BioValue

Guidance on Economic and Financial Instruments in Spatial Planning

D3.4: Proposals E&FIs
WP 3, T 3.4

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1. Introduction

The BioValue project aims to safeguard and enhance biodiversity from a transformative change perspective by better articulating spatial planning and management instruments, environmental assessment instruments, and economic and financial instruments (E&FIs) in spatial planning processes. The project explores how the three instrumental perspectives interact in practice to enable transformative change through three Arenas for Transformation respectively in Portugal (the Municipality of Mafra), Italy (the Municipality of Trento), and Germany (the Federal State of Mecklenburg-Vorpommern). In particular, Work Package 3 (WP3) focuses on understanding the transformative potential of E&FIs impacting biodiversity, individually and in articulation with spatial planning and environmental assessment instruments, across different levels of implementation.

This report is the final deliverable in a series of reports documenting the research conducted under WP3. In previous reports, we analysed biodiversity policy at the EU level and explored E&FIs that promote biodiversity in a broad sense (for more information, see: BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity). We also explored current practices of E&FIs in spatial planning and environmental assessments, evaluating their potential impacts on biodiversity within the context of transformative change ambitions (for more information, see: BioValue Report D3.2: Impacts of Economic and Financial Instruments on Biodiversity in Spatial Planning). In the third report, we explored the roles of different actors in spatial planning in alignment with the EU renewed Sustainable Finance Strategy and derived examples of recommendations for using the strategy to foster transformative change in spatial planning contexts (for more information, see: BioValue Report D3.3: Implications of the EU Renewed Sustainable Finance Strategy in the Context of Spatial Planning).

In this final report for WP3 on E&FIs, we aim to provide guidance on how to improve the design and implementation of E&FIs in order to minimise possible negative impacts associated with individual instruments and to enhance the transformative potential of using E&FIs in spatial planning through interactions with other instruments. To achieve this, we first assess the transformative potential of E&FIs for enhancing biodiversity based on the guidance document developed under WP4. Building on the assessment, we analyse the pathway for E&FIs in spatial planning to achieve impacts at different levels and scales and address the identified gaps by developing accessible guidelines for planning professionals on the design and implementation of E&FIs. The guidelines are intended to assist them in assessing opportunities for using E&FIs to enhance biodiversity and ecosystem service (ES) provision, and to outline how to select appropriate instruments in the context of transformative change.

The report is structured as follows: Section 2 analyses conceptually the transformative potential of the broad group of E&FIs promoting biodiversity and discusses the strengths, weaknesses, and gaps of E&FIs for biodiversity enhancement in spatial planning with preliminary suggestions for improvements; Section 3 presents an assessment framework for biodiversity and ecosystem service opportunities in spatial planning, adapted from the practical guide on Ecosystem Service Opportunities developed by Rode et al. (2016); Section 4 explores the potential application of the proposed framework with the three BioValue Arenas for Transformation; finally, Section 5 summarises our key findings with a brief outlook for the BioValue project.

2. Transformative Potential of Economic and Financial Instruments for Enhancing Biodiversity

In this section, we evaluate the transformative potential of E&FIs in general in spatial planning. Our analysis is guided by the transformative potential assessment guidance document developed by the BioValue team under Task 4.3, WP4. The guidance document is based on the BioValue transformative change framework, which describes three transformative change ambitions within transformative vision and building blocks of transformative knowledge, transformative dynamics, emancipation and agency for transformation, and transformative governance (for more information, see: BioValue Report D4.1: Analytical Framework Detailed and Specified for Application within BioValue). The guidance document aims to assess how specific measures can enhance biodiversity and address the root causes or indirect drivers of global biodiversity loss through the transformative change ambitions while contributing to enabling and supporting a broader transformation towards sustainability by enhancing the transformative potential of the spatial planning processes.

Although the intention was initially to evaluate individual measures or instruments, our previous analysis under WP3 revealed substantial flexibilities within the design of E&FIs: they can take different forms including taxes, subsidies, tradeable permits, etc.; the design process can vary widely incorporating different strategies such as top-down or bottom-up approaches and levels of stakeholder engagement, ranging from consultation to co-design and co-development; E&FIs may employ one or several environmental economic principles, such as steward earns, beneficiary pays, and polluter pays; they can draw on diverse funding sources, e.g., public, private, or through public-private partnership, and adopt different implementation strategies, e.g., whether as projects, programmes, or regulations, with or without monitoring mechanisms. In addition to these design elements, the impact of E&FIs is heavily influenced by the specific context and conditions of their implementation. Consequently, evaluating the transformative potential of particular E&FIs without concrete application cases poses significant challenges. Furthermore, selecting only a subset of E&FIs for analysis could also risk overlooking instruments that have not traditionally been considered in spatial planning, where there might be opportunities for radical changes.

Therefore, in this section, we assess the transformative potential of E&FIs that promote biodiversity as a broad group of instruments at a conceptual level. This ex-ante analysis of E&FIs that promote biodiversity in general serves as a reflective exploration of which elements in E&FI design and implementation could contribute to transformative change for biodiversity and which aspects require further attention in spatial planning processes. Following the guidance document from Task 4.3, our assessment focuses on E&FIs in relation to the transformative change ambitions and the criteria established for the building blocks of transformative potential: transformative knowledge, transformative dynamics, and emancipation and agency for transformation. The evaluation draws primarily from previous analyses on E&FIs conducted in WP3 of the BioValue project, as detailed in previous WP3 reports (for more information, see: BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity, BioValue Report D3.2: Impacts of Economic and Financial Instruments on Biodiversity in Spatial Planning, and BioValue Report D3.3: Implications of the EU Renewed Sustainable Finance Strategy in the Context of Spatial Planning).

In each subsection, we include instructions and guiding questions from the guidance document in *italic* to provide essential context for the assessment. Following each assessment block, we present an overview of the evaluation for the specific criteria using a continuum scale as shown below.

It should be noted that the placement on the continuum is not a quantitative measure; rather, it reflects the authors' reflection and perception of the expected impact of E&FIs that promote biodiversity in spatial planning based on the assessment guidance. A green designation indicates a clearly positive impact, yellow denotes no impact, orange stands for a potentially negative impact, and red signifies a clearly negative impact.

Description of the Instrument: Main Characteristics, Important Aspects and Elements

How is the instrument supposed to contribute to the overall objectives of the spatial plan/process?

E&FIs are mechanisms designed to motivate behavioural changes of stakeholders towards desired policy objectives (IPBES, 2018). They can be used to address market and policy failures by capturing the value of nature's contributions through full-cost pricing for biodiversity and ecosystem-related activities. This includes accounting for environmental and social costs while highlighting environmental benefits, such as enhanced ES, in order to encourage relevant actors to adopt conservation or enhancement practices and mobilise funding for biodiversity at different scales. E&FIs can take many forms, such as taxes, subsidies, tradable permits, and green credits. For example, authorities may impose ecological taxes on activities that potentially harm biodiversity and ES, such as taxes on pesticides and fertilisers or natural resource use. Another common example is the payments for ecosystem services (PES), which are voluntary transactions between ES beneficiaries and providers aimed at generating or enhancing ES provision based on agreed measures on ecosystem management (for more information, see: BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity).

Within spatial planning contexts, E&FIs are primarily employed to manage the trade-offs between environmental, economic, and social objectives. They often serve to internalise the benefits and costs associated with development in the form of various land value capture tools, e.g. recurring land value tax or building value tax, betterment levies, land value increment tax, sale of development rights, recurring lease payments, etc. (Halleux et al., 2022; Kamiya & Zhang, 2017). With land value capture tools, local governments can levy fees and taxes on developers and landowners to generate revenue for funding civic and municipal services. Communities can recuperate and reinvest increases in land value resulting from public investments and other government initiatives through these mechanisms. Land value capture tools are often applied in urban areas, particularly in the context of development (Halleux et al., 2022). While land value capture tools aim to internalise development-related benefits and costs – including environmental and social aspects – they do not explicitly target biodiversity conservation and enhancement. To increase the potential contribution of land value capture tools to biodiversity, readjustments are necessary, e.g., to integrate specific biodiversity-related elements into their design. As this assessment focuses on the transformative potential of E&FIs for biodiversity enhancement in spatial planning, the analysis in this section, focuses on the group of E&FIs designed to promote

biodiversity as identified by Rode et al. (2016) and further elaborated in BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity. In the subsequent discussions, we will refer to these instruments as "the instrument" or "E&FIs that promotes biodiversity".

What is the intention and expected outcome? What is the underlying (often implicit) theory of change within the spatial planning process?

The primary intention of E&FIs is to encourage behavioural changes among stakeholders towards desired policy objectives (IPBES, 2018). When applied in biodiversity-related contexts, these instruments aim to motivate stakeholders to undertake actions that benefit biodiversity. The effectiveness of this motivation largely depends on the design of the instrument and its specific objectives. For instance, a PES scheme might target local farmers, incentivising them to adopt sustainable farming practices that enhance water quality in a designated area. Overall, improvements in habitat and ecosystem conditions are anticipated, e.g., through the adoption of environmentally-friendly practices that support ES provision and generate environmental benefits.

