



Bio Knowledge Agora: Developing the Science Service for European Research and Biodiversity

Connecting biodiversity knowledge and decision-making

D1.1. Typology of challenges that hinder the implementation of BDS 2030

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Meaning / Full text
BDS 2030	Biodiversity Strategy 2030
CAP	Common Agricultural Policy
DG	Directorate General
EC	European Commission
EU	European Union
DC	Demonstration cases
KCBD	Knowledge Center for Biodiversity
MS	Member State
NbS	Nature-based solution
PA	Protected areas
T1, T2 etc.	Specific targets of the BDS 2030





BACKGROUND: ABOUT THE BIOAGORA PROJECT

BioAgora is a collaborative European project funded by the Horizon Europe programme. It aims to connect research results on biodiversity to the needs of policy making in a targeted dialogue between scientists, other knowledge holders and policy actors.

Its main outcome will be the development of a Science Service for Biodiversity. This new service will fully support the ecological transition required by the European Green Deal and the European Union's Biodiversity Strategy for 2030.

The BioAgora project was launched in July 2022 for a duration of 5 years. It gathers a Consortium of 22 partners, from 13 European countries, led by SYKE, the Finnish Environment Institute. Partners represent a diversity of actors coming from academia, public authorities, SMEs, and associations.

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EXECUTIVE SUMMARY

This document is deliverable of the BioAgora project, funded under the European Union’s Horizon Europe research and innovation programme under the grant agreement No 101059438.

The Science Service aims to ratchet up the EU Biodiversity Strategy 2030 (BDS 2030) by orchestrating science-policy interactions within the EU which can link scientific knowledge more efficiently with policy making and implementation. A preliminary requirement to this is the in-depth understanding of the challenges and barriers that might hinder the implementation of the BDS 2030. This deliverable includes an evidence-based analysis and categorization of such challenges and offers a list of selection criteria that can be used by the BioAgora project for identifying the most relevant demonstration cases.

Mixed-method research was conducted to identify complex and context-specific challenges whose resolution requires special attention, and to analyse which objectives and targets of the BDS 2030 are characterised by the most serious implementation challenges. The research included a general and a targeted literature review, semi-structured expert interviews, and researcher consultations both in a face-to-face workshop format and online. Eight challenge categories – detailed below – were identified and gradually refined according to expert feedback, crossed with BDS 2030 targets to classify specific challenges, and then used to create selection criteria for demonstration cases:

- “Availability of knowledge” refers to challenges in policy planning and implementation due to the lack of sufficient data or robust scientific knowledge, or due to ineffective communication and lack of interaction between science and policy making.
- “Funding” includes challenges related to the insufficiency and inadequacy of financial instruments allocated to biodiversity conservation goals.
- “Horizontal policy coherence” comprehends the incompatibility or lack of coherence between the policy objectives, instruments, and actions of the EU Biodiversity Strategy (nature conservation policy in general) and other sectoral (EU) policies.
- “Management effectiveness” covers challenges affecting the implementation of area-based conservation measures (e.g. Natura 2000 sites), like carrying out comprehensive management actions which fit to the local ecological, cultural, and socio-economic context, and which is supported by an effective institutional setup.
- “Systematic spatial planning” comprehends the lack of systematic conservation planning with transparent spatial priorities and clear conservation targets that avoid taxonomic bias and are based on solid ecological, social, and economic criteria.
- “Vertical policy implementation” refers to challenges related to the incorporation of EU strategic targets and directives into the national and regional laws and regulations of EU Member States.
- “Engagement” includes difficulties and contradictions related to stakeholder participation and public engagement
- “Challenges related to the dominant economic and political system” include, among others, limitations to public interest deriving from the market society, or short-sighted political vision for biodiversity due to shortcomings of representative democracy.

The research found strong interconnections among the eight main challenges. “Availability of knowledge” appeared to be central: influenced by, and at the same time influencing, almost all the other categories. This suggests that the Science Service, by addressing existing knowledge gaps and improving knowledge co-creation and -sharing processes, can contribute to ratcheting up the BDS 2030. Nevertheless, the most deeply rooted category, “current political and economic structures”, lies beyond the scope of knowledge-related processes, which suggest that a full implementation of the BDS 2030 needs more than improved knowledge production and information flow.





NON-TECHNICAL SUMMARY

The European Union's Biodiversity Strategy 2030 is in place for two years, and lessons learnt from the implementation of the previous strategies were considered when the current strategy was created. To meet the high expectations towards this new strategy, it is important to learn from previous failures and understand the obstacles and challenges which might limit actual implementation. This research used different information sources – including published scientific reports, expert knowledge of scientists working in the field of biodiversity conservation and management, and expertise of policy decision-makers working at different EU-level and national organisations – to understand which are the main challenges that impede the implementation of the Biodiversity Strategy 2030.

Some of the challenges are rooted in the current institutional setup, such as limited coherence between different sectoral policies or different political structures, processes and priorities at regional, national and EU-level. Other challenges are more practical and closely linked to on-the-ground biodiversity conservation and management, such as the lack of a systematic approach in spatial planning, the limited effectiveness of management actions, or difficulties associated with stakeholder and citizen engagement in decisions associated with biodiversity. We also found evidence that there are still some knowledge gaps related to biodiversity issues, and that the flow of information between knowledge providers and decision-makers needs to be further amended.

By making relevant knowledge more accessible through a Europe-wide Science Service for Biodiversity, the effectiveness of management actions can be improved, and biodiversity aspects can be better integrated into spatial planning and sectoral policies. The Science Service can also make decision-making processes more open and accessible for a wide range of actors, therefore contribute to better engagement processes and more harmonized decision-making across different scales (from the local through national to the EU-level). Nevertheless, there are also some deeply rooted challenges, associated with our growth-oriented political and economic structures prioritizing short-term benefits, which have a strong impact on how the current Biodiversity Strategy gets implemented. Improving the availability of knowledge can help increase the awareness and motivation of different actors, but it is not enough to systematically change our political and economic structures and processes.





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1. Introduction

The EU Biodiversity Strategy 2030 (BDS 2030), launched on 20 May 2020, aims to address the five main drivers of biodiversity loss (changes in land and sea use, overexploitation, climate change, pollution, and invasive alien species), set out an enhanced governance framework to fill remaining gaps, ensure the full implementation of EU legislation and pull together all existing efforts. The Science Service, being built by the BioAgora project, aims to ratchet up the BDS 2030 by orchestrating science-policy interactions within the EU which can link scientific knowledge more efficiently with policy making and implementation. A preliminary requirement to this is the in-depth understanding of the challenges and barriers that might hinder the implementation of the BDS 2030. Such challenges might arise due to lack of information, data and knowledge, or limitations in how such information, data and knowledge is shared and applied in the policy sphere, but also due to policy incoherences, ineffective governance structures, or capacity gaps. The evidence-based analysis and categorization of such challenges can be used as a basis for the future implementing, monitoring, reporting, and reviewing of the BDS 2030. More specifically, a typology of the challenges can help identify and select demonstration cases (DCs) within the project which offer (upscale-able) policy best practices to implementing the BDS 2030.

This deliverable offers a critical analysis of biodiversity policy implementation within the EU. It reviews the scientific literature as well as the evaluation reports of the former EU biodiversity strategies, and it collects expert knowledge and EU- and country-specific experience on policy implementation challenges, to evaluate which challenges are critical to achieve the different objectives of the BDS 2030. There are two main outputs of this deliverable: the typology of challenges and a list of selection criteria for demonstration cases. While these outputs are crucial for other tasks of the BioAgora project (especially Task1.2, Task1.3 and Task3.4), we consider them as interim results, which will be updated, complemented, and refined based on information harvested from the demonstration cases.

The document is structured into five chapters. This introduction is followed by an overview of the background and the content of the BDS 2030. This is followed by the description of the methodological approach and the tools used to collect and analyse data. Chapter 4 provides a detailed overview of the challenge typology. It outlines the eight main challenge categories identified on a conceptual basis and synthesises evidence from three main information sources: targeted literature reviews, EU-level key informant interviews, and national-level expert consultations. It contains a link to a detailed excel table where we assessed which challenge category might hinder the implementation of the different objectives (targets) of the BDS 2030. The fifth chapter sums up all the main findings of the deliverable, highlights interlinkages between challenges, and identify frequently observed target-challenge combinations. The final chapter proposes a list of criteria for selecting further demonstration cases (in Task1.3) to ensure that the chosen cases provide relevant knowledge on how to overcome specific implementation challenges.

2. A brief overview of the BDS 2030

2.1. Historical background

The EU adopted its first biodiversity strategy in 2006 as a response to the Millennium Ecosystem Assessment, and thereby stated a commitment to address the loss of biodiversity on a European level (EC, 2006). This 2010 Biodiversity Strategy (BDS 2010) related to an 'EU Action Plan to 2010 and Beyond' which entailed ten objectives including specific actions within four key policy areas (CEC, 2006). However, despite progress in certain areas, the overarching target of halting biodiversity loss in Europe by 2010 was missed evidently (EC, 2010). As a consequence,





the Commission adopted the BDS 2020 with the headline target of “halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss” (EC, 2011, p.2). The BDS 2020 revolved around six key targets which each addressed specific issues such as invasive alien species or global biodiversity loss, and each contained several concrete sets of actions. Besides setting ambitious targets, the BDS 2020 also demanded improvements in delivering progress reports on the strategy’s implementation, including data monitoring and assessment. Nonetheless, the EU failed in halting and reversing biodiversity loss by 2020 and did not achieve the objectives set out in its strategy despite individual successes regarding some actions (EC, 2022). The key outcomes of an evaluation of the BDS 2020 have largely contributed to shaping the novel BDS 2030 which was adopted in May 2020. It represents a core part of the European Green Deal and follows the ambition to put “Europe’s biodiversity [...] on the path to recovery by 2030” in order to “ensure that by 2050 all of the world’s ecosystems are restored, resilient, and adequately protected” (EC, 2022, p.3).

2.2. The previous biodiversity strategy’s influence on the BDS 2030

The BDS 2020 evaluation identifies nine lessons learned regarding its implementation which have largely influenced the design and formulation of actions within the BDS 2030 (EC, 2022b).

The first three lessons describe weaknesses in the formulation and the scope of actions. Lesson one covers the necessity of formulating well-defined, concrete, and measurable targets following a set timeline and appointed responsibilities. Lesson two points out the relevance of biodiversity conservation measures to aim at achieving environmental and socio-economic benefits simultaneously and lesson three acknowledges that protection efforts of the past have failed to address all pressures on biodiversity per ecosystem or habitat. The BDS 2030 responds to those points by setting measurable, scheduled commitments with clearly assigned responsibilities for each ecosystem type that put a strong focus on objectives with synergising benefits for social and economic aspects in addition to biodiversity. For example, the objective of bringing nature back to agricultural land is accompanied by the action to “implement measures to ensure that at least 10% of agricultural area will be under high diversity landscape features by 2030” and points the responsibility to conditionality (GAEC 9) and incentives (Pillar I and II) within the Common Agricultural Policy (CAP). Or, as another example, the objective calling for win-win solutions for energy generation includes the action to “prioritise renewable energy solutions favourable to biodiversity”. The BDS 2030 further recognises the interlinkages between mental as well as physical health and biodiversity by adopting an objective to strengthen the greening of urban and peri-urban areas (EC, BDS Action Tracker, 2022c). Lastly, responding to lesson three, the BDS 2030 contains a chapter named EU Nature Restoration Plan which includes specific targets and actions for each ecosystem type such as soils, forests, freshwater and marine systems, or agricultural land.

Another main area, addressed by lessons four, six, and seven of the evaluation document, cover shortcomings related to applying sufficient policy instruments to achieve the implementation. Lesson four underlines that implementation mechanisms based on voluntary instruments failed to achieve relevant progress in the past and that a mix of policy instruments including legally binding governance mechanisms is required in the future. Lesson six describes that biodiversity objectives remained limitedly integrated into the policies of other sectors and lesson seven emphasises that the overall governance framework lacked a holistic approach to mobilising capacities and accountability for the strategy’s implementation. The BDS 2030’s design responds to these shortages by planning the application of a wide variety of policy instruments including novel legally binding instruments such as the Nature Restoration Law which was adopted by the European Commission in June 2022 (EC, 2022d). The BDS 2030 addresses lesson six by strengthening the application of procedures to biodiversity-proof sectoral policies at member state (MS) and EU levels. For example, the new EU Forest Strategy adopted in July 2021 and the new EU Soil Strategy adopted in November 2021 are both re-designed to contribute to sustainably achieving biodiversity objectives. In response to lesson seven, which proposes the need for a robust governance framework, the EU





Commission’s scientific pillar, the Joint Research Centre, set up a Knowledge Centre for Biodiversity (KCBD) which supports policy making by strengthening the knowledge base on the EU level (KCBD, 2022). Further, Horizon Europe funds the collaborative BioAgora project which was designed to “connect research results on biodiversity to the needs of decision-making in a targeted dialogue”. To help reach this aim, the establishment of a Science Service, among other mechanisms, is planned. The Science Service’s purpose is to support the work of the KCBD and the European Commission (EC) to implement the BDS 2030 by responding to their needs through targeted and tailored outcomes such as knowledge syntheses, factsheets, and summaries which will fill identified knowledge gaps (BioAgora, 2022). Consequently, BioAgora plays an essential role in orchestrating existing EU-level science-policy interfaces such as Biodiversa, Eklipse, and Oppla, and to generally strengthen the bridge between research and policymaking.

Lesson five addresses the need to increase funding for protecting biodiversity to which the BDS 2030 adapts by integrating biodiversity aims into relevant funding schemes such as the Green Transition Pillar of the Recovery and Resilience Facility (EC, 2022c). Further, the funding for biodiversity ambitions is planned to be increased to 10% of the EU budget in 2026 and 2027. The above-mentioned Nature Restoration Law will support the required mobilisation of funding for conservation activities.

Lesson eight recognises that to achieve the 2030 objectives across all societal levels, existing gaps in knowledge, awareness, capacity, and skills must be addressed directly. As a response and as a way to improve the knowledge base for biodiversity policy, the BDS 2030 formulates actions to monitor and assess relevant ecological conditions. For example, the strategy requires “monitoring and reporting on protected areas beyond Natura 2000”, “monitoring of soil quality”, and “monitor[ing] by-catch” (EC, BDS Action Tracker, 2022c). Further, Horizon Europe funds biodiversity monitoring and assessments projects. To bring awareness and knowledge to all kinds of involved actors including the public, the KCBD will play an important role in coordinating initiatives which share and distribute consciousness.

