the utilisation or consumption of the service by users or those who benefit from the services (<i>i.e.</i> , what quantity is being used?). It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this use represent in the economy?). We recommend the use to be assessed and reported together with the supply.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Ecosystem service demand	The demand for ecosystem services is the measure in biophysical units of the need for specific ecosystem service(s) by society, particular stakeholder groups or individuals (<i>i.e.</i> , what quantity of an ecosystem service is needed?). For instance, the area of pollination dependent crops is a way of assessing the need for pollination services by farmers. It can be further valued in terms of their economic value in monetary units (<i>i.e.</i> , how much does this need represent in the economy?). The demand may not be equal to the use, as needing ecosystem services doesn't mean that they are supplied, accessed and used. The assessment of ecosystem service(s) demand can be of interest in scenario analyses or and to identify areas with deficits of ecosystem service(s).	YES / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

3.4.d. Should the ecosystem service assessment address social benefits and equity goals?

Answer yes, no, maybe, or don't know. Social benefits focus on improvements in people's quality of life. Equity goals focus on guaranteeing that ecosystem services are fairly distributed among social groups. Social benefit is a measure of the contribution of ecosystem services to societal well-being and equity. It can be quantified in terms of access, reduction in social vulnerabilities, social inclusion, etc.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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**3.4.e. Should the ecosystem services be valued in terms of their relevance to health?
If yes, should the assessment look at human, animal, or plant health, or take a One Health approach combining all three with ecosystem health?**

Answer yes, no, maybe, or don't know. Ecosystem services are crucial to health, including the health dimension in an ecosystem assessment. The assessment should take into account the wider impacts of changes in ecosystem services on human, animal, and plant health and the environment. The health scope will inform the selection of indicators, methodology, stakeholder engagement and reporting. The One Health approach is a cross-sectoral approach that recognises the interconnection between people, animals, plants and their shared environment.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

3.4.f. Is the ecosystem service assessment interested in evaluating the conservation, sustainable supply and / or use of the ecosystem service(s) of interest?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the services will be maintained and won't be used until depletion, but will be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided in the long term and be available for future generations. The assessment of sustainable levels of supply and use facilitates the evaluation of sustainability of use, management and conservation measures.

Yes.

3.4.g. Should the ecosystem service assessment include an evaluation of ecosystem condition?

Answer yes, no, maybe, or don't know. Ecosystem condition characterises the state of health of ecosystems. Ecosystem services are sensitive to a change in condition of the ecosystem that provides the service. Ecosystems in bad condition might have less capacity to provide ecosystem services.

Yes.

3.5. Scenarios

3.5.a. Are future scenarios required in the ecosystem service assessment?

Identify if there is a need to conduct the assessment while taking into account scenarios reflecting a change in policy, climate, environmental conditions, change in governance etc. In modelling, scenarios are used to represent a range of potential futures that one would like to predict.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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4. STAKEHOLDER ENGAGEMENT

4.a. Should the contractor conduct a stakeholder analysis?

Answer yes, no, maybe, or don't know. A stakeholder analysis aims at identifying and understanding third parties (i.e., individuals, organizations/institutions) who are interested in or are expected to be involved in the process of the ecosystem service assessment and / or its results.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

4.b. Is it anticipated that any stakeholder(s) will be involved at any stage of the ecosystem assessment process (e.g., assessment development, practice, review, reporting)?

Answer yes, no, maybe, or don't know. Stakeholder engagement means that key parties will be consulted during the development of the assessment and the evaluation of the results and deliverables.

Yes.

4.c. If key stakeholders have already been identified for direct involvement in the ecosystem service assessment: who are they and why have they been selected?

Identify the stakeholders who should be consulted during the development of the assessment. This can be based on an earlier stakeholder analysis or primary considerations that are important from the commissioners' perspective.