E&FIs can also play a crucial role in addressing or increasing social issues such as poverty, inequality, and exclusion when applying economic principles such as "steward earns", "beneficiary pays", and "polluter pays". These principles increase the incentives towards biodiversity improving behaviour: for stewards to increase supply and for users and polluters to reduce demand or damage. Depending on relative income and wealth of these groups applying them can reduce or increase inequality. In situations where stewards are marginalised groups compensated for their contributions to ecosystem health and biodiversity, these instruments can help increase the average income of certain vulnerable households in designated areas. In situations where marginalised groups are beneficiaries, differentiated user fees (with low income households paying less) can be used to avoid increasing inequality while still providing the desired incentive effect. In the design of E&FIs care needs to be taken to adequately deal with both the incentive and the distributive effects.

In what phase/ for which purpose is it typically used within the spatial planning process? If it is not currently used within the spatial planning process, please highlight phases in which it could potentially be used.

E&FIs that promotes biodiversity can potentially be applied during the "implementation of plans/policies" phase within spatial planning processes. They can be employed to support planning visions and objectives related to biodiversity and ecosystems and to facilitate financial flows for conservation activities, particularly from private sectors.

Who typically implements it?

It can typically be implemented by private utilities (as beneficiaries), governments, NGOs, etc. In the context of spatial planning, it may mainly need to be initiated by government bodies or civil society organisations to ensure effective integration into planning processes.

Please discuss or ideally provide one example in which the instrument has positively contributed to enhancing biodiversity and one in which this aim was not achieved.

The instrument can contribute positively to enhancing biodiversity when it has clearly-defined biodiversity objectives, e.g., with conservation easements, or its targeted measures have mutual

benefits for biodiversity, e.g., with an improved management plan for a natural park through a PES scheme. However, as the design of the instrument, e.g., in the case of PES schemes, could focus on ES rather than biodiversity per se, if the agreed ecosystem management rules or proposed measures in the instrument improve the provision of certain ES but degrade biodiversity, the instrument will fail to contribute positively to biodiversity enhancement.

Assessment with Regard to the Three Transformative Change Ambitions

The three ambitions identified in the BioValue transformative change framework help identify how spatial planning affects direct and indirect drivers of biodiversity loss addresses cross-cutting challenges and guides transformative change. They also contribute to guiding the direction in which spatial planning can contribute to change, keeping it on track towards sustainability. Therefore, the more a measure contributes to one or more of the three ambitions, the higher its transformative potential. These three ambitions should guide the formulation of a vision in a given place. While transformation literature stipulates that a series of small steps can, in sum, lead to the change envisaged when these steps contribute to a clear vision.

Ambition Nº 1:	***Spatial planning safeguards, restores, allows recovery and enhances biodiversity.***
Description:	*If the instrument can contribute to safeguarding, restoring or enhancement of biodiversity within the context of spatial planning and also induce more balanced, sustainable territorial relations between urban, peri-urban and rural communities, it can have transformative potential. Examples of approaches to contribute to this ambition are the reduction (and stop) of land take and land consumption or urban food system production.* *According to the EU taxonomy, the contribution could occur in different ways:* *1) conserve the state of semi-natural or natural ecosystems, i.e., directly maintaining or protecting the good ecological condition of specific semi-natural or natural ecosystems;* *2) improve the state of semi-natural or natural ecosystems compared to the current condition;* *3) maintain sustainable use of managed ecosystems;* *4) reduce the pressure on managed ecosystems, contributing to reaching and maintaining a sustainable use level;* *5) mitigate previous impacts, including interventions that can reduce the operational impacts on biodiversity of existing infrastructure or address the damage or impact caused by a previous activity or measure to reduce the pressure and achieve measurable and demonstrable conservation outcomes.*

	The contribution of a measure can be indirect.
Questions for assessment:	*How and how much does the instrument contribute to safeguarding, restoring, allowing recovery, promoting and enhancing biodiversity? Please specify.* E&FIs that promote biodiversity typically aim to internalise the social and environmental benefits and costs associated with biodiversity and ecosystem-related activities. In general, these instruments support stewards' activities that conserve or enhance ecosystems, discourage or reduce harmful practices from polluters, and secure financial or other forms of support from beneficiaries. Some E&FIs, such as conservation auctions and tenders, and compensation measures, are specifically designed with direct biodiversity and ecosystem conservation objectives. Others, such as PES and carbon payments, focus on enhancing specific ES, which often but not always yield mutual benefits for biodiversity. Overall, all E&FIs that promote biodiversity incorporate environmental objectives to varying degrees. When effectively implemented as intended, these instruments can significantly contribute to safeguarding, restoring, allowing recovery, promoting, and enhancing biodiversity. *Check if the instrument is not unintendedly shifting costs to other sectors, landscapes, or actors unless that contributes to reducing social inequality. Please include situations in which a not well-planned design/implementation could lead to shifting costs to other sectors (use examples if needed).* The key actors involved in E&FIs include stewards, who conserve biodiversity and manage ecosystems; beneficiaries, who use or depend on ES and have a direct or indirect interest in the ES provision; and polluters, who negatively impact ecosystems and ES provision (Rode et al., 2016). Well-designed E&FIs should adhere to at least one or multiple of following principles: • Steward earns: Stewards are rewarded based on the benefits they generate and the costs they incur. • Beneficiary pays: Beneficiaries contribute to conservation costs in line with the benefits they receive. • Polluter pays: Polluters are penalised or required to for the damages they cause. In an ideal scenario, E&FIs that promote biodiversity help to redistribute both environmental and social costs and benefits among stakeholders involved in biodiversity conservation and all other activities that may have positive or negative impacts on biodiversity and ecosystems. However, quantifying the monetary value of conservation efforts or destructive activities can be challenging due to their multidimensional nature and time-reluctant feature. While E&FIs aim to address externalities, they do not always achieve this perfectly, leading to potential risks of shifting costs to other sectors or actors.

	For example, when multiple groups of stewards, beneficiaries, and polluters exist under a universal pricing system – whether through payments from beneficiaries or compensation to stewards – there is a risk that costs may be disproportionately borne by certain groups. For instance, in a PES scheme where water utilities act as intermediaries, direct beneficiaries (i.e., the general public) may contribute financially through water tariffs without having direct control over the amount paid or the decision to participate in the programme. Similarly, if an intermediary party is involved in distributing funds among various steward groups without considering equitable distribution, socio-economic inequalities may inadvertently increase. Careful design of E&FIs is essential to avoid increasing inequalities.
	
Results:	*Where would you position the instrument on the continuum and why?* E&FIs that promote biodiversity are typically designed to motivate behavioural changes among various actors towards specific environmental targets by ensuring financial support for these activities. If these instruments are carefully designed and successfully implemented, they could significantly contribute to achieving transformative change Ambition 1. However, since some E&FIs do not directly address biodiversity but rather focus on associated ES for which beneficiaries can be identified, their contribution to biodiversity may be limited or even detrimental, e.g. when invasive species are used. Therefore, while these instruments hold substantial potential for positive impact, their effectiveness in directly enhancing biodiversity must be critically evaluated within the specific context.
Ambition Nº 2:	***Spatial planning significantly contributes to balanced and responsible consumption and production without external social and environmental costs.***
Description:	*If an instrument significantly contributes to the reduction of consumption and/or lowering of waste, it can have transformative potential. While, first and foremost, a wasteful use of products is meant, it can also signify a wasteful use of natural resources, such as a degrading use of arable land. The better suited an instrument is to correct for the non-accounted and non-attributed social and environmental costs, the higher its transformative potential. Essentially, this means prohibiting practices with highly detrimental environmental and social impacts and holding producers accountable in case of breach. Where this is not possible in the short run, remaining impacts are mitigated or compensated for, the costs of which should be included in the product or service provided (true or full cost accounting).* *The contribution of a measure can be indirect. This includes the impact of spatial planning on other sectors.*

Questions for assessment:	*How does the instrument contribute to avoiding/reducing social and environmental impacts and costs?* E&FIs that promote biodiversity can play a significant role in avoiding or reducing social and environmental impacts and costs by implementing the principles of "beneficiary pays" and "polluter pays", e.g., in the form of contributions from beneficiaries to finance ES provision such as PES (user side), user fees and surcharges, corporate sponsorship, etc., or in the form of negative incentives and compensations for harming biodiversity and ecosystem such as legal liabilities, fines, Pigouvian taxes, offsetting schemes, etc.. *How does the instrument contribute to uncovering and (if possible) internalising the social and ecological costs of (economic) activities?* E&FIs can be used to restore full-cost pricing for activities related to biodiversity and ecosystems by incorporating and revealing environmental and social costs and benefits through various ways. For instance, in PES schemes, the non-market benefits of ES are translated into financial transfers or technical support from beneficiaries to stewards. This process helps to internalise the social and ecological costs associated with economic activities, making stakeholders more aware of the value of biodiversity and ES. *Check if the instrument is not unintendedly increasing resource intensity in some part of the production process.* E&FIs can unintentionally increase resource intensity if the design of ecosystem management rules focuses solely on the provision of specific desired ES while neglecting other aspects of resource use. It is crucial for E&FIs to consider the broader impacts of ecosystem and resource management to avoid exacerbating resource intensity in certain processes. *Does the instrument contribute to reducing "consumption" i.e., less need for energy/transport, dietary shift to less resource-intense food? If so, how?* Some E&FIs can contribute to reducing consumption depending on their specific design. In particular, E&FIs in the form of positive incentives and rewards to motivate ES provision, such as PES (provider side), green subsidies, conservation easements, etc., have high potential to include measures that encourage consumption reduction and responsible production, e.g., a PES scheme promoting sustainable farming practices. E&FIs involving participation of stakeholders from other sectors beside the conservation sector may also have potential to promote radical changes in the consumption of other sectors, e.g., the PES scheme promoting sustainable farming practices may also lead to dietary shifts towards local-produced and less energy-intensive food options.