The last lesson learned describes the importance of improving the integration of synergistic interlinkages between biodiversity and climate change within the strategy. More specifically, it calls for increasingly incorporating nature-based solutions (NbS) in the new strategy. The BDS 2030 does so by proposing actions that aim at realising both biodiversity conservation as well as climate mitigation and adaptation. As an example, it adopts the measure to “strictly protect [...] all remaining EU primary and old-growth forests” which are highly valuable for biodiversity protection and carbon storage which supports climate mitigation. The 2030 strategy further provides guidance to green urban areas which includes the focus on biodiversity in favour of climate adaptation (EC, 2022b, 2022c).

2.3. Objectives and actions of the BDS 2030

I. A coherent network of protected areas:

- Target 1: Legally protect a minimum of 30% of the EU’s land area and 30% of the EU’s sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
- Target 2: Strictly protect at least a third of the EU’s protected areas, including all remaining EU primary and old-growth forests.
- Target 3: Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately

II. An EU Nature Restoration Plan: restoring ecosystems across land and sea:

- Strengthening the EU legal framework for restoration.
 - Target 4: Legally binding EU nature restoration targets to be proposed in 2021, subject to an impact assessment. By 2030, significant areas of degraded and carbon-rich ecosystems are restored;





habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.

- Bringing nature back to agricultural land
 - Target 5: The decline in pollinators is reversed.
 - Target 6: The risk and use of chemical pesticides is reduced by 50% and the use of more hazardous pesticides is reduced by 50%.
 - Target 7: At least 10% of agricultural area is under high-diversity landscape features.
 - Target 8: At least 25% of agricultural land is under organic farming management, and the uptake of agro-ecological practices is significantly increased.
- Forest quantity, quality and health
 - Target 9: Three billion new trees are planted in the EU, in full respect of ecological principles.
- Addressing land take and restoring soil ecosystems
 - Target 10: Significant progress has been made in the remediation of contaminated soil sites.
- Win-win solutions for energy generation (no target specified)
- Restoring freshwater ecosystems
 - Target 11: At least 25,000 km of free-flowing rivers are restored.
- Addressing invasive alien species
 - Target 12: There is a 50% reduction in the number of Red List species threatened by invasive alien species.
- Reducing pollution
 - Target 13: The losses of nutrients from fertilisers are reduced by 50%, resulting in the reduction of the use of fertilisers by at least 20%.
- Greening urban and peri-urban areas
 - Target 14: Cities with at least 20,000 inhabitants have an ambitious Urban Greening Plan.
- Restoring marine ecosystems
 - Target 15: The negative impacts on sensitive species and habitats, including on the seabed through fishing and extraction activities, are substantially reduced to achieve good environmental status.
 - Target 16: The by-catch of species is eliminated or reduced to a level that allows species recovery and conservation.

III. Enabling transformative change

- Put in place a new European biodiversity governance framework (no target specified).
- Stepping up implementation and enforcement of EU environmental legislation (no target specified).
- Business and biodiversity (no target specified), including the establishment of a new EU-level initiative on sustainable corporate governance, and a new European Business for Biodiversity Movement.
- Financing for biodiversity (no target specified). The objective suggests, among others, that at least €20 billion a year should be unlocked for spending on nature, that the EU sustainable finance taxonomy will help guide investment towards a green recovery, and that a Renewed Sustainable Finance Strategy will be put in place to ensure that the financial system contributes to mitigating existing and future risks to biodiversity.
- Measuring and integrating the value of nature (no target specified), including e.g. natural capital accounting and life cycle assessments of the environmental footprint of products and organisations.
- Knowledge (no target specified), including, among others, a long-term strategic research agenda for biodiversity implemented through the Horizon Europe framework, the establishment of the Knowledge Centre for Biodiversity.





- Education (no target specified), including guidance for schools and teachers on how to cooperate and exchange experiences across Member States on biodiversity teaching.

IV. The European Union for an ambitious global biodiversity agenda

- Raising the level of commitment worldwide (no target specified), including that the EU will promote biodiversity coalitions with partners and civil society around the world.
- International ocean governance (no target specified), including, among others, that the EU will support the conclusion of an ambitious legally binding agreement on marine biological diversity of areas beyond national jurisdiction (BBNJ) and it will support the designation of three vast Marine Protected Areas in the Southern Ocean.
- Trade policy (no target specified).
- Deforestation, wildlife trafficking, illicit trade (no target specified)
- International cooperation, neighbourhood policy and resource mobilisation (no target specified)
- Review of progress (no target specified)

Actions to implement the above listed objectives can be tracked transparently via the Commission's Action Tracker (<https://dopa.jrc.ec.europa.eu/kcbd/actions-tracker/>), while the progress towards the identified targets can be checked at EU Biodiversity Strategy dashboard (<https://dopa.jrc.ec.europa.eu/kcbd/dashboard/>).

3. Methodological approach

Policy analysis studies usually follow a traditional, a mainstream, or an interpretative direction (Browne et al. 2019). Since our task was to assess the challenges associated with policy implementation, our analysis focused on the implementation process (and not the problem formulation, policy design or policy content) and followed an interpretative direction (Yanow, 2007).

The main research question guiding this analysis was the following:

What are the implementation challenges related to the BDS 2030?

This was broken down into two sub-questions as follows:

Are there pertinent, complex, or context-specific challenges whose resolution requires special attention?

Which objectives and targets of the BDS 2030 are characterised by the most serious implementation challenges?

According to Howlett (2018), the success of policy implementation is shaped by critical junctures of five distinguished policy streams:

- the policy process from agenda setting to evaluation which provides an overall frame,
- the problem stream where the main actor is the epistemic community,
- the policy stream where the main actors are the instrument constituencies focusing on solutions,
- the politics stream where the main actors are the advocacy coalitions, and finally
- the programme stream, where the main actors are the on-the-ground implementers.

In this study we focused on the last four streams and applied a mixed-method research strategy to find answers to our research questions (Fig. 1).



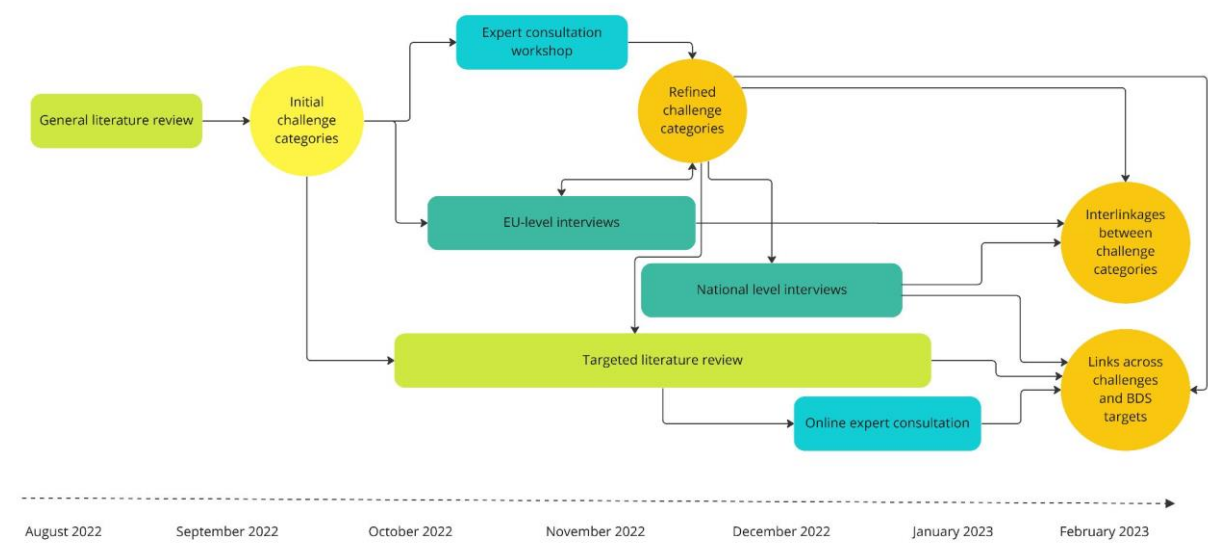


Figure 1 A schematic overview of the research process and its main outcomes

The research included a general and a targeted literature review, semi-structured expert interviews, and expert consultations both in a face-to-face workshop format and online. We started the research with a general, conceptually focused literature review to identify broad categories of challenges that are associated with the implementation of biodiversity policy in Europe (cf. problem stream). The general search was carried out between the 1st September and the 10th October 2022, and contained the fixed keywords EU, European, biodiversity, conservation, strategy, implementation, evaluation as well as the interchangeable terms barrier, challenge, and issue. This search returned approximately 16,800 results of which the abstracts of the first 70 hits were screened for relevant guidance to establish the broad challenge categories. In this first round of the literature review, we included papers that offered a conceptual insight into why specific conditions enable or restrict the implementation of biodiversity policy, and this let us identify the first challenge categories. After the general challenge categories were established, we launched a targeted literature search from the 10th October until the 5th November 2022. Here, a series of searches with the fixed terms EU, biodiversity, implementation, [target-specific input, e.g. invasive species, soil ecosystems, freshwater ecosystems] and the interchangeable terms challenge, barrier, and issue was conducted. Per search, the abstracts of the initial 15 results were screened and detailed information from the publications with relevance to the research question were extracted. Both searches included only publications from 2010 onwards and if possible, more recent publications were prioritised over older ones. The results of this targeted literature review were compiled in an excel database.

In November 2022, we organised a 90-minutes long interactive workshop session at the BioAgora project meeting to discuss the challenge categories together with biodiversity scientists and policy experts engaged in the BioAgora project (c.f. problem stream), and to check how the challenge categories can be linked to four specific biodiversity objectives which are covered in the first four demonstration cases of the project (Bringing nature back to agricultural land, Restoring freshwater ecosystems, Greening urban and peri-urban areas, Supporting, and the EU-global biodiversity agenda). The expert discussion and feedback during the workshop were analysed and used to refine the challenge typology and to start populating the literature review-based excel table with expert knowledge. Based on these refinements, the list of challenges discussed with interviewees were also modified. The review, complementation, and amendment of the excel database was continued by experts during December 2022 and January 2023 in parallel with the targeted literature review. Experts within the BioAgora consortium were first asked to fill a short survey about which BDS 2030 targets lie the closest to their expertise, and then relevant sections of the database were shared with them online, asking them to add further examples of specific challenges based on their expert knowledge and literature sources. As a result, the current version of the excel database includes information based on the targeted literature review and the expert consultation (access via Zenodo: https://zenodo.org/record/7685109#.Y_41Oh_MK5c).





Between October 2022 and January 2023, we contacted EU and national policy experts and decision makers and invited them to a semi-structured interview. While the EU-level interviews centred around the broad challenge categories and asked interviewees to assess the importance of these categories based on their high-level policy expertise (cf. policy and politics streams), the national-level interviews focused on on-the-ground implementation and enlightened specific situations where implementation becomes complicated for different reasons (cf. programme stream) (both interview guides are included in the appendix). Altogether 7 EU-level interviews and 13 national-level interviews were carried out with policy decision makers, representatives of environmental NGOs and public administration officers (table 1 and 2). Interviews lasted between 25 and 90 minutes and most of them were carried out online. EU-level interviews were carried out by the core author team, all recorded, transcribed, and analysed with qualitative content analysis. National-level interviews were carried out by BioAgora research partners in national languages in Belgium, Germany, Hungary, Italy, Norway, Poland and Romania. National-level interviews were recorded, and then anonymised written summaries were prepared in English for each interview. These summaries were shared with the core author team and analysed with qualitative content analysis. The analysis of the interviews was done by three members of the core author team. Separate analytical templates were prepared for the EU- and the national-level interviews in excel, which were filled with data from each interview. During the analysis the core author team gathered several times to discuss and cross-check the used codes and categories, which helped ensure intercoder reliability. Once the templates were filled and cross-checked, a written summary was prepared for each challenge category. In the written summary we included quotes from the EU-level interviews to illustrate the main findings – for transparency, the anonymised ID-s of interviewees whom the quotes belonged to include the reference to the EU-level and the number of the research participant when rendering the interviews in chronological order (e.g. EU_P1 refers to the research participant whom we interviewed first among the EU-level experts).

Table 1 The geographical distribution of the interviews across Europe

EU-level		7
Central-Eastern Europe	Hungary	3
	Poland	1
	Romania	2
North Europe	Norway	1
South Europe	Italy	3
Western Europe	Belgium	1
	Germany	2
Total		20

Table 2 The organizational background of the interviewed experts

Interviewed experts	Policy decision makers	Public administration officers	NGO representatives
EU-level	2	2	3
National level	4	4	5

Despite our efforts to ensure the depth and reliability of the research results, we faced several limiting factors during the study. The relatively short time that was allocated to this task (8 months) limited the breadth of the literature we could assess and required us to carry out targeted (instead of systematic) reviews. Consequently, the targeted review for some BDS 2030 targets or objectives remained superficial and should be completed later on –





ideally by demonstration cases of the BioAgora project. We also faced challenges when contacting policy experts and decision makers for interviews both at the EU and the national level – approximately half of the contacted people refused to participate in the study due to lack of time, lack of direct relevance to their work, fear of political consequences, or without giving any reason. As a consequence, most of the interviews were done with experts whose main activities focus on biodiversity and conservation, while other sectors that have a strong impact on biodiversity or where synergistic policy instruments are implemented could not be represented in the study. Thirdly, as national level interviews were done in national languages and the analysis was carried out on the English-language summaries instead of the full transcripts, their analysis could not go to the same level of depth as for the EU-level interviews. Also, in relation to the national interviews, we must acknowledge that the 13 interviews cover only 7 countries, so the evidence from these interviews are rather exemplary and not representative for the continent. While some regional patterns seemed to emerge from these interviews, further – and geographically more balanced – research is necessary to systematically assess country-specific implementation challenges (i.e. barriers and capacity gaps that are linked to specific ecological, socio-economic or political contexts across Europe).

4. Typology of implementation challenges

This chapter introduces the typology of challenges that limit the implementation of the BDS 2030. It is divided into eight main sections, each of them explaining one challenge category. All sections start with a brief definition and some key variables that summarise the main features of the given challenge category. Then main findings from the literature reviews, the EU-level interviews, and the national interviews are summarised.

4.1. Availability of knowledge

The category of “availability of knowledge” refers to challenges in policy planning and implementation due to the lack of sufficient data or robust scientific knowledge, or due to ineffective communication and lack of interaction between science and policy making.