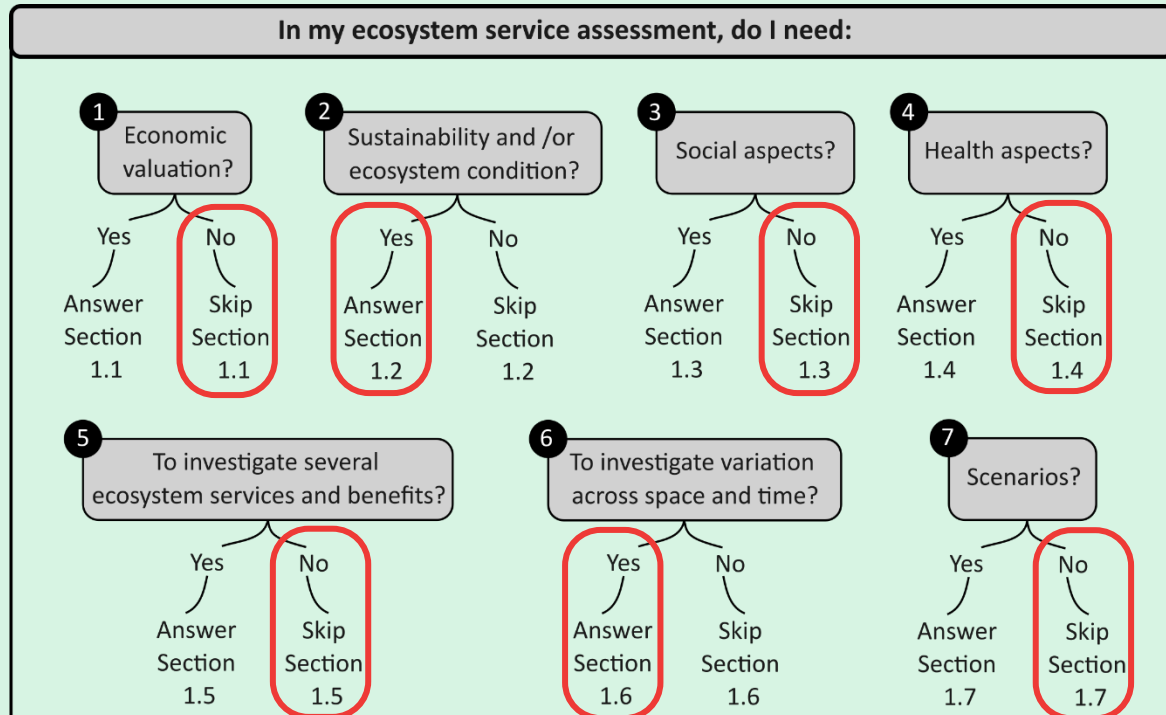
The MSP and Coastal Planning Coordination Group, established by the Commissioner, will be involved in discussions on the ecosystem service assessment results.

Step 3- Write the Frame & Scope section of the Terms of Reference using the preformatted text

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Step 1- Selection of the questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS



1.1. Economic valuation		This question is relevant
1.1.a. Which economic valuation method(s) should be applied in the assessment?	Link to the example question	YES / NO
1.1.b. Should the contribution indicators of the ecosystem service(s) to economic development such as employment and growth?	Link to the example question	YES / NO
1.2. Sustainability and ecosystem condition		This question is relevant
1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?	Link to the example question	YES / ~~NO~~
1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?	Link to the example question	YES / ~~NO~~
1.2.c. What aspects of ecosystem condition are you interested in?	Link to the example question	YES / ~~NO~~

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1.3. Social characteristics		This question is relevant
1.3.a Should the ecosystem service assessment results be disaggregated by gender to better understand who benefits from ecosystem services?	Link to the example question	YES / NO
1.3.b Should the ecosystem service assessment evaluate and report on attitudes, perceptions, and values of society towards ecosystem services?	Link to the example question	YES / NO
1.4. Health characteristics		This question is relevant
1.4.a. What aspects of health are you interested in?	Link to the example question	YES / NO
1.4.b. Should the ecosystem service assessment include attitudes, perceptions, and values towards health-relevant ecosystem services?	Link to the example question	YES / NO
1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?	Link to the example question	YES / NO
1.5. Relationships between ecosystem services		This question is relevant
1.5.a. Should the ecosystem service assessment identify potential interactions between ecosystem services and the benefits they provide?	Link to the example question	YES / NO
1.6 Spatial and temporal characteristics		This question is relevant
1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across space?	Link to the example question	YES / ~~NO~~
1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?	Link to the example question	YES / ~~NO~~
1.7 Scenarios and future projections		This question is relevant
1.7.a What future scenarios should be taken into account in the ecosystem service assessments?	Link to the example question	YES / NO

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2. UNCERTAINTY

		This question is relevant
2.a. Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
2.b. What is the preferred reporting format to document uncertainties?	Link to the example question	YES / ~~NO~~

3. VALIDATION

		This question is relevant
3.a. How should the methodology and results of the ecosystem service assessment be validated?	Link to the example question	YES / ~~NO~~
IF YES, ANSWER THE QUESTION BELOW		
3.b. Should the results be compared to other published reference data in the validation process?	Link to the example question	YES / ~~NO~~

4. STAKEHOLDER ENGAGEMENT

		This question is relevant
4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?	Link to the example question	YES / ~~NO~~
4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?	Link to the example question	YES / ~~NO~~

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Step 2- Answer the selected questions

1. METHODOLOGICAL CHARACTERISTICS OF THE OUTPUTS

1.1. Economic valuation

1.1.a. Which economic valuation method(s) should be applied in the ecosystem service assessment?

Select what applies. Choosing the type of valuation methods is voluntary, if the commissioners don't have sufficient information.