Results:	*Where would you position the instrument on the continuum and why?* The primary focus of the instrument is to promote behavioural changes among various stakeholders towards practices that have positive or reduced negative environmental impacts. As such, these instruments directly contribute to Ambition 2. By encouraging responsible practices and fostering a greater awareness of social and environmental costs and benefits, E&FIs can play a vital role in contributing to sustainability goals within spatial planning.
Ambition N°3:	***Spatial planning significantly contributes to reducing socioeconomic inequalities.***
Description:	*An instrument that contributes significantly to levelling the playing field and to fair access and distribution of resources has transformative potential.* *The contribution of a measure can be indirect.*
Questions for assessment:	*How does/could the instrument contribute directly or indirectly to enhancing access to benefits coming from biodiversity and ecosystem services in order to increase human well-being for all?* The instrument can enhance access to the benefits coming from biodiversity and ES for all when the identified beneficiaries include the general public. By ensuring that these instruments are designed with public access in mind, E&FIs can promote equitable distribution of the benefits provided by healthy ecosystems and biodiversity, thereby increasing human well-being for all. *How does/could the instrument directly or indirectly contribute to addressing the unfair distribution of benefits/opportunities/healthy living conditions?* E&FIs that promote biodiversity can play a crucial role in addressing the unfair distribution of benefits and opportunities by applying fundamental environmental economic principles "steward earns", "beneficiary pays", and "polluter pays". Adhering to these principles can help create a more equitable system that recognises and compensates the contributions of all stakeholders involved. *Check if the instrument is not unintendedly increasing socioeconomic inequality in terms of access or benefits.* There is a risk that E&FIs could inadvertently increase socio-economic inequality regarding access to benefits. This may occur if multiple stewards, beneficiaries, or polluters are identified, but only a select few participate in the

	programme. For instance, in PES schemes, if access to improved ES is not restricted to buyers, free-rider problems may arise. Conversely, if access is restricted, such as in cases where only specific groups of beneficiaries can utilise improved ES of water provision, this can lead to an unequal distribution of benefits that were previously commonly-accessible to all. It can exacerbate existing inequalities and limit the potential for widespread benefit from enhanced ES.
	
Results:	*Where would you position the instrument on the continuum and why?* E&FIs that promote biodiversity aim to address environmental externalities by converting the environmental and social (i.e., non-market) benefits of biodiversity and ecosystem-related activities into financial transfers or technical support from beneficiaries and/or polluters to stewards. In doing so, these instruments can contribute to a fairer distribution of benefits and costs among stewards, beneficiaries, and polluters within a given area. Therefore, they hold significant potential for fostering equity while enhancing access to the benefits provided by biodiversity and ES. Nonetheless this is not automatically the case and should be carefully considered and ensured in the design of the specific instrument. In addition, indirect effects may occur: e.g., improving the environmental situation in certain areas of a city can lead to gentrification and ultimately lead to further increasing inequality.

Assessment with Regard to the Building Blocks

Building Block 2: Transformative knowledge	
Description:	*Due to the very nature of transformation, continuous learning is necessary. Transformative knowledge on how to change the system means the capacity and willingness to learn about and deal with:* *1. Knowledge about desirable future states ("where we want to get")* *2. Knowledge on how the system works, understanding barriers and resistance.* *3. Knowledge about constructive and pragmatic ways to achieve the desired future and deal with the unknown and resistance.* *4. How knowledge may change with time, knowledge on what state or which activities can contribute to achieving the desired vision.*

	5. How knowledge about critical entry points and desired interventions is generated and can be used as input in other systems to improve and positively impact them. *6. Pluralising and creating synergies across diverse forms of knowledge: practical, indigenous, scientific, legal and procedural, etc.* *7. Effective ways of linking across scales (multi-scale approach - WP1)*
General questions to help identify gaps:	*How are diverse knowledge holders involved? Are missing groups identified?* *How are different forms of knowledge and values (intrinsic, instrumental, relational) considered?* *Is there an awareness of different cultures and traditions?*
Criteria:	***Instrument considers the available knowledge to understand and navigate the complexity of the system or contributes to building this knowledge.***
Questions for assessment:	*Are there structures in place that pluralise knowledge between different actors, institutions and subsystems? Please specify.* E&FIs that promote biodiversity can incorporate such structures. For instance, in PES schemes, intermediaries such as knowledge providers can play a crucial role. These intermediaries can include experts in various fields, such as resource management, valuation, land use planning, landscape architecture, regulation, and legal advisory (Macgillivray & Wragg, 2013). By providing scientific and technical support for project development and implementation, intermediate agency as knowledge provider can help ensure the expected ES outcome of a PES scheme. *Does the measure contribute to learning about the system and its ability to change? Please provide examples.* E&FIs have the potential to enhance learning about ecological systems when the instruments promote environmentally-friendly practices and establish relevant monitoring mechanisms. When both conditions are met, E&FIs contribute to the accumulation of knowledge regarding how human interventions impact ecosystems and the provision of ES. For example, by implementing sustainable land management practices while monitoring their effects on biodiversity and ecosystem condition through many E&FIs, stakeholders can gain valuable insights into effective strategies for ecological restoration and conservation.
	

Results:	*Where would you position the instrument on the continuum and why?* The design and effective implementation of E&FIs that promote biodiversity necessitate a comprehensive understanding of connections between ecosystems, ES, and biodiversity, as well as the impacts of human interventions on nature. With appropriate monitoring mechanisms in place, the analysis of the effectiveness of these instruments can further enrich knowledge about the interactions between human interventions and ecosystems as well as the ecological consequences. Therefore, E&FIs can make a positive contribution to this criterion by fostering learning and adaptation of different environmentally-friendly practices within the context of spatial planning.
Criteria:	***Instrument considers available knowledge about phase-in and phase-out sequences or contributes to building this knowledge.***
Questions for assessment:	*Does the instrument have the potential to contribute to the understanding of the root causes of biodiversity loss?* Potentially yes, as E&FIs that promote biodiversity primarily address ecosystem mismanagement issues that are caused by externalities, which often lead to an unequal distribution of costs and benefits. *Does the instrument contribute to understanding/identifying which activities degrading biodiversity need to be phased out, and which root causes need to be eliminated?* Potentially yes, by promoting practices that support biodiversity and ecosystem, the instrument encourages the reduction or elimination of harmful activities. As some of the E&FIs deal with ES provision, such as PES schemes, it also allows stakeholders to recognise and address the specific actions that negatively impact ES. *Does the instrument contribute to understanding/identifying what alternative approaches should be phased in? Is there sufficient knowledge about alternatives?* Potentially yes, as the instrument often promotes environmentally-friendly practices. However, in order to gather sufficient knowledge about viable alternatives, it is beneficial to incorporate existing information, including indigenous knowledge and local data, during the design phase for the E&FIs. Engaging various knowledge providers will enrich the understanding of alternatives and ensure that the proposed solutions are grounded in practical experience. *How does the proposed instrument contribute to phasing in and/or out, can it be better tailored to fit? Please critically think about the potential risk of knowledge bias (use examples if needed).*

	E&FIs that promote biodiversity can contribute to this knowledge acquisition by testing the ecological outcomes of environmentally-friendly practices (when proposed) with appropriate monitoring mechanism. This testing process can help determine which practices should be phased in or out. However, it is essential to remain vigilant about potential knowledge biases that may arise. Not only scientifically validated practices but also indigenous or local knowledge should be considered.
	
Results:	*Where would you position the instrument on the continuum and why?* E&FIs that promote biodiversity primarily address ecosystem mismanagement caused by externalities and aim to redistribute environmental and social costs and benefits among various stakeholders through principles such as "steward earns", "beneficiary pays", and "polluter pays". The instrument can potentially tackle root causes of biodiversity loss, particularly socio-economic inequalities. Since the instrument promotes environmentally-friendly practices over harmful ones, with appropriate monitoring mechanisms in place, E&FIs can also contribute to building knowledge on phase-in and phase-out sequences.
Criteria:	***Instrument considers available knowledge to design strategic interventions for system change or contributes to building this knowledge.***
Questions for assessment:	*Is the instrument aimed at being designed/implemented following/contributing to a systemic and strategic analysis and thinking?* Well-designed E&FIs should take into account the comprehensive impacts, both social and environmental, of their proposed measures on local communities and ecosystems. Incorporating systemic and strategic analysis during the design phase is beneficial; however, this is not always guaranteed in practice. *Have potential entry points for addressing root causes been identified? Do you see the potential of the instrument for the identification of root causes? If so, please provide examples.* Yes, E&FIs have the potential to address root causes by tackling externalities in ecosystem management. The extent to which an E&FI can contribute to this goal depends on various factors, including its design, the success of its implementation, and the alignment of outcomes with desired objectives. The principle of "steward earns" is particularly important in this context. For example, a carbon payment scheme that compensates indigenous communities for maintaining sustainable practices in high nature value areas can help offset opportunity costs for them. By providing financial support, such schemes encourage local communities to prioritise biodiversity conservation over alternative income-generating activities.

	How uncertainties and the unknown are considered and addressed (e.g. adaptive management)? Please provide examples. Uncertainties and unknowns can be managed by incorporating robust monitoring mechanisms into the implementation of E&FIs. For instance, including intermediaries, such as an administrative committee, in a PES scheme can enhance oversight and adaptability.
	