Relevant BDS 2030 targets: all targets incl. energy

Perceived importance by interviewed EU-level experts: medium (high variance in responses)

4.1.1. Evidence from scientific literature

The scientific literature confirms that knowledge gaps exist regarding certain ecological requirements relevant for the implementation of nature conservation measures (e.g. Aksoy et al., 2017; Bianchi et al., 2013; EC, 2022; Faivre et al., 2017; Roman & Mauerhofer, 2021). Limited knowledge on ecosystems and especially their complex interaction with human activities has an important negative impact on conservation efforts and the status of biodiversity (Blicharska et al., 2016). Popescu et al. (2014) and Johansson (2018) find that research on the Natura 2000 network focuses on ecological systems and further social, economic and policy research is needed in order to have an integrated vision on these cultural landscapes. Ecology as a scientific discipline has a limited ability to provide adequate explanations to complex socio-environmental phenomena (Shrader-Frechette & McCoy, 1994; Harte 1995, Molnar et al., 2020). The requirement of quantification and standardization in the scientific method makes it difficult to determine the intricate ways humans and the biophysical environment are entangled with one another and to account for the role of values, worldviews, and ways of life that fundamentally shape landscape and resource management practices (Ludwig et al., 2001).

Furthermore, research on the Natura 2000 network shows a bias towards specific scales, regions, habitats, and taxonomic groups (Miu et al., 2020; Orlikowska et al., 2016). An example is the bias in ecological observations towards the North-West of Europe and the under-representation of Central and Eastern Europe in the scientific literature (Sutcliffe et al., 2015). Further spatial and non-spatial data is lacking at the regional and national scale to





improve the quantification of ecosystem services and to assess management effectiveness (Schirpke et al., 2017). A more practical challenge is that existing scientific knowledge is not used to improve and adjust management practices (Bianchi et al., 2013), which might suggest reluctance of existing structures and procedures to change. Often, the site-specific local or regional pressures/threats affecting species and habitats (like pollution or hydrological change) are unknown which is intertwined with knowledge gaps about site-specific conservation values hindering the effective management of sites (European Environment Agency, 2020; Gallo et al., 2018; Geist & Hawkins, 2016).

In other cases, local knowledge of changes in habitat and species behaviour exists, but it is not well understood or incorporated into the scientific literature and policy studies. While there is an increased recognition of the significance of traditional ecological knowledge (TEK) and indigenous local knowledge (ILK) in the management and maintenance of high-biodiversity landscapes (such as pastures, mountain grasslands and marine ecosystems) (IPBES, 2019; Hill et al., 2020), very few ecologists work closely with the herders, pastoralists, and fishermen who have, for generations, maintained these land-, and seascapes (Molnar et al., 2020; Berkström et al., 2019). Integrating different knowledge systems is not a straightforward process and attempts to “use” TEK simply as a new source of data for science have been criticized from multiple angles (Nadasdy, 1999). On the other hand, there is growing evidence that the co-production of knowledge between science and TEK can result in successful conservation management regimes (Butler et al., 2012; Reed et al., 2007; Fernandez-Gimenez et al., 2006). Authors suggest that this requires a shift away from the co-development of simple knowledge integration products to the development of knowledge integration processes, where the research project is conceived jointly, from establishing hypotheses to data collection, testing, and analysis (Raymond et al., 2010; Fernandez-Gimenez et al., 2006; Molnar & Babai, 2021; Molnar et al., 2020).

The lack of standardised monitoring of the state of biodiversity and the environmental impacts of human activities is highlighted in the literature in general and related to most of the specific BDS 2030 targets, sometimes directly associated with problems in funding. This gap has been reported for soil monitoring (Königer et al., 2022; Lemanceau et al., 2015; Zeiss et al., 2022), forest management impact monitoring (Angelstam et al., 2004; Gosselin et al., 2018; Keith et al., 2011), freshwater ecosystems monitoring (Geist & Hawkins, 2016; van Rees et al., 2021), and the monitoring of the conservation status of marine ecosystems (Katsanevakis et al., 2020). A related specific barrier is that insufficient research is conducted which evaluates and assesses the ex-post effect that conservation measures have on the targeted aim which hinders the improvement of such activities (Falco et al., 2021; Geist & Hawkins, 2016; Turpin et al., 2017).

In terms of availability of knowledge related to business for biodiversity, current sustainability reporting systems for companies focus on individual and resource-oriented issues such as energy consumption, water and raw material abstraction, emissions, and waste. There is a lack of managerial understanding on how companies should assess and report about interlinked issues related to biodiversity and ecosystem services; and there is little third-party guidance and support for companies to do that. Perhaps even more problematic is to track biodiversity impacts at value chain level. Indicators and tools are few and somehow not fully developed (Addison et al., 2018; Crenna et al., 2020; D’Amato et al., 2015).

Beside the lack of knowledge and data on specific aspects of biodiversity, a significant body of literature suggests that within the field of environmental conservation, interactions between knowledge production and knowledge use are often challenging, while scientific knowledge is not merely a neutral input into decision making, as it has a political nature to a certain degree (Görg et al. 2016, Toomey et al. 2017, Young et al. 2014). Interactions between science, policy and society are complex, multi-faceted, multi-directional processes (Jolibert & Wesselink, 2012, Heink et al. 2015, Sarkki et al. 2015). Difficulties emerge during these interactions due to the complexity of problems to be solved (e.g. number of scientific areas involved); the interrelations of biodiversity issues with socioeconomic processes; and the characteristics of the policy field, including unequal power relations (Görg et al., 2016). Challenges related to knowledge sharing and co-production between science, policy and society also include the lack of common language and the highly diverse epistemological backgrounds across different disciplines, the lack of knowledge of scientific actors on how to navigate within the policy cycle and in legal structures, as well as the





difficulties of accepting uncertainty as an inherent characteristics of biodiversity related issues within the policy field (Kelemen et al. 2021).

4.1.2. Evidence from EU-level interviews

Interviews with EU-level decision-makers and experts reinforced that while there is a growing body of scientific knowledge around conservation related issues, biodiversity knowledge is still insufficient and monitoring data is highly uneven. There were diverging opinions on how critical this challenge is for the implementation of BDS 2030 – while some interviewees said this is the most important factor, others suggested that the currently available knowledge is sufficient to start efficient implementation and to promote further (more fundamental) policy changes.

„We did not invest in good information, and we are trying to act – you can't do it. You can't build a house from the roof, your village from the fundament.“ [EU_P1]

„Knowledge is there. It's just a matter of getting it to the right people, to the people who are writing the policy, who need that knowledge.“ [EU_P2]

According to the interviews, for certain habitats (e.g. marine ecosystems), species (e.g. insects), or drivers of change (e.g. the causes of decline of duck population in the Balkans) there is a well-acknowledged lack of knowledge at the EU-level. The main reasons behind this lack (or unevenness) of knowledge includes the fact that there is no single, EU-level, independent monitoring system for biodiversity, but there are several different databases which are not fully harmonised. Furthermore, data collection is often financed on a project basis which might result in a reduced reliability or unevenness of data across time. Unevenness of knowledge also emerges because monitoring is often done by member states, which might follow different protocols or rely on different types and limited amounts of data, due to lack of capacities at national-level.

„The only serious funding we get to monitor species and habitats is through research projects that are short, really short. So, even if scientists can do a great job in three or four years for that research project, that's not monitoring.“ [EU_P3]

"Something that I see is that often it's not the knowledge as such that is lacking, but the ministry in several countries, they don't have sufficient capacity. They need to do the monitoring to see if you achieve good results, and then there is no capacity to do so. I think they know how to monitor properly, but there is no funding and no stuff, and so they don't have good data, no good robust data from their country on how species and habitats are doing.“ [EU_P4]

Some interviewees highlighted that monitoring biodiversity in certain cases is very complicated and expensive (e.g. in the case of marine ecosystems), often depends on the access to land in private property (e.g. in the case of monitoring the biodiversity of semi-natural habitats in farmed landscapes), and sometimes relies on data which is proprietary and therefore hardly accessible (e.g. data on economic yields of fisheries or forests). In some cases, it might also happen that member states have economic counter-interests to transparently present the actual status of biodiversity at the national level.

Considering the flow of information between science, policy and society, interviewees underlined the importance of clearly communicating established scientific facts and to fight against the current post-truth culture where many facts are relativized and personal (often interest-led) opinion is considered equally robust and legitimate. While this issue was raised as a general phenomenon, interviews provided only very few details on potential ways forward – mostly referring to the need to increase environmental literacy and awareness within society, and among politicians.

„I think that if we want to change the framework we have to explain why, and this only happens through education. But again it's also difficult, because it goes against the dominant paradigm.“ [EU_P6]

BDS 2030 targets and objectives mentioned: T1, T3, T5, T10, T11, T15-16, transformative governance, global biodiversity agenda





4.1.3. Evidence from national-level interviews

Problems related to knowledge were mentioned by a significant number of country-level experts. Although they seem to agree that a growing body of scientific knowledge already exists, several interviewees referred to the lack of efficient tools, such as standardised monitoring systems, a register of authorised experts, as well as a lack of data concerning certain areas (e.g. marine or forest). One respondent also emphasised language barriers along with the inequality it fuels.

Interviewees also reinforced the difficulty, which has been identified in the literature and during EU-level interviews, that even though robust scientific knowledge is already available, it is not communicated and transferred properly enough. This is reflected in the inadequate flow of information between science and policy making on the one hand, and between science and other stakeholders (e.g. farmers and the general public) on the other. National-level experts recognised this as a problem both at country- and EU-level – an example for the former was that at the local level BDS 2030 is not part of the agenda since regional authorities are governed by national regulations, so unless governments make it a priority, it is not integrated into the local knowledge base. Several interviewees also mentioned the difficulties arising from the spread of fake news and the hasty decisions taken in the current crisis situation.

Overall, the country-level interviews seem to support the observations identified in the scientific literature and during the EU-level interviews. Suggested solutions included messages tailored to specific groups (jargon only for professionals and more general messages for politicians, land users and the general public), accurate translation adapted to local conditions that can also be used in the field, as well as constantly questioning and clarifying scientific evaluations.

BDS 2030 targets and objectives mentioned: transformative governance, T3, T9, T13, global biodiversity agenda

4.2. Funding

The category of „Funding” refers to challenges related to the insufficiency and inadequacy of financial instruments allocated to biodiversity conservation goals. This category also includes problems associated with conservation measures which are not cost-effective, taxonomically biased distribution of funding; funding not well aligned with future needs; etc.

Relevant BDS 2030 targets: T1, T2, T3, T4, T5, T6, T7, T8, T9, T11, T12, T14, T15, T16, energy

Perceived importance by interviewed experts: high (low variance in responses)

4.2.1. Evidence from scientific literature

A biodiversity financing report by the EC and the Institute for European Environmental Policy has estimated a financing gap of approximately 186.89 billion EUR to implement the BDS from 2021-2030 which equals a lack of 18.69 billion EUR annually (EC, 2022c). Many additional sources have similarly concluded that available financial instruments for implementing the BDS or individual pillars of it such as the Natura 2000 network are largely insufficient or uncertain (Blicharska et al., 2016; Bouwma et al., 2019; European Commission. Directorate General for Environment., Trinomics., et al., 2022; European Environment Agency, 2020; Hermoso et al., 2019; Hermoso, Carvalho, et al., 2022; Pezdevšek Malovrh et al., 2019; Rinaldi, 2021; Rocha & Europe, s. f.).

Some of the challenges stem from the fact that a significant part of biodiversity funding comes from the EU agricultural budget (Hermoso, Carvalho, et al., 2022), for which sectoral conflicts may arise (Sotirov et al., 2020), and funding opportunities are often not specifically attributed to biodiversity conservation measures (Illes et al., 2017). At the local level the coexistence of different institutions in charge can even lead to a fragmentation of funding, increasing bureaucratic burdens and blocking access to finance (Pellegrino et al., 2017). Regarding the financing mechanisms of the Natura 2000 network, Kati et al. (2015) underline that the vast majority of





stakeholders prefer an independent Natura 2000 fund to the integration of financing into relevant European policies, which is supported by member states and the European Commission.

A crucial funding-related challenge is that biodiversity-adverse subsidies are continuing, for example through area-based “Direct Payments” in the CAP, while agri-environment-climate measures receive insufficient incentives and funding to be effectively implemented (Pe’er et al., 2020). This is particularly visible at the local level, where farmers face important social and financial barriers to adopt biodiversity-friendly agricultural practices with a positive impact on soil ecosystems (Montanarella & Panagos, 2021). Within the forestry sector it appears as a challenge for biodiversity conservation that Member States favour funding of commercial and economic use of forests (Kettunen et al., 2011).

Other challenges deal with unproportioned distributions of funding. For example, funding is taxonomically biased towards the species listed in the EU Birds and Habitats Directives (Mammides, 2019; Sánchez-Fernández et al., 2018). Conservation funding to protect multi-realm species is biased towards land, favouring the terrestrial conservation needs to the marine ones (Giakoumi et al., 2019). The underrepresentation of invertebrates in the EU Habitats Directive seriously affects soil biodiversity, receiving 468 times less conservation funding compared to vertebrates (Köninger et al., 2022).

Hermoso states that applying systematic planning and integrating conservation policy in other sectoral policies, such as the Common Agriculture Policy, would lead to more cost-effectiveness (Hermoso et al., 2019). A further challenge in financial planning is that current estimates of expenditures do not include the needs under future climate change impacts (Lung et al., 2014).

Funding as a challenge for implementing adequate monitoring schemes of biodiversity in Natura 2000 sites was also detected in the literature (Kati et al., 2015). Lack of funds for monitoring appears as a challenge in several other BDS target areas too like restoring freshwater ecosystems (van Rees et al., 2021), or addressing invasive alien species (Caffrey et al., 2014; A. I. Roman & Mauerhofer, 2022).

Regarding the EU’s Global Biodiversity Agenda, the EU’s financial support to the global climate change agenda is far more generous than the funding dedicated to external biodiversity policy (Kettunen, 2018).

4.2.2. Evidence from EU-level interviews

Three main aspects of funding challenges could be distinguished in the EU-level interviews: challenges associated with dedicated funding for conservation actions, challenges associated with biodiversity-related funding integrated into other sectoral policies (i.e. implemented through financial support provided to specific sectors such as agriculture), and limited availability and temporary nature of funds for biodiversity monitoring. Interviews agreed that the insufficiency of funding is a highly relevant challenge for the implementation of BDS 2030, although most of them also acknowledged that the European Green Deal and the current Biodiversity Strategy provides a more solid background and a more balanced sectoral approach for financing conservation actions than previous EU strategies.