Skipped as not applicable

Possible valuation method	Description	Valuation should be carried out this way
Value transfer methods	Value transfer is the use of results from existing primary studies to predict values or related information for other sites or policy contexts. Using value transfer methods is generally faster, less resource intensive and can be applied over larger geographic scales in comparison with primary valuation methods.	YES / NO / MAYBE / DON'T KNOW
Primary valuation methods	Primary valuation methods produce new or original information generally using primary data for the specific location of the assessment. Results directly reflect the characteristics of the ecosystem and beneficiaries.	YES / NO / MAYBE / DON'T KNOW
IF YES TO PRIMARY VALUATION METHODS, COMMISSIONERS <u>MAY</u> CHOOSE FROM THE METHODS BELOW:		
Revealed preference methods	Revealed preference methods observe the behaviour of beneficiaries and their use of ecosystem services to elicit values. These methods are applicable to valuing a narrow set of ecosystem services including recreation, tourism, visual amenity, and moderation of hazards (e.g., flooding, air pollution).	YES / NO / MAYBE / DON'T KNOW
Stated preference methods	Stated preference methods use public surveys to ask beneficiaries to state their preferences for, generally hypothetical, changes in the provision of ecosystem services. These methods are widely applicable to value all ecosystem services but can suffer from bias due to survey design and the hypothetical nature of recorded preferences.	YES / NO / MAYBE / DON'T KNOW
Market prices	Prices of some ecosystem services can be obtained from markets or surveys of businesses and households. This approach is only applicable to ecosystem services that are traded in markets (e.g., extracted resources, carbon credits)	YES / NO / MAYBE / DON'T KNOW
Replacement cost	The replacement cost estimates the value of an ecosystem services as the cost of replacing it with a human-made service. It is only applicable to ecosystem services that have human-made alternatives (e.g., coastal protection by seawalls, water supply by reservoirs).	YES / NO / MAYBE / DON'T KNOW
Damage cost avoided	The damage cost avoided method estimates the value of ecosystem services that provide some form of protection (e.g., mitigation of floods, filtration of pollutants, climate regulation) as the cost of damage that is avoided.	YES / NO / MAYBE / DON'T KNOW

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Social cost of carbon	The social cost of carbon (SCC) is a special case of the damage cost avoided method used to value global climate regulation. The SCC is the monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The SCC therefore also represents the value of damages avoided by reducing the emission or sequestering one tonne of CO ₂ .	YES / NO / MAYBE / DON'T KNOW
Net factor income	The net factor income method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) as revenue from sales of the good minus the cost of other inputs.	YES / NO / MAYBE / DON'T KNOW
Production function	The production function method estimates the value of ecosystem services that are inputs into the production of marketed goods (e.g., filtration of drinking water, nursery for fisheries) by estimating a statistical function that models the value of different inputs into production.	YES / NO / MAYBE / DON'T KNOW
Hedonic pricing	Hedonic pricing is a revealed preference method that estimates the influence of ecosystem services on the prices of marketed goods (usually residential property). It is applicable for valuing recreational use, visual amenity and filtration of air pollution by urban green.	YES / NO / MAYBE / DON'T KNOW
Travel cost method	The travel cost method estimates the value of nature based recreation using data on travel costs and visit rates.	YES / NO / MAYBE / DON'T KNOW
Contingent valuation	Contingent valuation involves asking beneficiaries to state their willingness to pay for ecosystem services through public surveys. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Choice modelling	Choice modelling (or discrete choice experiments) involves asking beneficiaries to state their willingness to pay for ecosystem services by making choices between alternative levels of provision and payment. This method can be applied to value all ecosystem services.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

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1.1.b. Should the assessment include indicators of the contribution of ecosystem service(s) to economic development such as employment and growth?

Answer yes, no, maybe, or don't know. If yes and if assessors have the knowledge, they can specify the type of economic indicators. The economic importance of ecosystem services is often quantified through indicators such as the contribution to economic growth, the gross regional product, the economy, or employment. These indicators can be useful for assessing the importance of ecosystem services to decision makers and the general public.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).. If yes, specify.

1.2. Sustainability and ecosystem condition

1.2.a. Should the ecosystem service assessment evaluate how the condition of ecosystems influences the levels of ecosystem services supply and use?

Answer yes, no, maybe, or don't know. Ecosystem condition relates to the quality of an ecosystem. The levels of ecosystem service(s) supply and use may vary depending on changes in condition of the ecosystem that provides the service. Ecosystem service(s) supply is the provision of service(s) by the ecosystem(s). Ecosystem service(s) use is the utilisation of service(s) by those who benefit from them.

Yes.

1.2.b. Should the ecosystem service assessment define sustainable levels for the supply and / or use of ecosystem services?

Answer yes, no, maybe, or don't know. Sustainable use of ecosystem services means that the ecosystem services won't be used until depletion and will still be available for future generations. Sustainable supply of ecosystem services means that they will continue to be provided long-term and be available for future generations. Defining sustainable levels refers to the evaluation and identification of maximum use that is compatible with the supply of ecosystem services. If these levels are respected, the ecosystem condition and ability to deliver services for future generations is maintained.

Yes.

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1.2.c. What aspects of ecosystem condition are you interested in?

Ecosystem condition encompasses a lot of different dimensions. Select those of interest in this assessment.