Results:	*Where would you position the measure on the continuum and why?* E&FIs that promote biodiversity are designed to address externalities in ecosystem management, thus providing opportunities to identify entry points for addressing root causes, such as socio-economic inequalities. By applying environmental economic principles such as "steward earns", "beneficiary pays", and "polluter pays", E&FIs can foster a more equitable distribution of resources and responsibilities. Depending on the specific use case - both at the design and implementation stages - E&FIs can contribute to knowledge about systems change by promoting the above principles that are often overlooked in ecosystem management. However, establishing effective monitoring mechanisms is crucial to ensure that these instruments achieve their intended outcomes and maintain their relevance over time.

Building Block 3: Transformative dynamics	
Description:	*Far-reaching system change cannot be anticipated, managed, or controlled. These processes need fertile ground, which has to be prepared, e.g., via situation-specific stimuli, approaches, strategies, and measures.* *For transformation to sustainability, two different yet complementary processes should be considered: (i) The innovation and establishment of new sustainability solutions ('phase in'), and (ii) the reduction and ultimately closure of unsustainable practices ('phase out'). Both phase-in and phase-out processes have to coincide to lead to bigger system change – yet they tend to have different stages and dynamics. Phase-in processes involve initial promoting and extensive mainstreaming efforts for successful niche experiences and pilot solutions. Once this gains traction, we can imagine a stabilising phase. In contrast, 'phase-out' processes are about challenging established rationales and confronting– or convincing – those who adhere to them. 'Phase out', by definition, has to disrupt routines and practices until solutions are found for those who lose out from such change.*

General questions:	*Which parts of the unsustainable system or system characteristics have to be phased out? (technologies, practices, institutional set-ups, decision-making procedures, etc.)* *What prevents such phasing-out in the sense of stabilising or supporting the current unsustainable system (lock-in)*
Criteria:	***The instrument contributes to increasing the potential to generate momentum, including the use of triggers and timing that can contribute to the phasing in/ phasing out processes. It contributes to shifting from an unsustainable to a significantly more sustainable path.***
Questions for assessment:	*In your experience, to what extent does/can the instrument use available windows of opportunities which are, at best, cross-sectoral and inclusive? If possible, please provide an example.* E&FIs that promote biodiversity can be designed in a way that is inclusive and recognises the contributions of indigenous communities in ecosystem management. In particular, E&FIs that involve private funding are often better positioned to foster cross-sectoral collaboration for biodiversity conservation. Examples include privately-funded PES schemes, such as the Vittel Programme (Perrot-Maître, 2014) and the Evian Natural Mineral Water project (Defrance, 2015). These initiatives promote collaboration between mineral water and agricultural sectors, creating synergies that enhance ecosystem benefits, including improved ES of water provision. *Which leverage points does the instrument address according to Meadows?* E&FIs that promote biodiversity or some of them can potentially address the following leverage points: 12. Parameters: some E&FIs introduce subsidies and taxes that influence behaviour; 11. The size of buffer stocks: some E&FIs can contribute to the creation of green spaces or the conservation of nature conservation areas; 7. The gain around driving positive feedback loops: the instruments actively address externalities in ecosystem management and encourage sustainable practices; 6. Structure of information flows: effective E&FIs require collaborative governance and stakeholder engagement from the design phase through implementation and monitoring; 5. The rules of the system: as most E&FIs incorporate one or multiple of the environmental economics principles such as "steward earns", "beneficiary pays", and "polluter pays", which incentivise behavioural changes towards sustainability; 4. The power to add, change or self-organize system structure: some E&FIs are initiated through a bottom-up approach and can foster decentralised decision-making.

	How does the instrument itself support the development of new sustainable practices/technologies/ideas and allow for experimentation, spread and institutionalisation? Many E&FIs that promote biodiversity employ innovative strategies and explore new business opportunities for conservation. Although the core aim of E&FIs is to address externalities and redistribute environmental and social costs and benefits among stakeholders, their design can vary significantly based on context. This flexibility allows for innovation in how different actors are engaged and which conservation measures are prioritised. In addition, E&FIs can happen at different scales. Small-scale pilot schemes can provide opportunities for experimentation. However, scaling up successful practices can be challenging. Detailed context analyses to adapt best practices to local conditions are necessary. Regarding institutionalisation, it relies heavily on existing regulations and legal frameworks in the area. *How does the instrument directly or indirectly support/contribute to destabilising and phasing out the current unsustainable path? If possible, please provide an example.* E&FIs often promote environmentally-friendly practices over harmful ones. When implemented successfully, potentially with comprehensive environmental impact assessments, these instruments can help phase out unsustainable ecosystem management practices. By applying the "beneficiary pays" and "polluter pays" principles, E&FIs can encourage the reduction of unsustainable consumption and production practices. For example, when private businesses are involved as beneficiaries or polluters, they are incentivised to adopt greater corporate responsibility for biodiversity and environmental stewardship. *Does the instrument indirectly contribute to phasing in or phasing out, i.e., does it help to create the conditions for either or both?* If implemented effectively, E&FIs can create conditions conducive to phasing out environmentally-harmful practices and unsustainable economic activities, in particular, when "beneficiary pays" and "polluter pays" principles are applied. However, uncertainties remain regarding what happens after project funding ends; without continued financial support for rewarding environmentally-friendly practices, sustainability may be compromised. The outcomes depend largely on the specific design and implementation of each instrument.
	
Results:	*Where would you position the instrument on the continuum and why?* E&FIs designed to promote biodiversity inherently favour environmentally sustainable practices over harmful ones. If successfully implemented, with

	thorough environmental impact assessments ensuring substantial improvements in ecosystem conditions and ES without adverse effects, these instruments can contribute to both phasing in good practices and phasing out unsustainable ones. By employing principles such as "beneficiary pays" and "polluter pays", E&FIs can facilitate a transition from unsustainable to sustainable paths by promoting responsible production and consumption aligned with the EU Taxonomy. Nonetheless, successful implementation requires a robust legal and institutional framework, collaboration across sectors, and effective monitoring mechanisms to ensure their contribution to transformative dynamics.
Criteria:	***The instrument contributes to anticipating and pro-actively addressing resistance to the desired change.***
Questions for assessment:	*How are stakeholders – their positions, stakes, and roles – considered? When are they involved throughout the process?* The extent to which stakeholders are considered in E&FIs varies depending on the specific use case of each instrument. Ideally, stakeholders should be engaged from the conception stage of the instrument design. For instance, stakeholder workshops at the outset can help define a shared vision for all, reveal agreements and disagreements of different actors, identify key actors such as stewards, beneficiaries, and polluters, and enable collaboratively design of concrete measures for implementation. Continuous stakeholder engagement throughout the process is also essential for ensuring that diverse perspectives are integrated and avoiding potential resistance from certain affected stakeholders. *How are they involved (gradient of participatory involvement from consulting, collaborating, co-learning to co-developing)?* The degree of stakeholder involvement depends on the specific E&FI and its context. Consultation is generally encouraged for all E&FIs that promote biodiversity. E&FIs initiated from a bottom-up approach, such as PES schemes, eco-labelling and eco-certifications, tend to offer more opportunities for collaboration, co-learning, and co-development among stakeholders. *How is the decision to involve them made? If possible, please add an example.* It depends on the specific E&FI and its context. For example, in PES schemes, it is crucial to identify and involve ES buyers/beneficiaries and providers early in the process. The decision is often made by the government bodies, NGOs, or other organisations that initiate the PES scheme. Depending on the circumstances, the project leader or the leading team may also decide to involve intermediaries for reducing transaction costs or acquiring knowledge support.

	Are stakeholders considered who can be allies in order to create a joint impact to increase the probability of mobilisation and transformative dynamic? E&FIs that promote biodiversity can benefit from considering stakeholders who can act as allies to create joint impacts. This applies in particular under conditions where both "steward earns" and "beneficiary pays" principles are applied, as this may allow for further opportunities of a win-win scenario, e.g., with privately-funded PES schemes. These E&FIs often require extensive collaboration among diverse stakeholders to foster synergies between differing interests.
	
Results:	*Where would you position the instrument on the continuum and why?* E&FIs that promote biodiversity, particularly those initiated from a bottom-up approach, often require intensive involvement from various stakeholders to ensure effective design and implementation. These instruments often intend to translate non-market benefits of biodiversity and ecosystem-related activities into financial or technical support for environmentally-friendly practices, and the "steward pays" principle is typically employed here sometimes along with "beneficiary pays". This engagement can help address resistance to desired changes by providing financial and technical assistance for good practices, and by revealing a potentially less expensive option of nature-based solutions to the beneficiaries. However, the capacity of E&FIs to meet these criteria is highly case-specific. It depends on factors such as the type of E&FI, local context, design conception, implementation strategies, and uncertainties exist for the outcome of the instruments.