When interviewees talked about funds dedicated directly to conservation actions, they acknowledged the success of the LIFE Funds (in terms of achieved positive biodiversity outcomes), but also highlighted the huge disproportionality between the budget allocated to direct conservation action vs. budget allocated to sectoral developments that use (and destroy) the natural environment.

„You are short in one hand, and you're fighting someone much bigger with the other hand. That's what I think is the problem with biodiversity funding in Europe and worldwide. (...) You give hundreds in a subsidy to something that is going to cut trees and give one in a subsidy to something that is going to plant trees.” [EU_P2]

Considering integrated funds (e.g. eco-schemes or agri-environmental schemes within the CAP), interviewed experts highlighted the same imbalance, i.e. a much larger proportion of the agricultural funds are going towards area-based production support than to greening measures. Furthermore, several sectoral subsidies (e.g. for agriculture or fisheries) are perceived as actually harmful for biodiversity. A consensual view among interviewees is that the allocation of funds represents political priorities both at the EU and at the national level, and the above-





mentioned imbalance signals that politicians still do not consider biodiversity critical enough to allocate more substantial amounts of funding.

„Hopefully everybody would see that biodiversity is the basis for economic activity, but we are not there yet.“
[EU_P1]

Further challenges are associated with the accessibility of funds targeting biodiversity management. Several interviewed experts mentioned the long route money needs to flow through from EU-level funds to local level conservation action, often making it difficult for the actual land managers to cover their expenses or investments. The efficient use of the available budget is also difficult because the multi-level institutional system is fragmented and over-bureaucratized.

„When (funding) goes at the more granular level, it becomes more difficult. And that's, I presume, because of all the different stages that you need to go through before you can actually get the big donor to the small person. (...) There are so many layers in between that makes it very difficult.“ [EU_P2]

Finally, closely related to the previous challenge category (availability of knowledge), some of the experts mentioned the lack of stable funding for long-term biodiversity monitoring, as a core reason behind the limited data availability.

BDS 2030 targets and objectives mentioned: T3, T4, T5-8, T11, energy, transformative governance

4.2.3. Evidence from national-level interviews

The problem of inadequate funding, both on its own and in relation to other challenges, came up many times during the country-level expert interviews. According to interviewees, this is reflected not only in the lack of money earmarked for nature conservation but also in the inefficient use of available funding as well as the disproportionate distribution of financial resources among sectors. It was also pointed out that agriculture is closely linked to biodiversity issues, but aspects of nature conservation are not incorporated into its activities, despite the fact that part of their funding should be used to achieve these aspirations. Several interviewees suggested that a synergy of goals and policies could increase cost efficiency, thus help reduce financial pressures.

Another interviewed expert referred to the discrepancy between the usual timeframe given for projects (3-5 years) and the actual time needed to achieve results (usually more than 10 years). Thus, the proposed solution would be to adjust the funding to the project's lifecycle.

BDS 2030 targets and objectives mentioned: T1, T3, T5-8, T11, T14, transformative governance

4.3. Horizontal policy coherence

The category of „Horizontal policy coherence“ refers to the incompatibility or lack of coherence between the policy objectives, instruments, and actions of the EU Biodiversity Strategy (nature conservation policy in general) and other sectoral (EU) policies (such as e.g. the CAP, forestry, urbanisation, energy and climate, or trade policies). Examples: contradictory motivations/competing interests, financial asymmetries, specific pressures on biodiversity.

Relevant BDS 2030 targets: T1, T2, T3, T4, T5, T6, T7, T8, T9, T11, T14, energy

Perceived importance by interviewed experts: high (consensual)

4.3.1. Evidence from scientific literature

Horizontal policy incoherence describes challenges in implementing the BDS 2030 which can be based on the incompatibility between policy objectives of different sectors, as well as on the insufficient integration of biodiversity-related objectives into the governing structures of other sectoral EU policies (Council of the EU, 2010; EC, 2022b). However, it may also be the case that the main objectives of different policies are in fact coherent, yet the policy instruments and implementation practices cause conflicts (Nilsson et al., 2012). Irrespective of a specific





sector, it has been found that the general management requirements of the Natura 2000 Network are inadequately integrated into other relevant sectoral plans (European Environment Agency, 2020). In the literature review we focused on the agricultural, the forestry, the urban development and the energy sector to assess potential incoherences between these and the BDS 2030.

4.3.1.1. The Common Agricultural Policy

The largest sector causing the highest number of incompatibilities with achieving biodiversity objectives as adopted via the BDS 2030 is the agricultural sector. The Common Agricultural Policy (CAP) is the EU's agricultural policy and the only common policy in the EU. Since its introduction in 1962, it has undergone several changes which aimed at reducing its budget costs and addressing socio-environmental challenges regarding agricultural production. However, a high incoherence between the CAP and biodiversity conservation remains.

In an overarching manner, the CAP implies the increase and intensification of agricultural production and still fails to comprehensively mainstream biodiversity and ecosystem services. It therefore falls short of greening the agricultural sector and instead, continues to incentivise large-scale industrial farming (Bianchi et al., 2013b; Palacín & Alonso, 2018; Pe'er et al., 2020; Rinaldi, 2021; Simoncini et al., 2019). The increased intensification of agricultural production including the use of pesticides is not restricted inside Special Protected Areas belonging to the Natura 2000 Network, which results in an obvious conflict between biodiversity conservation and food production at the policy level (Palacín & Alonso, 2018). Even though conservation objectives have been added to the agricultural agenda, those are not properly integrated and trade-offs between multiple objectives are not thought over to favour synergy (Bouwma et al., 2019).

Among the consequences of intensive agricultural practices are increased nitrogen loads in freshwaters threatening the biodiversity of those realms (van Rees et al., 2021) as well as declines in farmland bird populations (Gamero et al., 2017) and potential negative effects on soil biodiversity (Köninger et al., 2021).

The area-based “Direct Payments” to farmers (from CAP Pillar I) are not coupled with environmental requirements and have been largely inefficient in achieving environmental aims as well as changes in agricultural practices. The CAP also fails to promote the application of biodiversity-friendly agri-environmental measures (Pe'er et al., 2020). The adoption of such measures has been found to be more likely in low intensity production systems in which, however, the area-based compensation payments are lower compared to high intensity farming systems (Zimmermann & Britz, 2016). In total, the portion of agricultural land that is under biodiversity-supporting management contracts is estimated to be 13 percent. However, this number varies largely between Member States and regions (Bouwma et al., 2019). Challenges in implementing biodiversity-friendly agricultural practices that are of institutional nature include the lack of funding (see “Funding” chapter), a high administrative complexity, and insufficient availabilities of indicators based on which the evaluation of the CAP could be monitored (Pe'er et al., 2020). Due to lack of relevant scientific information, rigorous economic and agronomic analysis lack on the impacts of functional agrobiodiversity measures compared to conventional practices (Bianchi et al., 2013b).

Biodiversity in agricultural landscapes is best conserved when managed at landscape scales. The CAP incentivizes actor fragmentation due to encouraging an individual perspective of farm resources, which hinders the delivery of coordinated farmland biodiversity management at a landscape scale (Leventon et al., 2017). “As seen in the case of the EU CAP, the uptake of the landscape-scale perspective in the agri-biodiversity policy realm and the consequent design of multi-scale measures for FAB conservation is still limited” (Falco et al., 2021, p. 19).

According to Rinaldi (2021), the member states' role in implementation is critical and many of them prioritise short-term economic objectives instead of the long-term conservation of their natural wealth. According to the Institute for European Environmental Policy (2020), in the future CAP, Member States should ensure their CAP plans are more aligned with biodiversity priorities than at present.





4.3.1.2. Forestry

The main EU-policy instrument governing the management of European forests is the EU Forest Strategy. Since July 2021, a new Forest Strategy for 2030 is in place (EC, 2021). Until then, the Forest Strategy which was adopted in 2013 was the guiding policy (EC, 2013).

On the EU-level, conflicts of competencies pose a challenge. As forests fulfil many functions, ranging from water quality regulation to biodiversity protection and to raw material provision, those functions are governed by distinct EU competent domains such as agriculture, energy, and environment. However, the EU Forest Strategy only poorly addresses relevant forest-policy frameworks and therefore lacks comprehensive and coherent coordination across EU sectors (Aggestam & Pülzl, 2018). Meanwhile, forestry policies are implemented through national rural development programmes, which leads to implementation asymmetries between different Member States (Aggestam & Pülzl, 2018). Additionally, discrepancies in communication, collaboration, coordination, and governance between the general policies of National Forest Programmes and on-the-ground management activities result in an implementation challenge (J. Johansson, 2018).

One of the largest incompatibilities between the BDS 2030 and forest policies and management is the conflict of interests between biodiversity conservation and biomass removal for economic timber production (Winkel et al., 2015). In alignment with this, Sotirov & Arts (2018) found that “economic rationality” still prevails in forest policy and forest management practices, leading to an imbalance between timber production and biodiversity conservation. An underlying explanation for that is a “resilience of forest sector actors in Europe to absorb, minimise and recover from the pressure built by environmental actors and the general public to integrate international, EU and national biodiversity policy into forest policy” (Sotirov & Storch, 2018, p. 987). Regarding energy, a thought-provoking conflict of our time can be observed between forest-based bioenergy generation and forest biodiversity conservation strategies. The forest biodiversity conservation targets – especially forest specialist species requiring old stands – may be counteracted by the policy for low carbon emissions through wood substituting fossil energy, or through carbon storage in young stands (Bouget et al., 2012; Carey et al., 2001; de Jong & Dahlberg, 2017; Hiron et al., 2017; V. Johansson et al., 2016; Ranius et al., 2018).

Further, the BDS 2030 omits the need for spatial coherence in forest conservation: the lack of ecosystem-based approach to forest management which would complement protection efforts poses another challenge (Selva et al., 2020). The target of planting three billion new trees in the EU is criticised for lacking a science-based ecological assessment of present restoration needs. BDS 2030 does not consider natural, spontaneous regeneration of forests that ends up being a cheaper and more effective strategy than planting (Selva et al., 2020).

The EU reduced roundwood availability, however, consumption of wood-based products has not decreased. Concerning the EU Global Biodiversity Agenda, EU biodiversity objectives are counteracted as reduced roundwood availability in the EU may relocate production to countries with less efficient forest and biodiversity protection regulations in place (Schier et al., 2022).

Lastly, stakeholder conflicts between forest authorities, forest landowners and -users on the one hand, and conservation authorities, nature protectionists, and scientists on the other, in addition to limited funding have also hindered the implementation of EU biodiversity objectives in forests (Winkel et al., 2015).

4.3.1.3. Urban development

While a specific EU-level policy guiding the governance of urbanisation does not exist, urban development still causes certain challenges in implementing the BDS 2030 as urban sprawl creates trade-offs with biodiversity conservation. The growth of urban areas implies increasing pressures on biodiversity due to habitat fragmentation, destruction, and degradation, exploitation of natural resources, the introduction and facilitated spread of invasive alien species, waste production and general pollution. Those ecological problems are the consequences of land cover change, economic development, socio-cultural factors, and administrative failures (Kronenberg et al., 2013). Biodiversity conservation efforts are potentially redundant as the accelerating spread of urban areas continues into recognised Natura 2000 areas. Reason for those developments is the desire of people to inhabit regions closer to





nature. Stricter legal mechanisms and observance controls aiming to inhibit such disturbances are lacking (Concepción, 2021).

It has generally been found that urbanisation in addition to income per household as well as absolute income are driving forces of a high absolute biodiversity footprint. Necessary urban and regional planning instruments are remaining insufficiently implemented (Kosłowski et al., 2020). At the same time, Branny et al. (2022) argues that smart city development has a technology-centred approach that often fails to incorporate crucial aspects of urban sustainability, like critical interactions between social and ecological components of urban systems. This can have unintended consequences and limit the impact of these technological solutions for urban residents.

4.3.1.4. Energy

Transforming the EU to achieve net-zero greenhouse gas emissions by 2050 and an economy that is decoupled from resource use as set out in the EU Green Deal, requires the shift from fossil fuels to renewable energies (EC, 2019). However, the promotion of renewable energy sources has the potential to clash with biodiversity objectives as the development of a novel infrastructure requires a list of biodiversity-threatening activities (Moreira, 2019).

A comprehensive review by Gasparatos (2017) has found that renewable energy solutions (solar energy, wind power, hydropower, bioenergy), are linked to the main drivers of biodiversity loss, namely: habitat loss/change, pollution, invasive-alien species, over-exploitation, and climate change. As biodiversity impacts may vary due to technologies, locations and species, it is challenging to find the right mitigation strategy on a case-by-case basis. Typical negative biodiversity impacts of renewable energy technology: land take (land use competition) and resulting habitat change/loss (and related wildlife loss) as well as different forms of pollution (air, noise, visual, heat, etc.) (Meletiou et al., 2019). It is highlighted in the literature that it is essential to understand complex relations between economic and environmental policies, as well as to minimise environmental impacts of renewable energy through choosing the optimal location and operation (Meletiou et al., 2019).

4.3.2. Evidence from EU-level interviews

Coherence across biodiversity policy and other sectoral policies was amongst the most frequently mentioned challenges by EU-level experts, which was also perceived as of high importance. Most interviewees made a distinction between coherence at the level of legal documents and strategic objectives, versus coherence at the level of concrete measures, financial allocation, and policy implementation. Coherence at the level of strategic objectives was considered to be increased in recent years, and the Green Deal was mentioned as a good example of how nature has occupied a more central role in EU-level policy-making. Interviews highlighted that the current Commission gives higher priority to environmental issues than its predecessors and acknowledged that legal documents tend to offer opportunities for cross-sectoral synergies.

“Until the Current Commission, it was very clear that biodiversity was at best an afterthought (...). This has improved a lot with the Green Deal. At least at the very high level, biodiversity now has its own strategy (...) and climate and biodiversity are recognized to have the same dignity as an economic goal, or whatever else.”
[EU_P5]

On the other hand, severe critique was formulated around conflicts and competition between different sectors at the stage of policy implementation. Several examples were mentioned from the fisheries, agricultural, and energy sector, where even if policy objectives are more-or-less aligned, the sectoral interests are strongly opposing, which can lead to imbalanced budget allocation, loose regulations, and weak law enforcement.

“I mean, same with the Common Fisheries Policies, even the climate stuff, pretty much everything touches biodiversity. Like in every family, at the level of the commission there are different interests, people pushing in different directions. So, you already have a battle there, and then in the member states you also have different interests.” [EU_P2]

Some interviewees traced back the lack of horizontal policy coherence to the political and societal priorities (i.e. economic growth is prioritised against biodiversity), which are embedded in the current political and economic





structures, and therefore hard to change over the short run. In addition, some of these priorities (e.g. food and energy security) have been aggravated due to the war in Ukraine, putting an increasing pressure on biodiversity. Others mentioned that the marginalisation of conservation in local- or regional-level policy implementation can also be the result of the lobby activity of industrial stakeholders, which could be weakened if stronger and more transparent law enforcement is practised at the EU-level.