Dimension of ecosystem condition	Why should I ask to measure this dimension of ecosystem condition?	I would like this dimension to be measured in my assessment
Index of general ecosystem condition	This kind of index is an overarching measure of ecosystem condition. It is usually a combination of all or some of the indicators mentioned below. It is useful to give an overview of the condition of an ecosystem. It can also help in broad scale assessments of the linkages between levels of pressures and use, and trade-off analysis between ecosystem condition and ecosystem services.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - Species	Species condition indicators show how well species are doing in an ecosystem such as the size of the population, the reproductive success or their spatial distribution within the ecosystem. It can be very important to measure them to identify whether the level of use of ecosystem service exceeds the supply. For instance, species condition indicators based on population recruitment will help determine whether harvest levels in fisheries and game are sustainable.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - structure	Structural condition indicators show how well the physical structure of an ecosystem (<i>i.e., whether a forest consists of tree, shrub and herb layers, and dead wood</i>) is doing. For example, the amount of dead wood can inform on the supply of ecosystem services such as habitat provision for native biodiversity and vegetation cover on soil retention and erosion control.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Biotic indicators - function	Functional condition indicators can inform about the level of specific ecological functions and processes of an ecosystem. These indicators are based on identifying and grouping species with similar ecological functional characteristics. For example, pollinators, organic matter decomposers, and herbivores. Diversity of functional groups is related to ecosystems' multifunctionality, and the potential supply of multiple ecosystem services. Diversity within functional groups can ensure ecosystem resilience, which is key in facilitating sustainable supply of ecosystem services.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~

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Abiotic - Physical indicators	Abiotic physical condition indicators show levels of non-living physical components of an ecosystem such as the pH of the soil, or the salinity and temperature of water. If affected, they can have an impact on the supply of ecosystem services. Abiotic physical indicators include for instance, the levels of the water table of wetlands and the water holding capacity of the soil. If these levels change, this will result in an impact on ecosystem services provided by wetlands including changes in carbon storage and resilience to drought spells of croplands, respectively.	YES / NO / MAYBE / DON'T KNOW
Abiotic - Chemical indicators	Abiotic chemical condition indicators show the chemical properties in water, soil and air of an ecosystem. Examples are levels of nitrates in soil and water through the addition of fertilizers, or particulate matters in the air through pollution. Changes in the chemical properties of an ecosystem impact the supply of their services such as habitat provision for biodiversity. These indicators can help with identifying areas with chemical imbalances to be addressed, or target areas for depollution..	YES / NO / MAYBE / DON'T KNOW
Landscape-level characteristics	Landscape condition indicators help assess how an ecosystem is physically organised in space. They help with identifying whether ecosystems are fragmented in space, or support a good connectivity allowing species to move between different patches. This is notably critical to ensure the supply of ecosystem services such as habitat provision for biodiversity. These indicators are particularly helpful to guide landscape level land-use planning, conservation and restoration.	YES / NO / MAYBE / DON'T KNOW

1.3. Social characteristics

1.3.a. Should the ecosystem service assessment results be disaggregated by social groups to better understand who benefits from ecosystem services?

Answer yes, no, maybe, or don't know. If the answer is yes, the assessment of ecosystem services guarantees that inequities are identified and addressed. This approach highlights who benefits, who is excluded, and who is most vulnerable. It helps to improve well-being and equity.

Answer in this box (yes, no, maybe, or don't know).

Skipped as not applicable

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1.3.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards ecosystem services?

Answer yes, no, maybe, or don't know. This question will investigate whether the ecosystem service assessment will document the attitudes, perceptions, value, and prioritize ecosystem services.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4. Health characteristics

1.4.a. What aspects of health are you interested in?

Select what applies.

Aspects of ecosystem services that can be measured	Description	This aspect should be measured
Health benefits	Health benefits refers to goods or services which promote good health or offer avenues for positive health interventions. Considering health benefits (e.g., salutogenic environments, medicinal or medical resources) in an ecosystem service assessment is essential to improve public health. For example, urban green areas in cities can reduce stress and improve mental health, and reduce the spreading of some diseases such as obesity by encouraging physical activities.	YES / NO / MAYBE / DON'T KNOW
Health risks	Health risks refers to potential threats to good health, including drivers of disease emergence. Considering actual or potential health risks (e.g., consideration of specific diseases, accidents or disasters) in an ecosystem service assessment is essential to protect public health. For example, deforestation and land-use changes can reduce biodiversity and contribute to the density increase of disease-carrying organisms such as mosquitos, which in turn increase the spreading of disease such as malaria. Another example is the decrease of green spaces in cities which can lead to an increase in air pollution and the rise of respiratory diseases such as asthma, which in turn impact the public health sector finances.	YES / NO / MAYBE / DON'T KNOW
Health outcomes	Health outcomes refers to the status of health as a result of an intervention or exposure to one or more conditions. Considering health outcomes (e.g., incidence or prevalence of positive or negative health status at varying population scales) in an ecosystem service assessment is essential to protect and / or improve public health. Contrary to health risks and benefits which refer to the way ecosystem types and /or	YES / NO / MAYBE / DON'T KNOW

Skipped as not applicable

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	services impact or improve health, health outcomes refer to the measurable effects of ecosystem types and / or services on health. In other words, health benefits and risks focus on how ecosystems and their services contribute to and impact health, while health outcomes focus on what the concrete result for health is. For example, there is a decrease in the prevalence of asthma in cities with higher urban green areas.	