Building Block 4: Emancipation and agency for transformation	
Description:	*Transformative change needs democratic involvement and engagement of individuals and communities to act on their own behalf; in particular groups whose voices are not usually heard. This requires spaces to do so. Such spaces offer possibilities for different voices to be expressed and heard for discourse and engagement. This is necessary to form opinions in a democratic and inclusive way, create legitimacy of decisions and generate adequate and adapted strategies.*
General questions:	*What human, institutional, financial and social capacities are available to support the implementation of the transformation pathway?*

	Are the interests and perspectives of diverse groups and individuals, especially marginalised ones, fairly represented in debates about transformative measures in spatial planning processes?
Criteria:	***Instrument strengthens spaces for deliberation, negotiation and emancipation.***
Questions for assessment:	*How does the instrument encourage diverse, inclusive, bottom-up arenas and processes?* Certain E&FIs, particularly if implemented in a bottom-up approaching strategy[2], have significant potential to foster diverse, inclusive arenas and processes, such as PES schemes, carbon payments, eco-labelling and eco-certification. Additionally, E&FIs in the form of incentives to establish access to credit for stewards, such as green investment facilities, green credits and loans, can also enable stewards to experiment with practices at small scale that may benefit biodiversity and ecosystems. These particular financial instruments make it more viable for pioneering stakeholders to engage in bottom-up processes. *How does it encourage participatory processes to generate ideas and create ownership?* Some E&FIs have the potential to encourage participatory processes that generate ideas and foster ownership. For instance, PES schemes facilitate negotiations between ES beneficiaries and providers, allowing them to co-develop and agree on rules for ecosystem management. In general, the following groups of E&FIs demonstrate high potential in this regard: 1. Positive incentives and rewards to motivate ES provision such as PES (provider side), green subsidies, conservation easements, etc.; 2. Incentives to establish access to credit for stewards that encourages innovative conservation ideas, such as green investment facilities, green credits and loans, etc.; 3. E&FIs that unlock new potentials to benefit from conservation by establishing new markets, such as certification and eco-labelling, ecological products, eco-tourism, etc..
	
Results:	*Where would you position the instrument on the continuum and why?* Not all E&FIs that promote biodiversity could effectively contribute to this criterion. However, those that focus on "steward earns" and create opportunities and space for stewards to innovate, negotiate and collaborate,

[2] The approaching strategy refers to whether the instrument is commonly initiated by government (i.e., top-down) or societies/citizens (i.e., bottom-up), e.g., E&FIs such as taxes and subsidies are commonly initated by government and other E&FIs such as PES schemes and eco-labelling can often be initated by citizens' groups or other types of societies. For more information on the characteristics of E&FIs, see: BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity.

	e.g. through financial and technical support, enabling access to credit, establishing new markets, can have high potential in this regard. These E&FIs include, for example, positive incentives and rewards to motivate ES provision such as PES (provider side), green subsidies, conservation easements, etc., incentives to establish access to credit for stewards, such as green investment facilities, green credits and loans, etc., and E&FIs that unlock new potentials to benefit from conservation by establishing new markets, such as certification and eco-labelling, ecological products, eco-tourism, etc. The potential contribution of these instruments also depends to a large extent on how they are used, including their design and implementation.
Criteria:	***Instrument strengthens capacities for pursuing own visions of a good life and builds on them.***
Questions for assessment:	*Is the instrument designed in such a way that it allows people to articulate their own vision of a good life and pursue it? Please provide an example.* Yes. Most E&FIs that promote biodiversity aim to compensate and encourage stewards to continue or adopt environmentally-friendly practices while motivating beneficiaries to pay for the non-monetary benefits derived from ES and biodiversity, and discouraging polluters from causing further harm to biodiversity and ecosystems. By revealing the often hidden environmental and social costs and benefits associated with economic activities, these instruments in general contribute to raising awareness among all actors about sustainable pathways. *Is the regulatory system considered in its ability or disability to support the implementation of instruments with a transformative potential? Please provide an example.* The regulatory system significantly influences the effectiveness of E&FIs throughout their conception, design, and implementation stages. It can either constrain or support E&FIs. For example, clearly defined land ownership rights are essential for stewards to conduct conservation activities; without a well-established regulatory framework defining property rights, it becomes challenging for stewards to fulfil the expected outcomes of E&FIs. On the other hand, a supportive regulatory environment can enhance the successful implementation of E&FIs that are initiated through a bottom-up approaching strategy, e.g., for privately-funded PES schemes, successful implementation often requires the involvement of policy makers and rely on the policy support at early stage. E&FIs that follow a top-down approaching strategy also rely heavily on the regulatory system, such as taxes, tax reliefs, subsidies, and all the negative incentives and compensations for harming ecosystems or biodiversity, such as legal liabilities, fines, offsetting schemes, etc.
	

Results:	*Where would you position the instrument on the continuum and why?* E&FIs that promote biodiversity can play a crucial role in raising awareness about the environmental and social costs and benefits associated with economic activities. By presenting these costs and benefits in monetary terms, i.e., making them more accessible to economic agents not typically involved in conservation, E&FIs can strengthen the capacity of all actors to pursue their own visions of a good life.

Strengths, Weaknesses, Gaps, and Suggestions

The assessment of E&FIs in the previous subsections indicates that E&FIs promoting biodiversity have significant potential to contribute to all transformative change ambitions and building blocks for enhancing transformative potential. However, the extent of their contribution depends on the design of each instrument and its specific application, including how the instrument is implemented and the degree to which it achieves its intended objectives. In general, effective monitoring mechanisms with standardised metrics are needed to ensure consistency between design and implementation outcomes. Additionally, Table 1 outlines the strengths, weaknesses, and gaps of E&FIs that promote biodiversity in relation to each transformative change ambition and building block based on our assessment results. For each ambition and building block, we identify groups of E&FIs with high potential of contribution. In the last column of the table, we provide examples of preliminary suggestions for addressing the identified gaps.

Table 1: Strengths, Weaknesses, Gaps, and Examples of Suggestions for E&FIs that Promote Biodiversity with Regards to Transformative Change Ambitions and Building Blocks

Strength	Weakness	Gap	Suggestion
Transformative Change Ambition 1 *Group of E&FIs with high potential:* - E&FIs with clearly-defined biodiversity objectives			
- Directly linked to environmental objectives, sometimes with clear conservation goals or associated with ES provision that has mutual benefits for biodiversity for a given area	- Limited direct focus on biodiversity for E&FIs that focus on ES provision; risks exist that effects on biodiversity may be overlooked - Impacts on biodiversity and ecosystem beyond the implementation	- Lack of concrete biodiversity-related guidance in the design of many E&FIs - Lack of assessment on the multi-level biological consequences of human interventions	- Accounting for biological principles such as area-species relationship and the source-sink dynamics in E&FI design and effectively integrating biodiversity into E&FI objectives - Proactively integrating analytical results from Strategic Environmental

Strength	Weakness	Gap	Suggestion
	area are often not considered		Assessment (SEA) and causal-loop analyses for spatial plans into the design of E&FI supported measures
Transformative Change Ambition 2 *Group of E&FIs with high potential:* - Positive incentives and rewards to motivate biodiversity conservation and ES provision - E&FIs that incorporate the principles of "beneficiary pays" and "polluter pays", such as contributions from beneficiaries to finance biodiversity conservation and ES provision and negative incentives and compensations for harming biodiversity and ecosystem			
- E&FIs are designed to motivate behavioural changes towards sustainability by revealing the full costs and benefits, including environmental and social ones, of economic activities; some E&FIs directly promote production measures with lower resource intensity by providing positive incentives - Effective implementation of the "beneficiary pays" and "polluter pays" principles can promote responsible production and consumption	- Poorly designed E&FIs can increase resource intensity if they focus only on specific ES provision without taking broader resource management considerations into account - Limited capacity to generate impact beyond the instrument implementation area, and good practices are often difficult to scale up and out due to context complexities - So far, in most cases, E&FIs only address responsible production and consumption in the food and forestry sectors	- Need for guidance on comprehensive design that includes resource use aspects - Lack of instructions on adapting E&FIs to different planning contexts, which facilitates up-scaling and out-scaling of good practices	- Practical guidance on the design and implementation of E&FIs for planners, including considerations in resource use and reflective follow-up work after the implementation of E&FIs to explore further opportunities for their wider application - Identifying opportunities in designing E&FIs to involve stakeholders from sectors other than conservation from the perspective of spatial planning provision for other sectors, in order to promote changes to consumption and production patterns in other sectors
Transformative Change Ambition 3			

Strength	Weakness	Gap	Suggestion
Group of E&FIs with high potential: - E&FIs that incorporate principles of "steward earns", "beneficiary pays", and "polluter pays", including positive incentives and rewards to motivate biodiversity conservation and ES provision, contributions from beneficiaries to finance biodiversity conservation and ES provision, and negative incentives and compensations for harming biodiversity and ecosystem - E&FIs that unleash innovative business opportunities, such as incentives to establish access to credit for stewards and incentives that unlock new potentials to benefit from conservation by establishing new markets			
- E&FIs can address the inequitable distribution of environmental and social costs and benefits by applying the principles of "steward earns", "beneficiary pays", and "polluter pays" - Some E&FIs aim to improve the provision of ES where the beneficiaries include the general public, thereby improving access to biodiversity and ES benefits for all	- Socio-economic inequalities may arise where issues such as unequal land distribution or property rights already exist, or where the conditions of the affected stakeholders have not been fully analysed, e.g. where multiple groups of stewards, beneficiaries or polluters are identified but only a few participate in the programme; or where stewards are already in an advantageous position such as large landowners who benefit substantially from development	- Lack of guidance on identifying and engaging stakeholders in terms of their roles in biodiversity and ecosystem-related activities (i.e. stewards, beneficiaries, and polluters) - If the objective is to improve access to the benefits of biodiversity and ES for all (in terms of public goods), the direct beneficiary is the general public, it is difficult for E&FIs to identify other financing sources apart from public funds	- Guidance on the design of E&FIs with relevant stakeholder identification and engagement processes; it is recommended to conduct a thorough stakeholder analysis at the design stage and, ideally, to involve affected stakeholders in a co-design and co-development process from an early stage - Using flexibility in the design of E&FIs to identify innovation opportunities for new markets and to facilitate access to credit for innovation
Building Block 2: Transformative Knowledge *Group of E&FIs with high potential:* - E&FIs that incorporate principle of "steward earns", such as positive incentives and rewards to motivate biodiversity conservation and ES provision - E&FIs that incorporate the principle of "polluter pays", such as negative incentives and compensations for harming biodiversity and ecosystem			