„When it comes to questions between human activity, prosperity, and biodiversity and environment in general, money always wins. (...) In the Parliament there are politicians, and the politicians are not elected by the trees.“
[EU_P6]

Two interviewees linked the issue of horizontal policy coherence to the institutional structures within the Commission, highlighting that the unequal availability of human resources at the different DGs also shows – and has further implications – on the sectoral imbalance at the level of policy implementation.

BDS 2030 targets and objectives mentioned: T1, T2, T3, T5-8, T9, T10, T11, energy

4.3.3. Evidence from national-level interviews

The lack of constructive communication and cooperation between sectors came up as a crucial problem in several interviews. According to the country-level experts, this is due to the fact that everyone is pursuing their own self-interest, decisions are based on predominantly economic considerations, whilst biodiversity values are not incorporated into the operating principles of each sector. The linkages between agriculture and conservation were often highlighted – there is a lack of attention paid to the impact of agricultural practices on biodiversity despite the strong interconnectedness between the two sectors. In addition, the Restoration Law, conflicts between state forestry and national parks, prioritising energy security and infrastructure development over conservation were also brought up as examples.

Synergies between objectives and a more horizontal approach, tight cooperation from the beginning, the integration of conservation values into the core principles of each sector and, especially in the case of agriculture, the development of a common language were among the proposed solutions.

Although statistics cannot be drawn due to the low number of interviews, difficulties in coordination between sectors were mentioned only by experts from Eastern and Southern Europe – this could be a subject for further investigation.

BDS 2030 targets and objectives mentioned: T4, T5-8, T9, T11, energy, transformative governance

4.4. Management effectiveness

Management challenges affecting the implementation of area-based conservation measures (e.g. Natura 2000 sites), like carrying out comprehensive management actions which fit to the local ecological, cultural, and socio-economic context, and which is supported by an effective institutional setup.

Relevant BDS 2030 targets: T1, T2, T3, T4, T5, T6, T7, T8, T9, T11, T15, T16

Perceived importance by interviewed experts: medium (variance in responses)

4.4.1. Evidence from scientific literature

This category lists challenges that occur during the implementation of area-based conservation measures such as Natura 2000 sites. Challenges identified by many sources from diverse biodiversity areas were the lack of comprehensive management plans as well as management objectives, measures, and monitoring plans (European Environment Agency, 2020; Hermoso et al., 2019; Katsanevakis et al., 2020; van Rees et al., 2021). This is further true for site-specific management objectives addressing identified site-specific pressures and threats as the monitoring of those is also inadequate (European Environment Agency, 2020; Hermoso, Salgado-Rojas, et al.,





2022), partially due to the difficulty in ensuring environmental baseline conditions (European Environment Agency, 2020).

Another challenge is that designated protected areas are falling short of an appropriate management intensity (van Rees et al., 2021) and that the management of Natura 2000 sites often lacks an ecosystem-based approach, for which increasing awareness of ecosystem values would be needed (Schirpke et al., 2017). Further, the monitoring of sites, which is an integral component of management, suffers from insufficient funding (Kati et al., 2015). Lastly, a frequent coexistence of authorities, organisations, and institutions per site implies conflicts among involved stakeholders regarding the responsibility for site administration which potentially hinders an effective management (Pellegrino et al., 2017).

Regarding the BDS forest target, there is a lack of organised monitoring, an especially critical activity in the context of uncertainties due to global changes. Monitoring should be spatially and statistically designed to track the effects of management practices on biodiversity (Angelstam et al., 2004; Gosselin et al., 2018; Keith et al., 2011). As to marine ecosystems, less than 40 percent of marine sites have management plans (Katsanevakis et al., 2020).

4.4.2. Evidence from EU-level interviews

The main specific challenges that appeared within this category can be divided into two main groups: those dealing with the question of how effectiveness can be approached and defined to achieve tangible results, and the ones that analyse the reasons for the lack of effective management in conservation areas in Europe.

Two interviewees argued that a more holistic approach of management effectiveness is needed. This holistic approach, on the one hand, means a dynamic vision of nature that considers natural successions, while it prioritises ecosystem health and resilience and allows spontaneous, natural regeneration processes.

“So, if you just be smart and let nature do most of the job intelligently, it would be easier. But no, we decided to go for species level conservation. So, we want to conserve each specie individually. (...) There are hundreds of thousands of species. You don't consider the trade-offs between different conservation plans. What you need is a biodiversity approach, ecosystem health and resilience approach, holistic approach, not a reductionist approach.” [EU_P1]

On the other hand, a holistic approach in management effectiveness means a balance between environment and social aspects and benefits, as mentioned by another interviewee, who uses here the example of ecosystem restoration:

“So, the restoration is on from an anthropocentric point of view. Not from an environmental point of view. Because you don't want mosquitoes there. You don't want things that will give you yellow fever or make space for invasive frogs. So, already there's a challenge to management effectiveness. Because [the question is - eds.] the effectiveness of what?” [EU_P2]

While protected areas in Europe are taken historically as an insurance that biodiversity will flourish, according to most interviewees there is a lack of real management and control activities in the designated areas, even if they have management plans on paper. There is insufficient information flow to the EU level on what is happening in management areas and resources are not enough to carry out effective monitoring, apart from voluntary schemes. Though efforts in designating protected areas have been significant, the designation of marine areas is lagging.

The reasons for the previous problems, mentioned in the interviews are the following: the implementation and enforcement framework of protected area management is too flexible and it does not work due to the lack of political will; the prioritisation of economic interests reduce management effectiveness, and site managing bodies are too weak to resist the pressure of powerful actors; a good management can be hindered by surrounding pressures like intensive agriculture; and finally there is a lack of resources assigned to monitoring.

BDS 2030 targets and objectives mentioned: T1, T2, T3, transformative governance





4.4.3. Evidence from national-level interviews

In national-level interviews, management ineffectiveness has been the least frequently mentioned among the identified challenges, so it would not be possible to build a coherent picture based solely on the interviews. According to interviewees, there seems to be a conflict of interest between land users and the implementation of BDS measures, and in the case of Natura 2000 sites, the problem of prioritising economic interests over biodiversity aspects was mentioned. In addition, one interviewee referred to the physical barriers of restoration, because in certain cases damage has already occurred to such an extent that even the best practice may not be successful.

Incentives for land users and softer policies were suggested as possible solutions, but experts are generally divided on this issue.

BDS 2030 targets mentioned: T3, T4, T5-8, T7, T9

4.5. Systematic spatial planning

Challenges related to the lack of systematic conservation planning with transparent spatial priorities and clear conservation targets that avoid taxonomic bias and are based on solid ecological, social and economic criteria. Examples: low representation of threatened species; prioritisation of economic interests; lack of planning tools; etc.

Relevant BDS 2030 targets: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T14, T15, T16, energy

Perceived importance by interviewed experts: medium (variance in responses)

4.5.1. Evidence from scientific literature

Without systematic conservation planning during the site designation process, the Natura 2000 network may fail at guaranteeing the sufficient protection of the EU's biodiversity, due to ignoring landscape connectivity issues, the small size of PAs, the underrepresentation of invertebrates, and likely impacts of climate change (Kati et al., 2015). Climate change has great relevance in terms of incorporating future patterns of species distribution into conservation planning, a missing criterion within the BDS 2030 (Adam et al., 2022). Blicharska et al. (2016) underline that planning cannot follow a general scheme – it has to be based on current, exact, and relevant ecological and social circumstances.

Common issues in conservation planning are the lack of landscape connectivity between Protected Areas (PAs) necessary to provide important ecological corridors (Nila et al., 2019; Opermanis et al., 2012) and taxonomic biases towards species listed in the Birds and Habitats Directives in which threatened species are underrepresented (Hermoso et al., 2019; Mammides, 2019; Mammola et al., 2020; Miu et al., 2020; van Rees et al., 2021). Conservation planning tools have the potential to provide relevant information on how to effectively maximise conservation efforts. Yet, they are only poorly used (Felix et al., 2022; Hermoso et al., 2019).

Furthermore, systematic planning is often hindered due to the lack of institutional support and due to the insufficient consideration of challenges in other affected sectors (Mikulcak et al., 2013; Raymond et al., 2017; van Rees et al., 2021). For the conservation of marine areas, similar challenges apply. There, economic interests often dominate conservation planning processes, and the application of multi-realm ecosystem approaches are lacking behind (Giakoumi et al., 2019; Katsanevakis et al., 2020).

Lack of systematic spatial planning is a challenge relevant to several targets included in the BDS 2030. Regarding the target of bringing nature back to agricultural land, restoring biodiversity in agricultural landscapes and creating a right balance between different interests require a great effort in terms of spatial planning (Bianchi et al., 2013b; Falco et al., 2021). Systematic spatial planning is needed to avoid conflicts between renewable energy generation and biodiversity conservation (Gasparatos et al., 2017). Concerning freshwater ecosystems, the approaches used to stream restoration are not systematic and evidence-based (Geist & Hawkins, 2016). Xie and Bulkeley (2020, p.





86) advocate for the dissemination and recognition of good urban green planning practices, validating “the need for transnational and international governance arrangements that can acknowledge the contributions of cities that are working for biodiversity and can guide other cities to take actions towards biodiversity in their jurisdictions”.

Regarding the target of greening urban and peri-urban areas, these ones face different challenges, like “spatial conflicts with urban system nestedness, specific urban biodiversity, fragmentation and altered environments, value plurality, multi-actor interdependencies and environmental injustices, path-dependencies with cultural and planning legacies and a potential misconception of cities as being artificial landscapes disconnected from nature” (Kabisch et al., 2022, p. 1388).

4.5.2. Evidence from EU-level interviews

Though there was variance in responses of the interviewees concerning the importance of this challenge category, one of the experts expressed its relevance in the following way:

“It’s very clear that all biodiversity conservation is ultimately about spatial planning. It’s about what you do, where and how do you allocate space? Because fundamentally if you do not allocate space to nature, nature will disappear, because there are all sorts of human activities that claim space and the non-humans do not have a standing.” [EU_P5]

The interviews connected this challenge category to “current political and economic structures”, as many of the specific challenges related to spatial planning indicated here stem from the lack of long-term environmental thinking in culture, politics, and economy. One of the interviewees raised a fundamental question of ecological economics when explaining that people act based on the dominant, dichotomous worldview that does not consider us as part of nature, or consider species as part of one system. Therefore, biodiversity conservation efforts are fragmented, and ineffective, complex policy problems are not treated based on a complete understanding of the context.

“That would be a systematic approach, you look at the system and you see what is the best overall. I mean it’s not only about specific conservation of species or habitats, it’s really about how we live with nature in harmony basically, how not to live against it.” (EU_P1)

Short-term political and economic interests play an important role in the lack of systematic spatial planning. Politicians, as reflections of the society that votes for them, aim to ensure the provision of food, energy, and general comfort on the short run, even if it goes against long-term environmental and social well-being:

“Environmental biodiversity doesn’t give anybody richness. So, it’s always the low end of any list of priorities.” [EU_P3]

“It’s only for a few illustrated academics that understand the models and think about what the world would be in 2050.” [EU_P3]

At the same time, according to the interviews, spatial planning is also strongly related to policy implementation in a multilevel governance framework. An interviewee criticised that there is no overarching EU direction on ecosystem-based spatial planning meaning that member states manage their own space, and the different – often conflicting – interests and views play an important role in a limited space. Countries define their own plans without any specific requirements on aligning them with other neighbouring countries according to ecosystem-based criteria. Even an excellent, ecosystem-based specific spatial planning directive, like the maritime directive, can fail in its implementation, because it is up to 27 different governments.

One interviewee highlighted that land planning has been eroded systematically over the last 40 years due to the neoliberal vision that the market would allocate the resources efficiently. There is a continued pressure to ignore land planning. According to the principle of subsidiarity, in most countries all planning is happening at the lowest, the municipality level, which has led to a lack of strategic vision and a bad way of using resources. The suggested solution is to go back to more strategic top-down planning which should be completely compatible with a kind of inclusive, democratic, and science-based process, with the use of all available electronic tools and applications.





Not all interviewees considered systemic planning a relevant issue, one of them saw it as a symptom of other, more relevant challenges.

BDS 2030 targets and objectives mentioned: T1, T2, T3, T9, energy, transformative governance

4.5.3. Evidence from national-level interviews

Besides effective management, this problem was the least emphasised during country-level interviews. However, the problem of land scarcity was mentioned on more occasions: on the one hand, more protected areas would be essential for biodiversity conservation and soil remediation, and on the other, more precise designation and protective laws are needed, especially in the case of biodiversity hotspots and marine areas. One expert also mentioned that more agricultural land should be reclassified to preserve biodiversity, meaning that agriculture should not sacrifice long-term viability for short-term profit. The dominance of ad-hoc decisions in nature conservation was also mentioned, as there is not enough capacity and time for strategic planning.

BDS 2030 targets mentioned: T7, T8, T10, T15, T16

4.6. Vertical policy implementation

Challenges related to the incorporation of EU strategic targets and directives into the national and regional laws and regulations of EU Member States. This includes the difficulties of coordinating both between MS and across decision-making levels within one MS (i.e. from national to local and vice versa), manifested in issues of political will; inadequate or asymmetric implementation; weak accountability; law enforcement etc.

Relevant BDS 2030 targets: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14

Perceived importance by interviewed experts: medium-high (variance in responses)

4.6.1. Evidence from scientific literature

The implementation of the BDS 2030 often becomes a question of political will as the strategy is not legally binding, and Member States are not effectively incentivised to act on behalf of it. Therefore, EU-level decisions have only been poorly adopted by national and regional governments which suggests a top-down governance gap (EC, 2022a; Kati et al., 2015; Rocha & Europe, s. f.). Additionally, existing legal instruments such as the Birds and Habitats Directive, the Water Framework Directive, and the Marine Strategy Framework Directive are lacking effective enforcement (Yakusheva, 2018; Rocha & Europe, s. f.). Further challenges of this category contain bureaucratic hurdles such as insufficient availabilities of administrative, institutional, and human resources or the high bureaucratic burden associated with managing conservation processes (Baquero et al., 2021; Campagnaro et al., 2022; Gallo et al., 2018; Pellegrino et al., 2017).