1.4.b. Should the ecosystem service assessment evaluate and report the attitudes, perceptions, and values of social groups towards the relevant ecosystem services?

Answer yes, no, maybe, or don't know. The assessment will document how social groups perceive, value, and prioritize ecosystem services. These perceptions include significance, recreational use, or economic reliance.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.4.c. Should the ecosystem service assessment establish health links with specific ecosystem types and / or ecosystem services?

Answer yes, no, maybe, or don't know. The assessment will consider general environmental compartments (e.g. air, water, soil, urban environment) and health, or aim to provide a more detailed understanding of specific ecosystem types and / or their services on specific health issues.

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

1.5. Relationships between ecosystem services

1.5.a. Should the ecosystem service assessment identify potential interrelationships between ecosystem services and the benefits they provide?

Answer yes, no, maybe, or don't know. The assessment will identify potential interrelationships between ecosystem services, between benefits, or between ecosystem services and benefits. Identifying interrelationships means that the services and / or benefits are related and can be understood in a number of ways ecosystems services and / or benefits can be related: dependencies, synergies, trade-offs...

Skipped as not applicable

Answer in this box (yes, no, maybe, or don't know).

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1.6. Spatial and temporal characteristics

1.6.a. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide vary across the space?

Answer yes, no, maybe, or don't know. This helps determine whether the assessment should quantify and track how the ecosystem service supply, use, demand but also the benefits derived from them vary across the geographic areas and spatial scales (e.g., continental, national, regional, local) considered in the assessment. For example, this could allow to identify differences in supply and / or benefits between different countries, regions, municipalities, or other relevant areas.

The ecosystem service (ES) assessment of fish provisioning shall cover all marine and coastal waters of the Latvian part of the Baltic Sea. There are different spatial units and scales to be used for ES:

- for marine waters: the results for the open sea fish landing assessment shall be presented using spatial units of the grid network (2.8x3 km or 0.05° longitude × 0.025° latitude);
- for the coastal waters: the results shall be presented according to the established fishery units for coastal waters, i.e., municipal level;
- the assessment of nursery and spawning habitat maintenance shall be based on environmental suitability parameters and visualized using available data.

Trend data to assess ES supply and use should be presented at an aggregated level (national scale).

1.6.b. Should the ecosystem service assessment evaluate how the distribution of ecosystem service(s) and / or the benefits they provide change over time?

Answer yes, no, maybe, or don't know. This allows for quantifying and tracking how the ecosystem service(s) supply, use, demand but also the benefits derived from them vary over time due to management actions, environmental factors, or policy changes.

Yes, annual for wild fish provisioning in terms of fish landing per commercial species. For maintenance of nursery and spawning habitats, the information could be available depending on up-dates of habitat mapping for different species (commercial and protected species).

The first ES assessment of fishery covered the period of 2004-2013; the updated assessment: 2014-2022. It would be needed to link to HELCOM HOLAS assessment; Marine Spatial Framework Directive cycle - 6 year period.

1.7 Scenarios

1.7.a What scenarios should be taken into account in the ecosystem service assessments?

Answer yes, no, maybe, or don't know. Identify the scenarios and the chosen metrics for which a scenario analysis is required. List and describe the scenarios that should be taken into account. Even a broad description of the scenarios required is sufficient.

Skipped as not applicable



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sufficient. In modelling, future scenarios represent a range of potential futures that one would like to predict.

Answer in this box.

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2. UNCERTAINTY

2.a Should the uncertainties inherent to the ecosystem service assessment be assessed and documented for the purpose of the decision-making?

Answer yes, no, maybe, or don't know. Uncertainty is present in all ecosystem service assessments. It is essential that both the commissioners and potential contractors are conscious of the sources of uncertainty that matter for a particular purpose. We recommend that commissioners ask for the assessment and documentation of uncertainties pertaining to any results of their requested assessment.

Yes, the uncertainties should be documented, as the Commissioner may request the results of the uncertainty analysis.

2.b What is the preferred reporting format to document uncertainties?

Select what applies.

Possible formats	Description	Uncertainties should be reported with this format
Uncertainty section/report	Ask the potential contractors to document uncertainties in a separate section of the main report or as a separate short deliverable. A structured report can use clear language and summary tables to highlight uncertainties across results, data sources, and models.	YES / NO / MAYBE / DON'T KNOW
Visual summary	Contractors should report uncertainties using visual tools like confidence maps, interval bars in plots, or a traffic light system (green-orange-red) to show result reliability. These visual cues make uncertainties easier to understand, especially for those with less experience.	YES / NO / MAYBE / DON'T KNOW
Decision-relevant summary	These summaries are designed for decision-making and can take different forms based on commissioners' needs. Options include executive highlights for key uncertainties, risk profiles outlining risks in management choices, and an assumption register listing critical assumptions and their impacts.	YES / NO / MAYBE / DON'T KNOW
Scenario-based documentation	This documentation is relevant only if a scenario analysis is requested. Commissioners can ask for comparative tables, best- and worst-case outcomes, or qualitative scenario narratives to explore uncertainties and alternative results.	YES / NO / MAYBE / DON'T KNOW
Participatory documentation	This is a basic, qualitative approach to documenting uncertainties, relying on expert and stakeholder judgments. Engaging stakeholders helps capture their perceptions of uncertainties and their potential impact on results.	YES / NO / MAYBE / DON'T KNOW
Technical appendices	Commissioners can request advanced technical documentation as appendices, detailing data, models, and uncertainty analysis. This should include model structure, parameters, assumptions, and sensitivity analysis to show how input changes affect results.	YES / NO / MAYBE / DON'T KNOW

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Other (specify)		YES / NO / MAYBE / DON'T KNOW

3. VALIDATION

3.a. How should the methodology and results of the ecosystem service assessment be validated?