Strength	Weakness	Gap	Suggestion
- Flexibility in E&FI design allows for the inclusion of intermediaries and engagement of diverse knowledge providers - E&FIs often address ecosystem mismanagement issues and promote sustainable practices; the outcomes can contribute to knowledge accumulation on the ecological system and impacts of human interventions - E&FIs may encourage local communities to prioritise conservation over alternative income-generating activities through the "steward earns" principle	- Ecological outcomes are often not tracked - Effective design of E&FIs often requires comprehensive understanding of the ecological system, which demands extensive data	- Lack of guidance on essential knowledge and information for E&FI design in spatial planning - Absence of monitoring mechanisms to track ecological outcomes of proposed interventions	- Establish a spatial planning knowledge base, channelling available data on ES and ecosystem conditions, to facilitate instrument choice and instrument design - Integrate E&FI outcome monitoring into standard monitoring processes within spatial planning to ensure knowledge accumulation and its effective use in subsequent planning cycles
Building Block 3: Transformative Dynamics *Group of E&FIs with high potential:* - E&FIs that incorporate principles of "steward earns", "beneficiary pays", and "polluter pays", including positive incentives and rewards to motivate biodiversity conservation and ES provision, contributions from beneficiaries to finance biodiversity conservation and ES provision, and negative incentives and compensations for harming biodiversity and ecosystem - E&FIs that unleash innovative business opportunities, such as incentives to establish access to credit for stewards and incentives that unlock new potentials to benefit from conservation by establishing new markets - E&FIs initiated with a bottom-up approaching strategy			
- E&FIs involving private funding may foster cross-sectoral collaboration for	- Scaling up or transferring good practices can be challenging due to	- Lack of guidance on designing E&FIs for different spatial planning contexts, including the development of work	- Guidelines on forming a core team at the project's outset and developing a detailed work plan

Strength	Weakness	Gap	Suggestion
biodiversity conservation - Flexibility in E&FI design allow for innovative engagement of actors and prioritisation of conservation with new business opportunities - Small-scale pilot schemes provide opportunities for experimentation - E&FIs encourage the reduction of unsustainable consumption and production practices by applying "beneficiary pays" and "polluter pays" principles - Contrasting with top-down spatial planning practices, E&FIs initiated with a bottom-up approaching strategy have greater potential for fostering co-learning and co-development	context complexities - Uncertainties exist regarding instrument outcomes and further impacts beyond the project lifetime - Successful implementation often relies on existing legal and institutional frameworks - Dependency on project leadership	plans and stakeholder engagement strategies - Need for consistent leadership	including stakeholder engagement strategy - Establish monitoring and evaluation mechanisms to ensure positive outcomes and continuity of impacts, ideally integrated into existing mechanisms within spatial planning - Develop legal and institutional frameworks that support E&FIs, particularly for those with bottom-up approaching strategies - Ensure stakeholder engagement from conception through implementation, monitoring, and evaluation stages
Building Block 4: Emancipation and Agency *Group of E&FIs with high potential:* - E&FIs that incorporate principles of "steward earns", such as positive incentives and rewards to motivate biodiversity conservation and ES provision - E&FIs that unleash innovative business opportunities, such as incentives to establish access to credit for stewards and incentives that unlock new potentials to benefit from conservation by establishing new markets - E&FIs initiated with a bottom-up approaching strategy			
- E&FIs initiated with a bottom-up approaching	- Highly case-specific, depending	- Lack of supporting regulatory and	- Develop comprehensive

Strength	Weakness	Gap	Suggestion
strategy have potential to foster diverse and inclusive processes - E&FIs that establish access to credits for stewards may enable experimentation and innovation - With the "steward earns" principle and innovation for new business opportunities, E&FIs encourage participatory processes to generate ideas and create ownership - E&FIs are designed to reveal and redistribute environmental and social costs and benefits among different actors	on stakeholder engagement and decision-making processes - Dependency on existing regulatory systems - Potentially high institutional barriers for E&FIs initiated with a bottom-up approaching strategy	institutional environment - Insufficient guidance on stakeholder engagement in E&FI design and implementation	guidance on E&FI design and implementation in different spatial planning contexts - Establish mechanisms to reduce institutional barriers for E&FIs - Ensure stakeholder engagement from conception through implementation, monitoring, and evaluation stages

A Pathway for E&FIs to Enhance their Potential and Impact for Transformative Change for Biodiversity in Spatial Planning

As E&FIs can be designed and implemented at various scales, evidence from pilot projects or experimentations at local planning level may motivate changes at higher levels and in broader areas and sectors. This can subsequently facilitate administrative processes and stakeholder engagement for instrument design and implementation across all levels, scales, regions, and sectors. Based on the assessment in previous subsections, we derive a potential pathway illustrating how E&FIs in spatial planning can enhance their transformative potential and impact through interactions with other instruments. In Figure 1, we explore conceptually how different types of spatial planning and management instruments (SP&MIs) and environmental assessment (EA) processes and elements[3] can potentially support E&FI scoping, design, and implementation; and how E&FI outcomes may contribute to knowledge accumulation and information collection for certain SP&MIs or EA processes. These interactions can help ensure the effective design and

[3] Respectively based on the SP&MI typology developed in BioValue Report D1.4: Guidelines to Define Future Pathways for Inclusion of Biodiversity in Spatial Planning and Management Instruments and the EA process, practice, and content integrated across spatial planning cycle proposed by Kørnøv (2024).

successful implementation of E&FIs, and enhance the impact of E&FIs for transformative change for biodiversity through three main perspectives, as represented by the blue text in the figure.

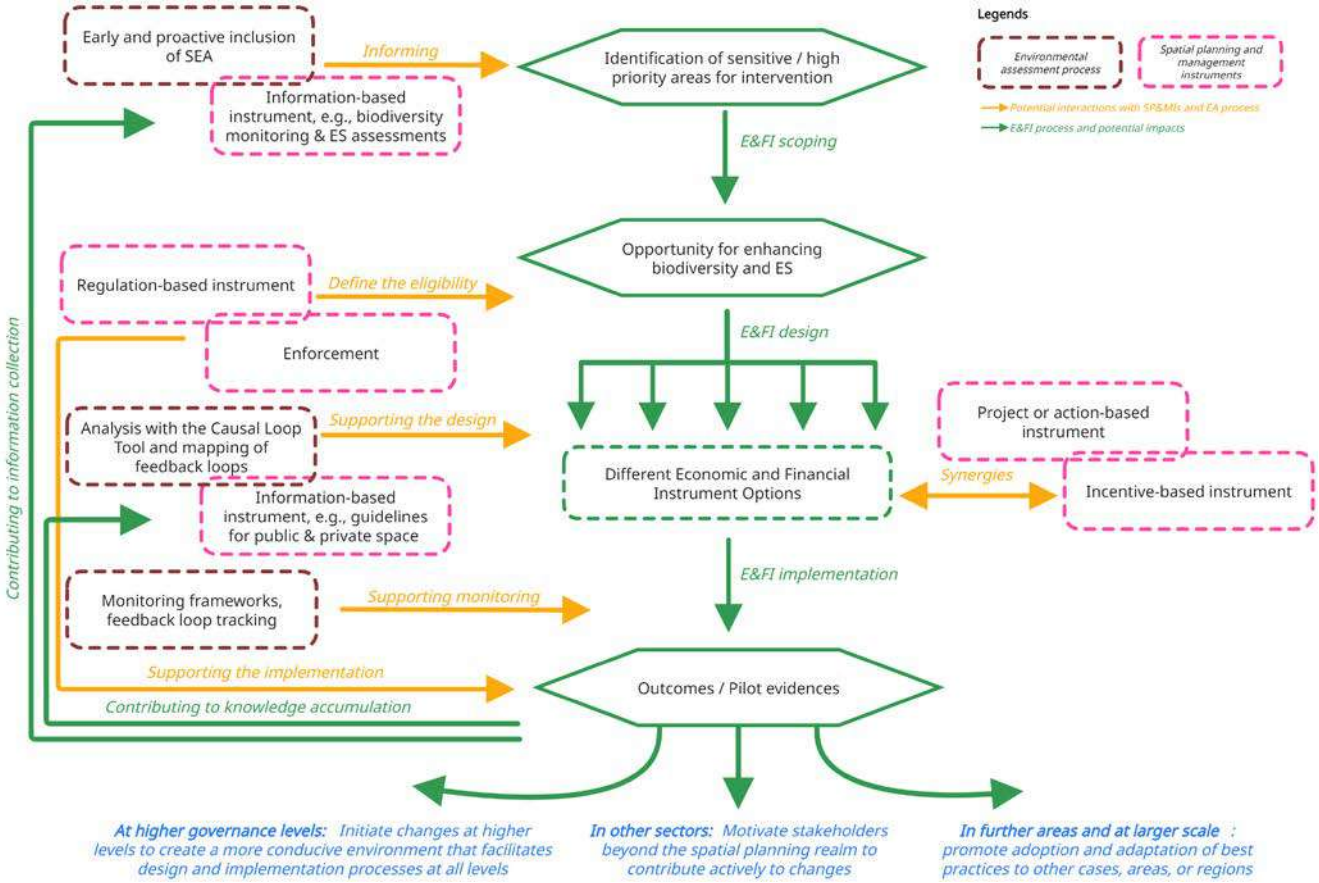


Figure 1: Pathway on How the Transformative Potential of Economic and Financial Instruments for Biodiversity can be Enhanced in Spatial Planning