Though the category is about policy implementation, we can find here some challenges that are related to policy formulation too. For example, in the previous BDS weakness in scope and formulation of some of the targets including their actions was mentioned in following assessments (EC, 2022b). According to a case study in Romania, EU policies are not well aligned with local conditions and are not flexible enough to take into account particular local challenges in a way that biodiversity is really favoured (Mikulcak et al., 2013). In post socialist countries there is an inherited set of implementation shortcomings stemming from prevailing hierarchical structures, limited democratic tradition, and weakness of civil society, sometimes originating a mismatch between formal compliance (Europeanization) and practical noncompliance of EU policies and regulations (Klůvanková-Oravská et al., 2013; Sotirov et al., 2015; Stringer & Paavola, 2013).





4.6.2. Evidence from EU-level interviews

The most important challenge in this category, highlighted by all the interviewees, is the deficient implementation of EU strategies and Directives by Member States. Though expectations towards the European Commission are high, it has limited influence on processes at the national level. While EU strategic targets and directives can be perfectly incorporated into national laws on paper, implementation and monitoring may not be done, so there is an implementation gap. The main problem is the lack of implementation of EU regulation in the Member States, while the EU has limited room for law enforcement and fighting infringements. An interviewee mentioned that certain environmental directives, like the Nitrate Directive, have been openly ignored by Member States for more than thirty years without consequences.

“That is the mother of all problems, that’s where the problems are. And in a nutshell, the problem is that the EU is actually quite good in passing fairly good legislation. (...) The EU is dreadful at enforcing its own legislation.” [EU_P5]

“(...) if all agricultural ministries were spending the CAP money kind of in line with what the EU legislation says, and with the declared EU criteria, we would be in a completely different place. If all Member States were correctly implementing the Birds and Habitats Directive, the Nitrate Directive, we would have solved the vast majority of the problems we have.” [EU_P5]

While Birds and Habitats Directives can be legally enforced, BDS 2030 is not legally binding, so Member States and authorities may not take it seriously – there is no enforcement, no penalization, and no responsibility for a clear reporting flow. Although the new BDS already has clear, smart targets, still, it is a significant challenge to make real implementation sure, associated with reporting and control. The EU Nature Restoration Law, implemented as part of the BDS 2030, represents an important step towards increased enforceability and is appreciated by several of the EU-level interviewees.

Monitoring as a challenge is quite relevant in this category too, as apparently ambiguous goals, scarce and vague reporting, and poor results in the implementation of EU policies in Member States are associated. When the European Union wants to design a new legislative framework but without creating an extraordinary burden for Member States, effective implementation becomes difficult.

In small areas concrete, tangible biodiversity conservation actions are carried out, sometimes by cross-border programs. However, the engagement between the local and the EU level was mentioned to be a challenge within the multilevel governance framework, basically because the national level appears to be a barrier.

“I personally see that the national level is really some kind of barrier because we get many regions and cities, even some villages, which are very active in terms of biodiversity conservation, they do great things, but there is a lack of communication, a lack of engagement with the EU level because that national level is just a barrier there.” [EU_P1]

Due to the current governance framework and the structure of Member States with representative democracies, one of the interviewees from an EU institution stressed the importance of citizen responsibility in defining the EU agenda through citizen participation in their own national elections.

BDS 2030 targets and objectives mentioned: T3, transformative governance

4.6.3. Evidence from national-level interviews

At the country level, vertical policy implementation was most often referred to among the identified challenges – only two experts did not mention it, and many others underlined it with numerous examples. The main problem seems to be that, although a legal framework is in place, implementation does not come into effect, whilst several individual interpretations are developed – especially in the case of the Restoration Law – which can undermine the implementation of the Biodiversity Strategy.

According to an interviewee, countries do not share the EU's ambitions, point fingers at each other and often feel that the expectations are rather unfair. There is also a lack of coordination and communication among the EU,





national, regional and local levels. Another expert said that the BDS objectives did not even reach the local-level implementation due to the country's centralised governance system and its prioritisation of other national interests, thus biodiversity principles are often overshadowed. One interviewee also mentioned that local authorities are completely excluded from the planning process, whilst their integration would be crucial.

Although they agree that policy implementation faces serious challenges, experts are strongly divided on how to tackle the problem. Some argue that more objectives should be made mandatory, using regulations instead of directives would be more effective, and that infringement procedures should be stricter to ensure a positive change. Others, however, claim that this would unfairly burden some countries, which do not even know how they will meet current expectations. In the case of Norway, it was suggested that the EU directives should be applied in their country, too, but adapted to local circumstances.

Overall, based on interviews at the local level, policy implementation seems to be the most prominent challenge while it was less emphasised by experts at the EU level.

BDS 2030 targets and objectives mentioned: T1, T2, T3, T4, T5-8, T6, T13, global biodiversity agenda, transformative governance

4.7. Engagement

This challenge category includes difficulties and contradictions related to stakeholder participation and public engagement. While biodiversity policies usually strive for stakeholder participation, participatory processes are often skewed towards powerful actors and interest groups and do not give equal opportunities for all relevant actors (including e.g. marginalised social groups) due to conflicts, mistrust and unequal power relations between them. Furthermore, obstacles to the shift from a centralised decision-making to more inclusive arrangements, lack of capacities, and lack of community influence over policy decisions makes it ineffective to engage citizens and their communities in the design and implementation of conservation policies.

Relevant BDS 2030 targets: T1, T2, T3, T5, T6, T7, T8, T9, T10, T11, T12, T14, T15, T16

Perceived importance by interviewed experts: medium (variance in responses)

4.7.1. Evidence from scientific literature

Regarding the Natura 2000 network, no regulatory standards are established about stakeholders and local communities' involvement in the process of designation, implementation and management of the sites (Gallo et al., 2018). Natura 2000 sites designation is carried out only based on scientific criteria, no social criteria are included, while the lack of formal stakeholder participation leads to numerous related conflicts. Four types of conflicts between stakeholders are identified by the author: due to restrictions to human activities; conflicts caused by incrementing bureaucratic procedures; by no clear institutional roles; and, conflicts due to insufficient information about Natura 2000 requirements (Gallo et al., 2018). Within the governance system for biodiversity conservation in agricultural landscapes top-down decision-making approaches prevail, while stakeholders like non-governmental actors and farmers would prefer a model that differs from the status quo (Velten et al., 2018). This phenomenon is even more accentuated in post socialist countries, where participatory decision-making and multilevel, decentralised institutions and practices are weak (Kluvánková-Oravská et al., 2013; Stringer & Paavola, 2013). However, according to more recent studies, the increasing focus on multi-level governance solutions contributes to a shift towards more inclusive arrangements in the region. (Niedziałkowski et al., 2016; Pezdevšek Malovrh et al., 2019).

A large portion of this category covers challenges related to poor communication and knowledge-exchange to and among stakeholders. For example, stakeholders are often unaware of the impacts that their practices have on biodiversity and the environment (Flávio et al., 2017). On the other hand, they are unaware about the benefits they can gain from protecting biodiversity, as the communication about ecological as well as socio-economic biodiversity values remains insufficient (Kati et al., 2015; Pellegrino et al., 2017). Besides communication, professional capacity





development and the provision of various training opportunities for stakeholders remain scarce (Campagnaro et al., 2022; European Environment Agency, 2020). The promotion of collective social learning is necessary to achieve legitimate decision-making processes and better biodiversity governance outcomes (Suškevičs, 2012, IPBES 2022).

Though collaboration between local actors is necessary for a successful landscape-management, it relies on trust and social capital, which has uneven levels even among landusers and landowners, so it should be incentivized by private benefits (Prager, 2015). According to Dedeurwaerdere et al. (2016), a wide array of collaborative governance mechanisms needs to be applied in order to boost biodiversity conservation. However, CAP has not been actively supporting collaboration at a landscape scale but contributed to fragmentation by encouraging farmers to adopt individualistic behaviours and only consider their own farm resources (Leventon et al., 2017).

Local stakeholders in most EU member states see Natura 2000 as an obstacle to development and often resists its implementation, according to the weight of economic interests at stake (Pellegrino et al., 2017). While farmers are crucial land-use decision makers with considerable influence on the effectiveness of biodiversity conservation (Hauck et al., 2016), their willingness to participate in agri-environmental schemes depends on a wide set of factors: fair payments, lower household dependency on agricultural incomes, age and education levels, the presence of a successor, and the ability to make progressive rather than stepwise changes to agricultural activities (Lastra-Bravo et al., 2015).

Finally, the neoliberal model affects transparent citizen engagement within the framework of biodiversity governance, limiting people's role in agenda-setting, in shaping conservation priorities or in questioning present policies. Inequalities of wealth and power create asymmetries in democratic participation (Paloniemi et al., 2015). Member States use diverse political strategies to align conservation patterns to capitalist interests, achieving the exclusion of local community groups from conservation (Leventon et al., 2019). Based on a neoliberal approach and under the disguise of promoting stakeholder participation, arrangements can favour the inclusion of profit-driven private actors in biodiversity governance schemes (Maestre-Andrés et al., 2018).

4.7.2. Evidence from EU-level interviews

This challenge category turned out to be highly controversial in the EU-level interviews: while there was a general agreement that stakeholder participation is important, the relevance of engaging the general public in environmental policy decision-making was debated. Some interviewees made interesting theoretical comments as well, especially around the question of whether stakeholder participation (as a concept) includes citizens and society too (as everyone has a stake in the ongoing nature crisis), or it should rather be divided into two categories: one for citizen engagement (i.e. society representing mostly public interest), and one for interest groups with particular economic or socio-political interests.

One interviewee stressed that in EU policy making the number of organised actors and observers is increasing, and the different groups of society are better represented now than before.

"I can say that in EU policy making, there are more and more observers, organised actors. Civil society continues to be a blank spot, in my view. [Its participation - eds.] mostly depends on communication actions, and we don't have many. But the organised society, the groups [NGOs or social movements - eds.] are better represented now." [EU_P3]

Another person mentioned that stakeholder participation happens at all levels, from the EU to the local level. There are different stakeholders and though their participation is important, it is already part of other challenge categories, like planning, policy implementation or management effectiveness. A relevant topic that was raised in several interviews is the long distance between local stakeholders and EU-level decisions. Even though participatory instruments exist, the system is too complicated, there is a top-down policy approach, there are too many steps between decision levels, and technical language hinders communication.

"I do not think it's the lack of mechanisms for stakeholder participation, it's the reach that local stakeholders are able to have vis-à-vis these top-down policies. So, they normally don't get up to talk with the people making





the policy at higher levels. But the people at the local level might be able to talk with their mayor, maybe with the province representative who might take it to the national level, but there are too many steps." [EU_P2]

The regular conflict between “effective” decision-making and time-consuming consultations with stakeholders and citizens also appears as one of the reasons for the preference at the EU level for engaging with few interest groups with economic weight. This challenge was described by an interviewee as intrinsic to the multi-level governance system itself. Another interviewee highlighted that participatory processes often do not go well on the ground, as decisions are already made when people are consulted.

“I mean, we've had the declarations of bosses of the farm unions coming out from a dinner with the minister, saying: we have agreed on the new eco-schemes for this and that. What do you mean: you have agreed? Where was the rest of society? So that malpractice is pervasive all around you.” [EU_P5]

A somewhat stronger criticism was also expressed on the actual practices of citizen and stakeholder engagement, stating that most Member States are not interested in developing open engagement processes as they would get in the way of corruption.

“And this is not sloppiness, or ineffectiveness, this is designed to ensure that citizens who are not part of the power system cannot get in the way of the people who distribute the money to themselves and their friends.” [EU_P5]

On the other hand, several experts highlighted that social movements (e.g. Fridays for Future) have had a strong influence on the EU Green Deal and the increased political interest in biodiversity, therefore the role of public engagement should not be underestimated in changing the political agenda. A good and wide participatory consultation carried out in the right moment can save time and represent other gains in terms of the legitimacy of the process. The process must include all stakeholders to prevent resistance to change.

BDS 2030 targets and objectives mentioned: T5-8, transformative governance

4.7.3. Evidence from national-level interviews

Lack of engagement, both from key stakeholders and from society at large, was also repeatedly mentioned at the national level as an obstacle to the successful implementation of the Biodiversity Strategy. According to interviewees, this is reflected in the lack of cooperation from key sector leaders and in the slow pace of stakeholder negotiations. Moreover, although green issues are gaining a certain popularity, there is still room for improvement in environmental awareness among land users, business owners and the general public.

Furthermore, even though regulations are often strong at the national level, neither environmental organisations nor local residents are consulted during their elaboration, which not only leads to environmental damage but also fuels conflicts with the local communities – and that slows down progress even more. One interviewee even mentioned the possibility of eco-terrorism among the dangers of too slow action, for which a mild example from the recent past is mentioned (environmental activists threw a tin of tomato soup over a painting). The engagement of business actors would also be crucial. Although positive trends were observed by the interviewees in several countries (e.g. the Hungarian National Bank’s green agenda), others reported that local businesses do not operate according to sustainability guidelines. The key would be to incorporate biodiversity considerations into their core principles.

Although many experts recognise the issues around engagement, they are divided on whether sensitisation or stronger regulation is more effective to achieve stakeholders’ more active participation in conservation actions.

BDS 2030 targets and objectives mentioned: T3, T5-8, T11, global biodiversity agenda, transformative governance

4.8. Current political and economic structures

Challenges related to the dominant economic and political system, like limitations to public interest deriving from the market society, or short-sighted political vision for biodiversity due to shortcomings of representative





democracy. Examples: multiple power asymmetries, private property limiting monitoring, unavailability of non-marketable expertise, disregarding long-term public interest by politicians elected for short term, lack of an informed public holding politicians accountable. This challenge category emerged during the interviews, therefore it builds entirely on expert knowledge (no targeted literature review was carried out).

Relevant BDS 2030 targets: T5, T6, T7, T8, T9, T11, T14

Perceived importance by interviewed experts: high (variance in responses)

4.8.1. Evidence from EU-level interviews

The four main problems outlined by the interviews in this category are: land ownership associated to the current Nation-State system and the logic of subsidiarity; short-term thinking in politics associated to disinformation and short-termism in society; the undermining of the EU's law enforcement capacities; and the current neoliberal economic paradigm that prioritises economic growth over the environment.

The EU has little influence on how land (either in public or private property) is managed in different Member States, which is a structural political challenge related to systematic spatial planning. Member States are strongly attached to their competences in defining the land use priorities within their borders. The same applies to private landowners when it comes to soil and land management. There is a lack of public discussion on property right regimes concerning the governance of environmental public goods.