Select what applies. Validating the methodology means ensuring that the metrics, data, choice of scenarios and analyses, and stakeholder involvement plan chosen meet the goals of the commissioners. Validating the results of the assessment means verifying that the findings are accurate, reliable, and answer the goals of the commissioners.

Validation process	Description	Validation should be carried out this way
Internal validation of the methodology and / or results	The validation process will not involve third parties such as external stakeholders. Examples of internal validation of the methodology can be planning a pilot to test the methodology before scaling it up. It can also be peer-reviews within the contractor's team of the assumptions, models or code that are planned to be used. More simply, it can be indicating that there will be ground-truthing. Examples of internal validation of the results can be peer-review within the contractor's team, or comparison with similar ecosystem service assessment conducted previously. It can also include the use of published reference data to compare how the results differ from publicly acknowledged references or benchmarks.	YES / NO / MAYBE / DON'T KNOW
External validation of the methodology and / or results	The validation process will involve external third parties such as stakeholders. Stakeholders can be involved in numerous ways such as advisory boards, public consultations or workshops. Section 4. Stakeholder Engagement expands more on this.	YES / NO / MAYBE / DON'T KNOW

3.b. Should the results be compared to other published reference data in the validation process?

Answer yes, no, maybe, or don't know. Reference data are baseline or benchmark datasets or already published figures that will be used to compare the results of the ecosystem service assessment. Commissioners might want to list some key datasets or figures they would like the results to be comparable with. Alternatively, stakeholders can be consulted to identify these references.

Maybe. The results could be compared with studies conducted within the HELCOM framework or other international projects carrying out similar research.

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4. STAKEHOLDER ENGAGEMENT

4.a. At which step(s) of the ecosystem service assessment should the stakeholders be informed, consulted, or participate?

Identify when the stakeholders should be informed, consulted or participate in the ecosystem service assessment. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible steps of the assessment process at which involving stakeholders	Description	Stakeholder should be involved in this step
Development of the methodology	Consult/participate: stakeholders have a direct role in designing the approach. It might be relevant to involve stakeholders with key technical expertise to overcome some very specific technical difficulties in the methodological approach. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the methodology (e.g., metrics, indicators, data, choice of scenarios and analyses)	Consult/participate: stakeholders have an advisory role as the method has already been selected by the potential contractors and / or commissioners. It might be relevant to involve stakeholders with key technical expertise to quality ensure that the methodology that will be applied meets the minimum technical requirements for the objective(s) of the assessment. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Validation of the results	Consult/participate: stakeholders with specific and different source of expertise may be a strong support for validating the results of the an assessment. This gives more credibility and legitimacy to the results. It also ensures that they are understood by future potential users and compliant with their use(s). Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Data collection	Consult/participate: stakeholders can directly participate in data collection as respondents, and / or can help disseminate the means of collecting data such as surveys. This notably facilitates the	YES / NO / MAYBE / DON'T KNOW

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	inclusion of local knowledge in the assessment. Inform: provide updates and transparency on the progress of the assessment.	
Interpretation of the results	Consult/participate: stakeholders have local and practical knowledge that can help contextualise the results, avoid misinterpretation and identify gaps. This also supports a sense of ownership of the results of the assessment by other stakeholders. Inform: provide updates and transparency on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Communication and dissemination of the results	Consult/participate: stakeholders can directly participate in the co-creation and dissemination of the key messages from the results of the assessment. Alternatively, they can also be used as channels of dissemination and communication of the results to a larger audience.	YES / NO / MAYBE / DON'T KNOW
Other (specify)		YES / NO / MAYBE / DON'T KNOW

4.b. What methods should be used for involving stakeholders in the ecosystem service assessment?