Built on the preliminary suggestions presented in Table 1 and the pathway illustrated in Figure 1, we derive nine recommendations (see Figure 2) for improving transformative potential of E&FIs for biodiversity in spatial planning, related to the building blocks of the BioValue transformative change framework and potential interaction stages within the generic spatial planning process as outlined by Partidário (2024). An important part of the potential lies in proactively searching for synergies between planning instruments and processes and E&FIs:

1. *Transformative Vision/Ambition 1* [Vision]: Account for biological principles such as area-species relationship and the source-sink dynamics when designing objectives and measures of E&FIs to ensure positive contributions to biodiversity. This may involve proactively integrating analytical results from Strategic Environmental Assessment and causal-loop analyses for spatial plans into E&FI design;
2. *Transformative Vision/Ambition 2* [Vision and Objectives]: Identify opportunities to promote changes to consumption and production patterns in other sectors, e.g. mobility and energy sectors, when designing E&FIs with support from spatial planning actions such as infrastructure planning and zoning;
3. *Transformative Vision/Ambition 3; Emancipation and Agency for Transformation* [Vision until Implementation]: Be creative and think broadly with active consideration of empowerment

and innovation opportunities during scoping and when designing E&FIs. This includes evaluating the potential for reallocating land use rights in spatial planning. Sometimes such instruments can be combined with establishing new markets and enabling communities to participate in these markets (e.g. credits, knowledge, information, user rights);

4. *Emancipation and Agency for Transformation* [Vision until Implementation]: Ensure effective stakeholder engagement through thorough stakeholder analysis at the design stage and by involving affected stakeholders in a co-design and co-development process of E&FIs. Identify synergies with the stakeholder participation and public consultation processes embedded within the planning and related processes;
5. *Transformative Knowledge* [Diagnosis until Evaluation]: Use the data and information, e.g. on biodiversity, ecosystem services and conditions, mitigation and enhancement measures, generated by spatial planning information instruments and environmental assessment processes in E&FI selection, design, and implementation. Include adequate monitoring to ensure instrument achievement in terms of its objectives (linked to Recommendation 9);
6. *Transformative Dynamics* [Strategy and Proposals]: Acknowledge the transition process in the design of E&FIs while in early phases high subsidies and other support might be needed to trigger experimentation and while in later stages access to credits might be sufficient. At the same time, ensure phasing-out of unsustainable practices is also addressed;
7. *Transformative Knowledge* [Strategy until Evaluation]: Be pragmatic and adaptive in implementation and where possible in design by building on potential synergies with established instruments. These synergies can arise in terms of legal framework, institutional set-ups, networks, leadership, etc. and they help to lower entry barriers and reduce transaction costs for E&FI implementation. Adapt when and where necessary both during set-up and after implementation whenever problems occur;
8. *Transformative Dynamics* [Monitoring and Evaluation]: Establish reflective follow-up after the implementation of E&FIs to explore opportunities for improvements, or the need for modifications when entering new stages of the transition. Collaborate with others for wider application in terms of governance levels, spatial extensions, and sectors;
9. *Transformative Knowledge; Transformative Dynamics* [Monitoring and Evaluation]: Integrate results from monitoring and evaluating E&FI outcomes into standard monitoring and evaluation processes within spatial planning to make positive outcomes visible and thereby support continuity of biodiversity enhancement practices and knowledge accumulation as well as its effective use in subsequent planning cycles.

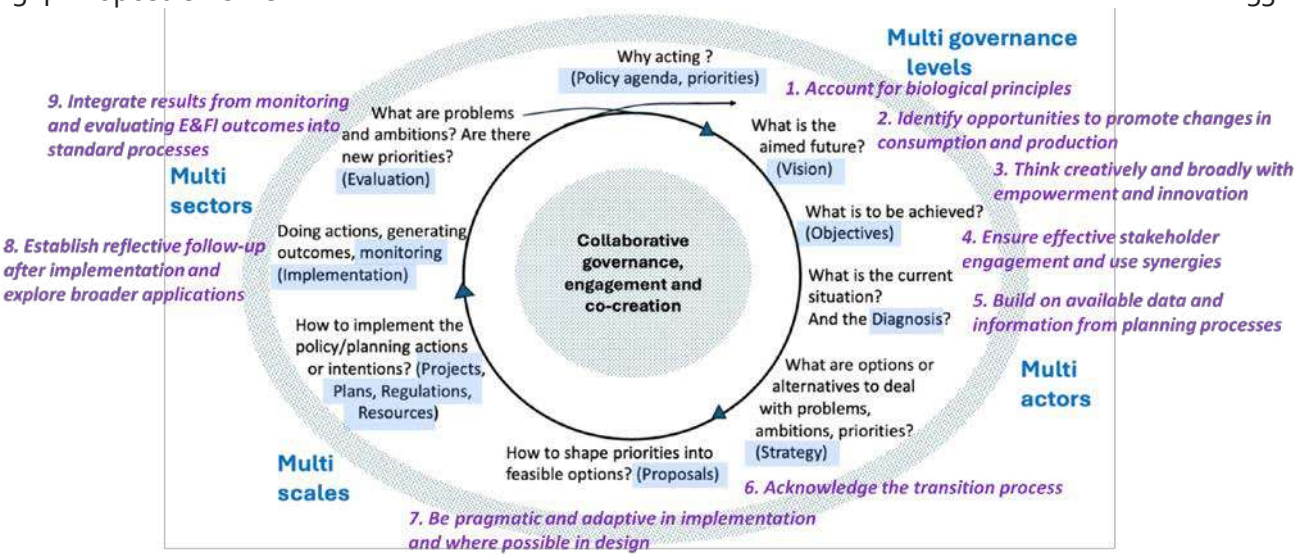


Figure 2: Nine Recommendations for Improving Transformative Potential of E&FIs for Biodiversity in Spatial Planning[4]

By allocating incentives, E&FIs can contribute to increase biodiversity outcomes and foster a greater appreciation for biodiversity and ecosystem services among decision-makers and economic actors. However, to fully unlock the transformative potential of E&FIs in spatial planning for biodiversity, there is a need for practical guidance based on the general recommendations. A comprehensive assessment framework detailing the selection, design, and implementation of appropriate E&FIs in different contexts would be beneficial for practitioners to maximise the effectiveness of E&FIs, thereby enhancing their capacity to drive positive changes for biodiversity conservation and sustainable development.

[4] Based on the generic spatial planning process outlined by Partidário (2024).

3. Biodiversity and Ecosystem Service Opportunities in Spatial Planning: An Assessment Framework

The assessment of the transformative potential of E&FIs for enhancing biodiversity in spatial planning in Section 2 highlights the need to consider synergies between E&FIs and relevant SP&MIs and EA processes, as well as the need for practical guidance on the selection, design and implementation of appropriate E&FIs in different contexts. Based on these analyses, in this section, we present an assessment framework for biodiversity and ecosystem service opportunities in spatial planning. This framework is adapted from the practical guide on Ecosystem Service Opportunities (ESO) developed by Rode et al. (2016). Here, with the adapted framework, we aim to identify and use biodiversity and ecosystem service opportunities (including habitat service) to address biodiversity and ecosystem related issues and enhance biodiversity in spatial planning processes. The target audience of the framework are professionals in the planning sector who are responsible for the design, planning and implementation of development activities, including people from government agencies, academia, and private consultancies.

Overview of Biodiversity and Ecosystem Service Opportunities in Spatial Planning

The Ecosystem Service Opportunities framework, developed by Rode et al. (2016), provides guidelines on selecting, designing, and implementing E&FIs for decision makers and practitioners in both conservation and development sectors. The ESO framework has been regularly updated based on lessons from implementation and the latest version is accessible as a practical, step-by-step, live guide on the "Acting on Ecosystem Service Opportunities" website (see: https://www.es-opportunities.net/home.html). While the ESO framework has been applied in various contexts, such as agricultural supply chains, protected area management, and urban green corridors, it has not been specifically tailored for spatial planning. To address this gap, we adapt the framework for spatial planning contexts, based on the most recent version of the ESO guidance published on its website (Rode & Muñoz Escobar, 2024).

Our adapted framework (see Figure 3) aims to assist planning professionals in reflecting on how to address biodiversity and ecosystem related issues and identify opportunities for biodiversity and ES enhancement in their planning practice. Guided by the BioValue transformative change framework, the adaptation focuses on two main aspects: i) integrating explicit biodiversity considerations through the BioValue transformative change ambitions and potential interactions with EA processes and elements into the ESO tasks; and ii) aligning the ESO tasks with different spatial planning stages in the generic process as outlined by Partidário (2024) and exploring potential interactions with existing types of SP&MIs.