“It is critical. Can we, in the 21st century, deal with global challenges without redefining what land ownership means? If we cannot tell people using 80% of the land what they should be doing for a common goal, should we be even trying to develop and implement policies that are required? This is a question that is not being discussed at all.” [EU_P1]

Out of six EU-level interviews five stressed the challenge of short termism in democratic politics, that politicians are opportunistic, cannot see beyond the next elections, and are not willing to take responsible decisions based on science and long-term needs of society. At the same time, society is affected by the collapse of the traditional media, and a culture of disinformation seeks to undermine facts and trust. Of course, this has an enormous impact on science-policy interfaces. This short-termism and loss of trust is a structural challenge of our political system, as it is related to the shortcomings of modern democracies.

“Whether it's the fact that even those politicians were not corrupt, only have a 1 or 2-year time horizon, because they cannot see anything beyond the next elections – when you are lucky, because usually they cannot see anything beyond the next fall, or this afternoon's press release. Which means that it's impossible to plan and it's impossible to take courageous decisions.” [EU_P5]

“Politicians will of course selectively choose information and facts that will help them to go with the decisions in an easy way... (...) They will intervene in science in order to change the facts to such a way that their decision is easier to make, and then you end up with policy-based science and not science-based policy.” [EU_P1]

The interviews also reveal the relationship between this short-term political thinking and the political preference for economic interests of society over long-term complex socioeconomic concerns.

“These people need to be elected every four or five years in the Member States and they will not take decisions that will make their electorate not vote for them in the next election. So, unfortunately, national governments tend to go for the economy before the environment, well, with the consequences that it has in the longer term.” [EU_P2]

The challenge of the undermining of the EU's environmental law enforcement capacities is related to the challenge category of policy implementation. According to this opinion, the two previous European Commissions had a deregulation approach to environmental policy. This has been changed with the launch of the Green Deal, which puts emphasis on stronger law enforcement. However, there is still a significant imbalance in resources (i.e. staff or budget) allocated to DG ENV and other, more powerful DGs, whose impacts on nature are often negative.

“DG Environment has one legal officer that is supposed to enforce a dozen pieces of environmental legislation on 27 countries. It's a joke. So, we are still in a situation where both at Member State-level and its operators’





and stakeholders' level, everybody knows that you can ignore EU law, and you don't risk anything. And this is coded in the EU from the inside..." [EU_P5]

According to this interviewee, the lack of enforcement has a political reason: there is strong political pressure in the direction of subsidiarity. Law-breaking has often been tolerated due to interests and exchange of favours in political negotiations. The interviewee stresses the importance of political will and suggests that the Commission channel more resources into enforcement and start to listen to their own court auditors.

"We need to go back to a logic where laws have to be followed by everyone immediately. That means no grace periods where we delay 5, 6, 7, 10 years. No. A law comes into force, and if you are not following, we will take you to court immediately." [EU_P5]

Finally, as a challenge stemming from the economic structure, the prevailing paradigm of economic growth was criticised by one interviewee, stressing that "what we are trying to do currently, unsuccessfully, is to create sustainability through an unsustainable political and economic structure" [EU_P6]. The prioritisation of economic growth makes the achievement of sustainability impossible.

BDS 2030 objectives mentioned: transformative governance, global biodiversity agenda

4.8.2. Evidence from national-level interviews

Several experts identified the current political and economic structures as a fundamental obstacle to implementing the BDS 2030, since economic prosperity tends to outweigh biodiversity protection, which is a major barrier to real progress in conservation. This is reflected in the economic developments in areas of great importance for nature conservation (such as the new Tesla factory in Brandenburg, Germany or the investments planned by Lake Fertő, Hungary), the lack of cooperation between leaders of key sectors due to their own financial interests, and the fragmentation of the conservation sector. Furthermore, the absence of long-term policy planning and of a coherent vision were also identified as obstacles in the implementation of the Biodiversity Strategy along with the consumer culture cultivated by the economic establishment.

Opinions are divided on how to overcome the problem, with some interviewees suggesting that the only effective way to tackle it is through grassroots action and social pressure, while others see the engagement of political leadership as the only way forward.

BDS 2030 targets and objectives mentioned: transformative governance, T5-8, T9, T11

5. The interplay of challenges and the potential role of the Science Service in addressing them

Both the literature review and the interviews indicated that the challenges we grouped into eight separate categories are strongly interlinked and, sometimes, it is hard to draw a clear boundary between different challenge categories. During the interview analysis, we paid special attention to identify the cross-linkages between the challenges and to understand the causal relationship (if there is any) behind them. Table 3 shows how many times different challenge categories were mentioned together by the interviewed EU experts – the darker the cell, the more the given two challenges were grouped together by the interviewed experts. The table clearly shows that while almost everything intertwines, there are stronger and weaker relationships between the challenge categories. The 'Current economic and political structures' category was linked the strongest way to 'Vertical policy





implementation’ (12 times mentioned), and to ‘Horizontal policy coherence’ (10 times mentioned), while the ‘Availability of knowledge’ was linked to ‘Vertical policy integration’ by the same frequency (10 times mentioned). The ‘Funding’ category was linked to ‘Horizontal policy coherence’ and ‘Availability of knowledge’ only a little weaker (mentioned 9 and 8 times, respectively). There are several medium-strength relations linking ‘Systematic spatial planning’ and ‘Management effectiveness’ to the other previously mentioned challenges. The least connected challenge category seems to be ‘Engagement’.

Table 3 Frequency of different challenge categories mentioned together by EU-level interviewees

	Availability of knowledge	Funding	Horizontal policy coherence	Management effectiveness	Systematic spatial planning	Vertical policy implementation	Engagement	Current political and economic structures
Availability of knowledge								
Funding								
Horizontal policy coherence								
Management effectiveness								
Systematic spatial planning								
Vertical policy implementation								
Engagement								
Current political and economic structures								

Legend: White cells indicate that a given combination of challenges did not occur in the analysis, then the frequency of mentioning a given challenge combination increases from light to dark blue cells. Duplicated cells are indicated with grey, i.e. grey cells do not convey further information.

Since the EU-level interviews were fully transcribed¹, the in-depth analysis of the full texts enabled us to go beyond the frequency analysis, towards understanding how the interviewed experts perceived the causal relationship between the challenges (see Fig. 2 for a graphical representation). The most overarching challenge category, which is at the same time the hardest to tackle, is the ‘Current political and economic structures’, i.e. the political short-termism, the focus on financial/economic aspects and the growth imperative, and the legitimacy crisis around science and democracy. Such challenges determine political and social priorities and, through these established priorities and the associated political will, they contribute to power battles, conflicts and incoherences between sectoral policies. Hence, the category of ‘Horizontal policy coherence’ is rooted in the political and economic context, and at the same time has a strong influence on the distribution of public money. By prioritising certain economic activities and aspects of well-being against others, the interplay between sectoral policies lead to insufficient and imbalanced funding for biodiversity. The ‘Funding’ challenge is also closely associated with ‘Vertical

¹ Regarding the national-level interviews, the partial geographical coverage and the limited number of interviews make it difficult to give an overall assessment. However, it was clear that the challenge categories of vertical policy implementation, availability of knowledge and horizontal policy coherence were referred to most often, so it might be worth exploring these in more depth, such as in the form of country-specific case studies. Nevertheless, the national interviews also confirmed that the challenge categories we identified are faced at country level, too, and that there are clear linkages between some of them.





policy implementation’. Here we could observe a two-way relationship. On the one hand, the multi-level and often bureaucratic institutional system through which biodiversity policy is enacted in the EU makes it difficult to efficiently allocate funds to those who are doing the actual implementation. On the other hand, the insufficiency of financial resources makes it difficult to enhance capacities in the institutional system and improve the vertical integration across the local, national and EU level. The ‘Availability of knowledge’ category proved to be in a central position, bridging across on-the-ground implementation, engagement of stakeholders and citizens, and higher level political decision making. Lack or inconsistency of data (and the lack of consistent and long-term monitoring) is an important limiting factor in ‘Systematic spatial planning’ and ‘Management effectiveness’. The imperfect information flow and the limited opportunities to knowledge co-creation between science and society lead to missed opportunities of awareness raising, and this way they create a linkage towards the ‘Engagement’ challenge category. Likewise, the imperfect information flow between science and policy contributes to political short-sightedness and to the downgrading of environmental issues on the political agenda, and hence a link from ‘Availability of knowledge’ to ‘Vertical policy implementation’ and ‘Current political and economic structures’ can be observed. Of course, challenges in spatial planning and conservation management are not only related to knowledge availability, but also to policy implementation in the EU multi-level governance framework, as well as to available funding.

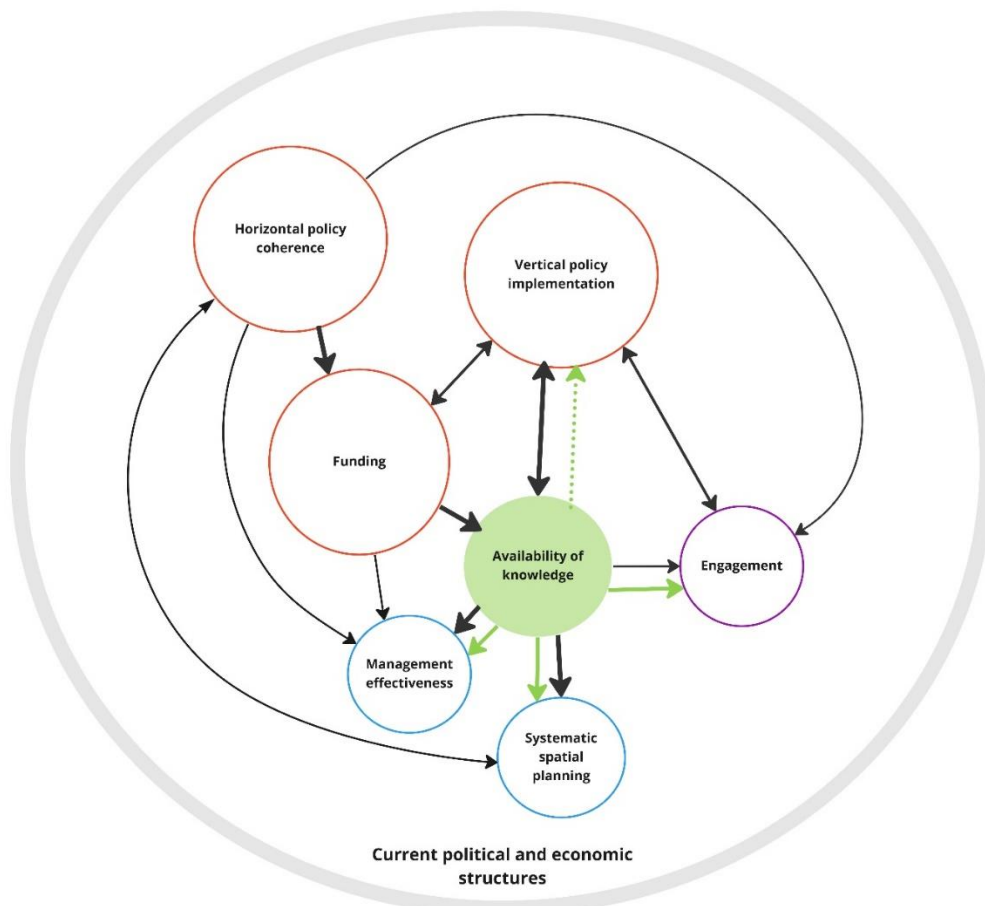


Figure 2 Cross-linkages between the eight main challenge categories

Legend: Categories in red circles include those which emerge from the socio-political system, and which have considerable spillover effect on other challenge categories. Categories in blue circles include those which are rooted more in local level ecological, socio-cultural, economic characteristics, and which are closely linked to on-the-ground conservation. The category in purple circle indicates the cross-linkage between locally rooted and more system-wide challenges. All these categories are embedded into the widest ‘current political and economic structures’ category.





The ‘availability of knowledge’ category is distinguished with green colour as it appeared as a central category, and because this is the most relevant one to be directly addressed by the Science Service. Black arrows show when one challenge category aggravates another challenge, while green arrows indicate the positive impacts which could be achieved if challenges related to the availability of knowledge are resolved. The width of the arrows highlight the strength of the relationship. Normal lines indicate direct relationships, while dotted lines indicate indirect relationship between two categories.

The cross-linkages between the different challenge categories also outline an action space for the Science Service. As it will primarily address knowledge-related issues (i.e. knowledge and data availability, information flow between science, policy and society, and capacities to act upon the available knowledge), the Science Service can have direct influence on challenges which are associated with the ‘Availability of knowledge’ category. Based on our analysis, we assume that an efficient and well-functioning Science Service can have a direct positive influence on implementation barriers in conservation management and spatial planning, and can also help resolve some of the engagement challenges (i.e. through improved science-society relationships and awareness raising). Beside these more direct influences, we can assume that the Science Service might have an indirect positive impact on vertical policy implementation by supporting institutional capacity building at different levels of policy making. However, there are broader challenges associated with funding, horizontal policy coherence, and the current political and economic structures which are beyond the scope of the Science Service. In other words, we cannot expect from the Science Service to address the most deeply rooted, systemic causes of the observed implementation failures. On the contrary, there is a risk that such challenges might limit the long-term impact and effective functioning of the Science Service itself.

The targeted literature review, the interviews and the expert consultation also provided evidence on which challenges aggravate the implementation of which BDS 2030 targets. While the information provided by this study on the linkages between challenge categories and targets is not equally detailed for each target of the Biodiversity Strategy (because of the shortage of time for carrying out the targeted literature review, and because of the lack of direct expertise for some topics among the collaborators of our task), we can map the most critical target-challenge combinations by synthesising the different evidence sources. Table 4 sums up the result of this synthesising effort. Dark blue cells indicate target-challenge combinations which were extracted during the literature review (l), and also mentioned in the interviews with EU-level experts (ie) and national implementers (in). Medium blue cells indicate combinations which were proven by two different evidence sources, and light blue cells indicate combinations found in one evidence source. Please note, that the coloured table cannot be used to identify the most critical challenges and action points in detail (for such in-depth information we recommend the reader to consult the full excel database²). Rather it is an indication of which challenges are observed most often by different actors (scientists, EU-level policy experts and decision-makers, and national level policy implementers), therefore it can signify the representativeness and the consensual nature of the target-challenge combinations.