Describe how the stakeholders should be involved. Stakeholders are any group, organisation or individual who are interested in and / or will or might be affected by ecosystem services and any change made to their flows. In the context of an ecosystem service assessment, stakeholders notably include those who directly or indirectly benefit from the service, those who try to regulate the use, the experts in the science of ecosystem services, or the data holders. For this, the commissioner can choose from the table below:

Possible ways of involving stakeholders during the assessment process	Description	Stakeholders should be involved this way
Newsletters or email updates	This format is very relevant to inform the stakeholders on the progress of the assessment.	YES / NO / MAYBE / DON'T KNOW
Websites	This format is very relevant to inform the stakeholders on the progress of the assessment, the events to come, or the communicating and disseminating the results.	YES / NO / MAYBE / DON'T KNOW
Webinars	This format facilitates direct communication and interaction with stakeholders. It helps inform stakeholders on the progress of the assessment, the events to come, or communicating and disseminating results.	YES / NO / MAYBE / DON'T KNOW

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Stakeholders events such as forums	This format brings stakeholders together, which can facilitate discussions between them and with the commissioners and / or contractors of the assessment. It helps with directly integrating the stakeholders and shows a higher level of consideration of their feedback and inputs.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Advisory boards, expert groups, focus groups, or steering committees	These formats are direct channels of inputs and feedback from the stakeholders throughout the assessment process. It may be relevant to create an advisory group of stakeholders with specific expert or local knowledge to ensure the robust and safe development of the assessment.	YES / ~~NO~~ / ~~MAYBE~~ / ~~DON'T KNOW~~
Public consultations	This format is very inclusive as it is not aimed at specific stakeholders only, but is open to all. Public consultations can take place in meetings, written forms, organised debates, deliberative groups etc. Note that Environmental Impact Assessment regulations may require certain procedure for public hearing.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Workshops	This format allows a direct interaction with stakeholders and facilitates knowledge transfer but also the collection of local and expert knowledge relevant to the assessment.	~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~
Other (specify)		~~YES~~ / NO / ~~MAYBE~~ / ~~DON'T KNOW~~

Step 3- Write the Methodology section of the Terms of Reference using the preformatted text

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7.3.5.5 Evaluation Criteria template

Step 1- Complete the column “WRITING EVALUATION CRITERIA”

Step 2- Write the Evaluation Criteria section of the Terms of Reference using the preformatted text

Step 3- Evaluate proposals with the column “EVALUATING PROPOSALS”

1. FRAME & SCOPE

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
1.a. Include recommendations to decision-making	X		X		
1.b. Correspondence with the requested format of the results	X		X		
1.c. Include the ecosystem types of interest	X		X		
1.d. Include the ecosystem services of interest	X		X		
1.e. Include the correct the spatial extent(s)	X		X		
1.f. Include the correct time period and temporal scale for the results	X		X		
1.g. Include the correct spatial scales for the results	X		X		
1.h. Quantify ecosystem services in biophysical terms	X		X		
1.i. Quantify ecosystem services in terms of their economic value in monetary terms		X		X	
1.k. Quantify ecosystem service supply , use , demand	X		X		

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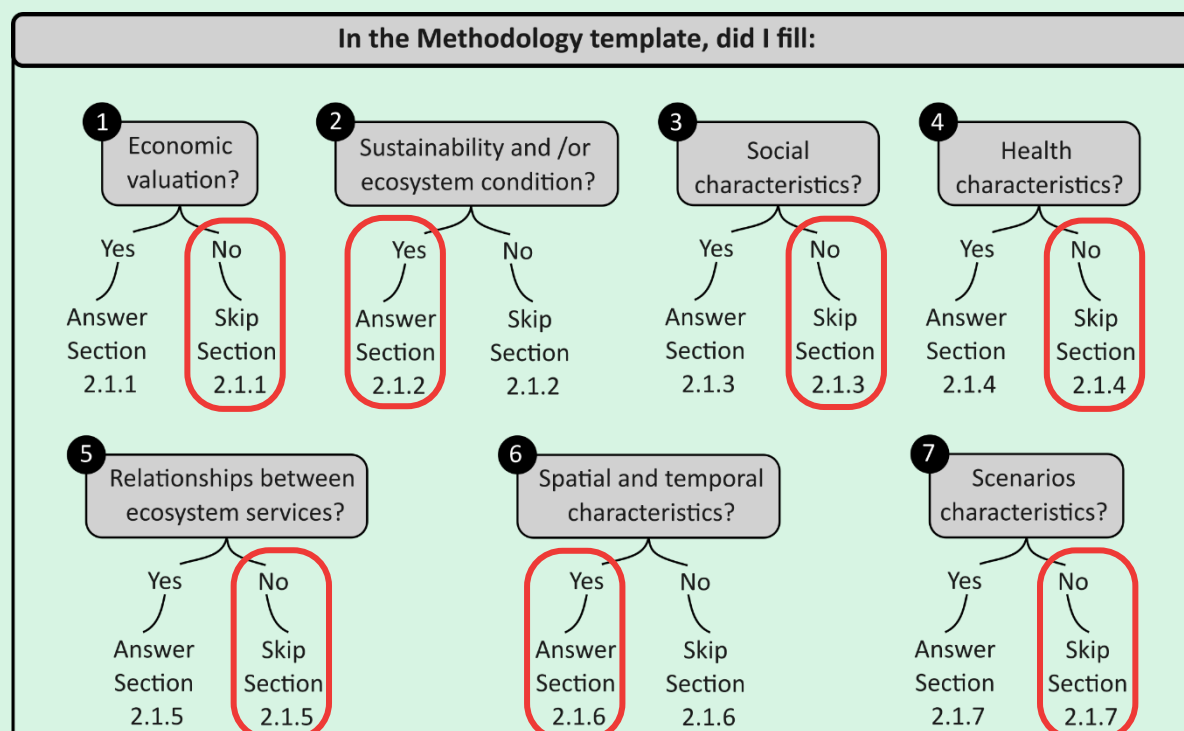