² Access the full excel database via Zenodo: https://zenodo.org/record/7685109#.Y_41Oh_MK5c





Table 4 Combinations of BDS 2030 targets and challenge categories based on three sources of evidence (l = literature review, ie = interview with EU policy experts and decision-makers, in = interview with national level policy implementers)

	Availability of knowledge	Funding	Horizontal policy coherence	Management effectiveness	Systematic spatial planning	Vertical policy implementation	Engagement	Current political and economic structures	Comments
T1 Legally protect a minimum of 30% of the EU's land area and 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.	l, ie	l, in	l, ie	l, ie	l, ie	l, in	l		Targeted lit review and expert consultation.
T2. Strictly protect at least a third of the EU's protected areas, including all remaining EU primary and old-growth forests.	l	l	l, ie	l, ie	l, ie	l, in	l		Targeted lit review and expert consultation.
T3. Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately	l, ie, in	l, ie, in	l, ie	l, ie, in	l, ie	l, ie, in	l, in		Targeted lit review and expert consultation.
T4. Strengthening the EU legal framework for nature restoration	l	l, ie	in	in	l	in			Targeted lit review and expert consultation
T5. The decline in pollinators is reversed.	l, ie	l, ie, in	l, ie, in	l, in	l, in	l, in	l, ie, in	in	Targeted lit review and expert consultation. Targets often not separated by interviewees, therefore the assessment was done at the level of the objective.
T6. The risk and use of chemical pesticides is reduced by 50% and the use of more hazardous pesticides is reduced by 50%.									
T7. At least 10% of agricultural area is under high-diversity landscape features.									
T8. At least 25% of agricultural land is under organic farming management, and the uptake of agro-ecological practices is significantly increased.									
T9. Increasing the quantity of forests and improving their health and resilience: Three billion new trees are planted in the EU, in full respect of ecological principles.	l, in	l	l, ie, in	l, in	l, ie	l	l	in	Targeted lit review and expert consultation
T10. Addressing land take and restoring soil ecosystems: significant progress has been made in the remediation of contaminated soil sites.	l, ie		l, ie		in	l	l		Targeted lit review and expert consultation





T11. Restoring freshwater ecosystems: At least 25,000 km of free-flowing rivers are restored.	l, ie	l, ie, in	l, ie, in	l	l	l	l, in	in	Targeted lit review and expert consultation
T12. Addressing invasive alien species: A 50% reduction in the number of Red List species threatened by invasive alien species.	l	l			l	l	l		Targeted lit review but no expert consultation
T13. Reducing pollution. The losses of nutrients from fertilisers are reduced by 50%, resulting in the reduction of the use of fertilisers by at least 20%.	l, in		l			l, in		l	Targeted lit review but no expert consultation
T14. Greening urban and peri-urban areas: Cities with at least 20,000 inhabitants have an ambitious Urban Greening Plan. No chemical pesticides are used in sensitive areas such as EU urban green areas.	l	l, in	l		l	l	l	l	Targeted lit review and expert consultation
T15. The negative impacts on sensitive species and habitats, including on the seabed through fishing and extraction activities, are substantially reduced to achieve good environmental status.	l, ie	l		l	l, in		l		Expert consultation but no targeted lit review. Assessment done at the objective level.
T16. The by-catch of species is eliminated or reduced to a level that allows species recovery and conservation.									
<i>Win-win solutions for energy generation: More sustainably sourced renewable energy will be essential to fight climate change and biodiversity loss.</i>		ie	l, ie, in		ie				No targeted lit review or expert consultation





6. Selection criteria for further demonstration cases

The analysis of challenges is a crucial first step for the BioAgora project to aid the selection of future demonstration cases that have the potential to ratchet up the BDS 2030 by finding solutions to some of the major barriers against effective implementation. Therefore, in the closing section of this deliverable, we propose a list of selection criteria (Table 5) that can be used by the BioAgora project for identifying the most relevant demonstration cases. The selection criteria include the main challenge categories and specific subcategories within those based on the literature review and the expert interviews, and the selection process should be built on context-specific knowledge and expertise related to these (potential) challenges in each of the proposed demonstration cases. We suggest a 6-step procedure, the first four steps are taken by the proponents of demonstration cases, and the last two steps are taken by the BioAgora partners evaluating the submitted demonstration case proposal:

- Collect a priori knowledge on what might be the major conundrums in the proposed demonstration case - suggested action for DC proponents.
- Based on a priori knowledge, select all relevant challenge subcategories from the given list (column B-C) - suggested action for DC proponents.
- Select minimum 2 and maximum 5 challenge sub-categories which can (and would) be addressed by the demonstration case (column D) - suggested action for DC proponents.
- Briefly explain the approach the demonstration case would like to employ to tackle the specific challenge sub-categories identified in the previous column (column E) – suggested action for DC proponents.
- Assess the relevance of challenge sub-categories selected in column D in relation to the general assessment of implementation challenges (c.f. main findings of D1.1) from 1 to 5, where 5 indicates the highest relevance (column F) – suggested action for BioAgora partners.
- Assess the feasibility of approaches proposed in column E to tackle the selected challenges from 1 to 5, where 5 indicates the highest feasibility (column G) – suggested action for BioAgora partners.

Table 5 Selection criteria for demonstration cases

A	B	C	D	E	F	G
Key challenges	Specific challenges (sub-categories)	Mark with X all specific challenges relevant in the DC	Mark with X those which can be tackled by the DC	Indicate the approach(es) offered by the DC to tackle the specific challenges	Assessment of relevance (1-5)	Assessment of feasibility (1-5)
Availability of knowledge	Gaps and inequalities in data availability					
	Flow of information between science and policy making					
	Flow of information between science and society (awareness raising)					
	Lack of capacities in on-the-ground implementation to use available knowledge					





Funding	Funding is insufficient and fragmented across different sectors					
	Perverse subsidies undermine the effectiveness of biodiversity funding					
	Funding is too short-term					
	Private funding often comes with high environmental costs					
Horizontal policy coherence	incompatibility of the objectives of biodiversity policy and other sectors (e.g. agriculture, energy etc.)					
	insufficient integration of biodiversity-related objectives into other sectoral policies					
	incoherence between biodiversity-focused and other sectoral policy instruments and implementation practices (i.e. presence of harmful incentives)					
Management effectiveness	lack of context-specific management objectives and measures that are tailored to the given ecological, social and economic context					
	lack of transparent monitoring which considers both ecological and social impacts					
	fragmented institutional system, unclear responsibilities and bureaucratic burdens					
	increased pressures due to exacerbated economic development and climate change					
Systematic spatial planning	lack of (multi-realm and long term) ecosystem approaches in planning					
	lack of landscape connectivity and fragmentation of protected areas					
	taxonomic bias in conservation planning					





	lack of transparent prioritisation between competing land uses across different spatial scales					
Vertical policy implementation	competing interests at different decision-making scales (EU-national-local)					
	heterogenous political culture, differing legal structures, and counter-interests across member states					
	weak law enforcement (lack of legally binding regulation)					
	hierarchical and bureaucratic institutional structures of implementation					
Engagement	participatory processes are nominal, manipulative, or skewed towards the elites (i.e. powerful actors or economically strong interest groups)					
	conflicts and lack of trust between different actors					
	lack of capacities and skills to actively participate in decision making processes					
Current political and economic structures	property rights system - clashes between private property (i.e. private land ownership) and the provisioning of public goods					
	short-term thinking in politics					
	internal processes within the institutional system that undermine law enforcement					
	prioritising economic growth over the environment					





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8. Appendix

8.1. Interview guide for EU-level policy implementers

Cover story

I would like to invite you to an interview about the implementation challenges of the EU Biodiversity Strategy 2030. I am participating in a recently started Horizon Europe project, BioAgora, which aims to set up a European Science Service to help ratcheting up the EU Biodiversity Strategy by providing timely and relevant scientific knowledge for decision-makers. As a starting point of this project, we assess the main challenges which can hinder the implementation of the biodiversity strategy. Beside analysing official documents and the scientific literature, we also would like to talk to policy decision-makers and experts to gain a more in-depth understanding of implementation challenges. Considering your experiences in this field, we believe your views would be highly beneficial for our understanding. The interview would last for approximately 1 hour, and the interview notes will be anonymized before further analysis (your name and position will not appear in any written material). We attached a short explanation of the research and a GDPR consent form which needs to be signed if you agree to participate in the interview. We also attached a preliminary list of implementation challenges as a background document, which we would like to discuss with you during the interview.

1st part: Introduction

- Could you please briefly introduce yourself and your work?
- If not mentioned in the first question: How does your work relate to the planning / implementation of the EU biodiversity strategy (or biodiversity policy more generally)?

2nd part: In the main part of the interview, we would like to ask you to go through the analytical categories of implementation challenges we identified through the literature and share with us your reflection.

- Share on the screen the list of challenges and go through the challenges one-by-one
- Have you met with this challenge in your work? If yes, could you give an example?
- How relevant / serious is this challenge in terms of impeding the implementation of the BDS 2030? Please rank it on a scale of 1-6 where 1 means not relevant at all, and 6 means very relevant?
- Could you please briefly explain your choice of ranking?
- Repeat for all the challenges
- Would you like to add any other challenges of implementing the BDS 2030 which we did not mention? If so, please explain briefly.

3rd part: General questions about implementation challenges

- Considering the evolution of the EU biodiversity policy in recent years, do you think that the BDS 2030 can address some of the implementation challenges which emerged previously?
- Do you think that a well-functioning EU-level Science Service can address some of the above discussed challenges? If yes:
 - Which challenges are the most relevant to tackle by the Science Service?





- What would be the most important recommendations of yours to the Science Service in order to effectively tackle these challenges?

4th part: Closing

- We are approaching the end of our discussion. Is there anything else you would like to add, e.g. something you think is important but we haven't discussed it yet?
- I would like to thank you for your time. If you have any further questions, please, do not hesitate to reach out to me.

8.1.1. List of challenge categories (included in the EU-level interviews)

Availability of knowledge: The category of “availability of knowledge” refers to challenges in policy planning and implementation due to the lack of sufficient data or robust scientific knowledge, or due to ineffective communication and lack of interaction between science and policy making.

Funding: The category of „Funding” refers to challenges related to the insufficiency and inadequacy of financial instruments allocated to biodiversity conservation goals. This category also includes problems associated with conservation measures which are not cost-effective, taxonomically biased distribution of funding; funding not well aligned with future needs; etc.

Horizontal policy coherence (e.g. between biodiversity policy and the CAP, forestry, urbanisation, energy and climate, or trade policies): The category of „Horizontal policy coherence” refers to the incompatibility or lack of coherence between the policy objectives, instruments, and actions of the EU Biodiversity Strategy (nature conservation policy in general) and other sectoral (EU) policies (such as e.g. the CAP, forestry, urbanisation, energy and climate, or trade policies). Examples: contradictory motivations/competing interests, financial asymmetries, specific pressures on biodiversity.

Management effectiveness: Management challenges affecting the implementation of area-based conservation measures (e.g. Natura 2000 sites), like carrying out comprehensive management actions which fit to the local ecological, cultural, and socio-economic context, and which is supported by an effective institutional setup.

Systematic spatial planning: Challenges related to the lack of systematic conservation planning with transparent spatial priorities and clear conservation targets that avoid taxonomic bias and are based on solid ecological, social and economic criteria. Examples: low representation of threatened species; prioritisation of economic interests; lack of planning tools; etc.

Vertical policy implementation: Challenges related to the incorporation of EU strategic targets and directives into the national and regional laws and regulations of EU Member States. This includes the difficulties of coordinating both between MS and across decision-making levels within one MS (i.e. from national to local and vice versa), manifested in issues of political will; inadequate or asymmetric implementation; weak accountability; law enforcement etc.

Engagement: This challenge category includes difficulties and contradictions related to stakeholder participation and public engagement. While biodiversity policies usually strive for stakeholder participation, participatory processes are often skewed towards powerful actors and interest groups and do not give equal opportunities for all relevant actors (including e.g. marginalised social groups) due to conflicts, mistrust and unequal power relations between them. Furthermore, obstacles to the shift from a centralised decision-making to more inclusive arrangements, lack of capacities, and lack of community influence over policy decisions makes it ineffective to engage citizens and their communities in the design and implementation of conservation policies.





Current political and economic structures: Challenges related to the dominant economic and political system, like limitations to public interest deriving from the market society, or short-sighted political vision for biodiversity due to shortcomings of representative democracy. Examples: multiple power asymmetries, private property limiting monitoring, unavailability of non-marketable expertise, disregarding long-term public interest by politicians elected for short term, lack of an informed public holding politicians accountable. This challenge category emerged during the interviews, therefore it builds entirely on expert knowledge (no targeted literature review was carried out).

8.2. Interview guide for national- and local-level policy implementers

Cover story

My name is XY (name and organisation of the interviewer) and I would like to ask your help to share with me your insights about the challenges of implementing biodiversity policies. I am participating in a recently started Horizon Europe project, BioAgora, which aims to set up a European Science Service to help ratcheting up the EU Biodiversity Strategy by providing timely and relevant scientific knowledge for decision-makers. As a starting point of this project, we assess the main challenges which can hinder the implementation of the biodiversity strategy. Beside analysing official documents and the scientific literature, we also would like to talk to experts who work on the implementation of biodiversity policies to gain a more in-depth understanding of implementation challenges. Considering your experiences in this field, we believe your views would be highly beneficial for our understanding. The interview would last for approximately 1 hour, and the interview notes will be anonymized before further analysis (your name and position will not appear in any written material). Before starting the interview, please read and sign the GDPR consent form.

1st part: Introduction

- How does your work relate to the planning / implementation of the EU biodiversity strategy (or biodiversity policy more generally)?
- How long have you been dealing with this topic (professionally)?
- If the answer is more than 2 years: Since you have been working in this area, have you seen a shift in the focus of biodiversity policies? Could you please explain it briefly?

2nd part: Personal experiences around the challenges of implementing the EU biodiversity strategy (or biodiversity policy more generally)

- From your own point of view / based on your experience, what challenges could you identify in the implementation of the biodiversity strategy (or biodiversity policies) at the national/local level?
- Among the challenges listed above, which one is the most critical for the future implementation of the biodiversity strategy? Why?
- Could you give some concrete examples of how the above mentioned challenge(s) manifest?
- Other supporting questions if the interviewee is not very talkative:
- In your opinion, how specific is the challenge to your own country? Is it a very context-specific issue, or is it more general across the EU?
- What makes the challenge difficult to overcome?
- Who are the key actors in handling the challenge?
- Do you see any potential ways of how to resolve the challenge?

3rd part: Closing

- When it comes to the big picture, what do you think it would take to avoid the biodiversity crisis in Europe?





- We are approaching the end of our discussion. Is there anything else you would like to add, e.g. something you think is important but we haven't discussed it yet?
- I would like to thank you for your time. If you have any further questions, please, do not hesitate to reach out to me.