Criteria	YES	NO	YES	NO	DON'T KNOW
1.l. Include an evaluation of sustainable use and / or supply	X		X		
1.m. Include social aspects		X		X	
1.n. Include health aspects		X		X	
1.o. Include an evaluation of ecosystem condition	X		X		
1.p. Include a stakeholder analysis	X		X		
Qualitative appreciation of the proposal	The proposal aligns well with the scope and objectives of the ecosystem services (ES) assessment for maritime spatial planning needs, including recommendations on significant areas related to provisioning and regulating services. It addresses the required spatial scales and time periods, the sustainability of service flows and use, and the condition of ecosystems, in line with internationally established methodological approaches. Additionally, the proposal will provide information on the interconnections with regulating services—such as the maintenance of spawning and nursery areas—that support the provision of wild fish.				
Qualitative score:			5 /5		



2. METHODOLOGY

2.1. Methodological characteristics of the outputs



	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.1. Economic valuation					
2.1.1.a. Specify and justify the economic valuation method that will be used					
2.1.1.b. Evaluate the contribution of ecosystem services to economic development					
2.1.2. Sustainability and ecosystem condition					
2.1.2.a. Quantify the impact of <u>ecosystem condition</u> on ecosystem service supply	X		X		
2.1.2.b. Define and evaluate <u>sustainable levels</u> for the use and / or supply of ecosystem services	X		X		

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.2.c. Quantify relevant dimensions of ecosystem condition	X		X		
2.1.3. Social characteristics					
2.1.3.a. Disaggregate results of the ecosystem service assessment by identifying					
2.1.3.b. Assess attitudes and values of target groups towards ecosystem services					
2.1.4. Health characteristics					
2.1.4.a. Measure of health risks					
2.1.4.b. Measure of health benefits					
2.1.4.c. Measure of health outcomes					
2.1.4.d. Assess attitudes and values of target groups towards health-relevant ecosystem services					
2.1.4.e. Establish health links with specific ecosystems and / or ecosystem services					
2.1.5 Relationship between ecosystem services					
2.1.5.a. Assess the benefits provided by ecosystems					
2.1.6 Spatial and temporal characteristics					
2.1.6.a. Evaluate the spatial distribution of ecosystem service(s) and / or benefits	X		X		
2.1.6.b. Evaluate the temporal distribution of ecosystem service(s) and / or benefits	X		X		

Skipped as not applicable

Skipped as not applicable

Skipped as not applicable

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Criteria	YES	NO	YES	NO	DON'T KNOW
2.1.7. Scenarios					
2.1.7.a. Include relevant scenarios	X		X		
Qualitative appreciation of the proposal	The Contractor's proposal addresses all the methodological requirements specified in the Call for Tender. However, the spatial dimension of coastal fishery is rather coarse, being limited to the municipal level. The proposal would be improved by including a new method or tools for assessing ecosystem service (ES) supply related to wild fish provisioning in coastal waters.				
	Qualitative score: 4 /5				

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2. METHODOLOGY

2.2. Uncertainty

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.2.a. Assess and document uncertainties arising in the ecosystem service assessment	X		X		
2.2.b. Include a clear reporting format for uncertainties	X			X	
Qualitative appreciation of the proposal	The information on how the Contractor will assess and document uncertainties arising in the ecosystem service assessment is rather superficial. The proposal would benefit from a more elaborate description and references to the methodologies used for uncertainty assessment.				
	Qualitative score: 3 /5				

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2. METHODOLOGY

2.3. Validation

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.3.a. Include a clear workplan and timeline for the validation of the methodology, and / or results of the ecosystem service assessment		X		X	
2.3.b. Involvement of stakeholders in the validation process of the ecosystem service assessment	X		X		
2.3.c. Validation of the results of the ecosystem service assessment includes comparison with published reference data	X		X		
Qualitative appreciation of the proposal	The proposal provides sufficient detail on how the results will be compared with the Baltic Sea regional framework, international projects, and scientific publications. It also indicates a willingness to engage with stakeholders, as required by the Call for Tender.				
	Qualitative score: 5 /5				

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2. METHODOLOGY

2.4. Stakeholder engagement

	WRITING EVALUATION CRITERIA		EVALUATING PROPOSALS		
	Is this criteria essential to the assessment?		Is this criteria included in the proposal received?		
Criteria	YES	NO	YES	NO	DON'T KNOW
2.4.a. Include a clear workplan and timeline to inform, consult and / or make stakeholders participate in the ecosystem service assessment	X		X		
2.4.b. Propose relevant modes of stakeholder involvement throughout the ecosystem service assessment	X		X		
Qualitative appreciation of the proposal	The Contractor has confirmed that they will engage with stakeholders as specified by the Commissioner. They will prepare relevant information targeted at stakeholders involved in the maritime spatial planning process. A dedicated communication manager has been appointed to oversee stakeholder information delivery.				
	Qualitative score:		5/5		

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