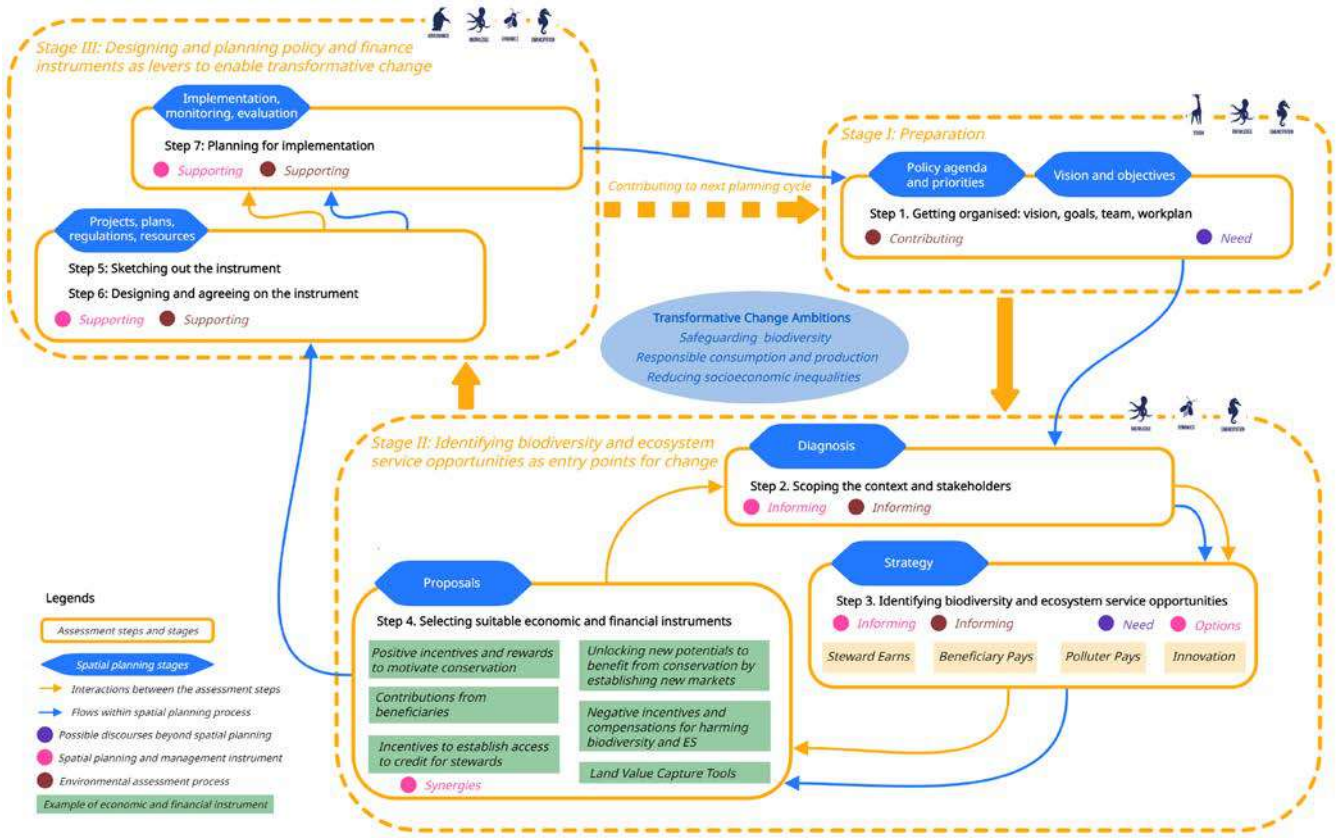


Figure 3: Biodiversity and Ecosystem Service Opportunities in Spatial Planning

As illustrated in Figure 3, the adapted framework is centered around the three BioValue transformative change ambitions that should be kept in mind throughout all assessment stages, steps, and tasks:

- Ambition 1: Spatial planning safeguards, restores, allows recovery and enhances biodiversity
- Ambition 2: Spatial planning significantly contributes to balanced and responsible consumption and production without external social and environmental costs
- Ambition 3: Spatial planning significantly contributes to reducing socioeconomic inequalities

In addition to assessing biodiversity and ES opportunities, we also aim to illustrate examples and identify opportunities for:

- Potential actions needed beyond spatial planning;
- Potential interactions with SP&MIs and EA processes, such as SP&MIs and EA processes that provide information for conducting the relevant ESO analysis;
- While identifying biodiversity and ES opportunities, identify potential examples of SP&MIs that could address certain biodiversity and ecosystem related issues more efficiently, or help establish a basis (e.g., regulatory basis, technical information) to support E&FIs, as E&FIs may not be the most effective solution in all circumstances;

- Developing examples of operational checklists to assist planning professionals in determining which types of E&FIs are appropriate based on their specific context or challenges.

The subsequent subsection will provide detailed examples for each of the assessment steps.

A Step-by-step Process

In this subsection, we present the seven assessment steps of the adapted framework with examples of reflective questions and potential interactions with other instruments to identify and leverage biodiversity and ES opportunities in spatial planning. Each assessment step is associated with specific stages of spatial planning in the generic process as outlined by Partidário (2024).

Description of Components

As the ESO website (Rode & Muñoz Escobar, 2024) is an extensive database that provides accumulated knowledge and practical guidance from real-world implementation experiences, in order to streamline this report and draw on existing knowledge and resources, we include a link for each assessment step to the corresponding step page with detailed descriptions on the ESO website. These descriptions include objectives, tasks, expected outcomes, checklists, examples, relevant literature and available guidelines from various sources, etc. for each step. Although certain steps in the adapted framework have been adapted to explicitly include biodiversity and spatial planning contexts, the core essence of each step remains similar to the original ESO assessment, and therefore the extensive resources from the ESO website would be a great complement for users that are interested in using this adapted framework for their own planning cases.

For each assessment step, we add examples of questions for reflection adapted for spatial planning contexts, with references from the BioValue Report D4.1: Analytical Framework Detailed and Specified for Application within BioValue and literatures (EC, 2017; Engel et al., 2008; GNF, 2014; Rode et al., 2016). These examples of reflective questions are not exhaustive and can be expanded based on application experience. In particular, for tasks 3 and 4, to complement the checklist and detailed explanations provided on the ESO website, we develop some examples of accessible checklists with yes/no answers that can be directly applied in spatial planning contexts to identify biodiversity and ES opportunities and relate these opportunities to specific E&FI groups.

In each assessment step, we also highlight examples of needs for action beyond the scope of spatial planning and interactions with relevant SP&MIs and EA process and elements[5] in terms of potential contributions or support to particular ESO analysis. These examples of potential needs and interactions are indicated by arrows with dashed round rectangles: purple for actions beyond spatial planning, pink for SP&MIs, and brown for EA process and elements. Please note that these

[5] Similar to the previous illustration in Figure 1, the types for SP&MIs and EA process and elements are defined based on the SP&MI typology developed in BioValue Report D1.4: Guidelines to Define Future Pathways for Inclusion of Biodiversity in Spatial Planning and Management Instruments and the EA process, practice, and content integrated across spatial planning cycle proposed by Kørnøv (2024).

interactions are illustrative and not exhaustive, and should be expanded or modified upon applications.

We also include animal symbols from the BioValue Transformative Change framework that represent different building blocks[6]. These symbols indicate that criteria from the respective building block should be fully considered when conducting the relevant assessment task(s). The criteria for the building blocks linked to the animal symbols are presented as follows:

Transformative Vision- reflection on how to address biodiversity loss including the root causes through the three transformative change ambitions:

- Ambition 1: Spatial planning safeguards, restores, allows recovery and enhances biodiversity;
- Ambition 2: Spatial planning significantly contributes to balanced and responsible consumption and production without external social and environmental costs;
- Ambition 3: Spatial planning significantly contributes to reducing socioeconomic inequalities.

Transformative Knowledge: reflection on considerations of or potential contributions to building the following knowledge:

- Considerations of the available knowledge to understand and navigate the complexity of the system or contributions to building this knowledge;
- Considerations of available knowledge about phase-in and phase-out sequences or contributions to building this knowledge;
- Considerations of available knowledge to design strategic interventions for system change or contributions to building this knowledge.

Transformative Dynamics: reflections on how to contribute:

- To increasing the potential to generate momentum, including the use of triggers and timing that can contribute to the phasing in/ phasing out processes, and to shifting from an unsustainable to a significantly more sustainable path;
- To anticipating and pro-actively addressing resistance to the desired change.

Emancipation and Agency for Transformation: reflections on how to strengthen:

- Spaces for deliberation, negotiation and emancipation;
- Capacities for pursuing own visions of a good life and builds on them.

[6] For more information, see: BioValue Report D4.1: Analytical Framework Detailed and Specified for Application within BioValue

Transformative Governance: reflections on how to contribute to a mode of governance that is:

- Inclusive;
- Informed;
- Adaptive;
- Integrated;
- Accountable.

The three transformative change ambitions and criteria for the transformative knowledge, transformative dynamics, and emancipation and agency for transformation building blocks are explained and elaborated along the transformative potential assessment in Section 2 of this report. For more information on the five criteria for transformative governance, please refer to the BioValue Report D4.1: Analytical Framework Detailed and Specified for Application within BioValue and the transformative change framework developed by Wittmer et al. (2021).

Seven Steps to Identify and Leverage Biodiversity and Ecosystem Service Opportunities in Spatial Planning

To initiate the step-by-step process, it is important for the team to get well-organised. This first step, as shown in Box 1, includes clarifying the vision, objectives, and scopes, identifying technical and logistical requirements, and developing a comprehensive work plan. The EA process identifying key environmental challenges and opportunities may contribute to clarifying the objective and the role of biodiversity and ecosystems within the planning vision.

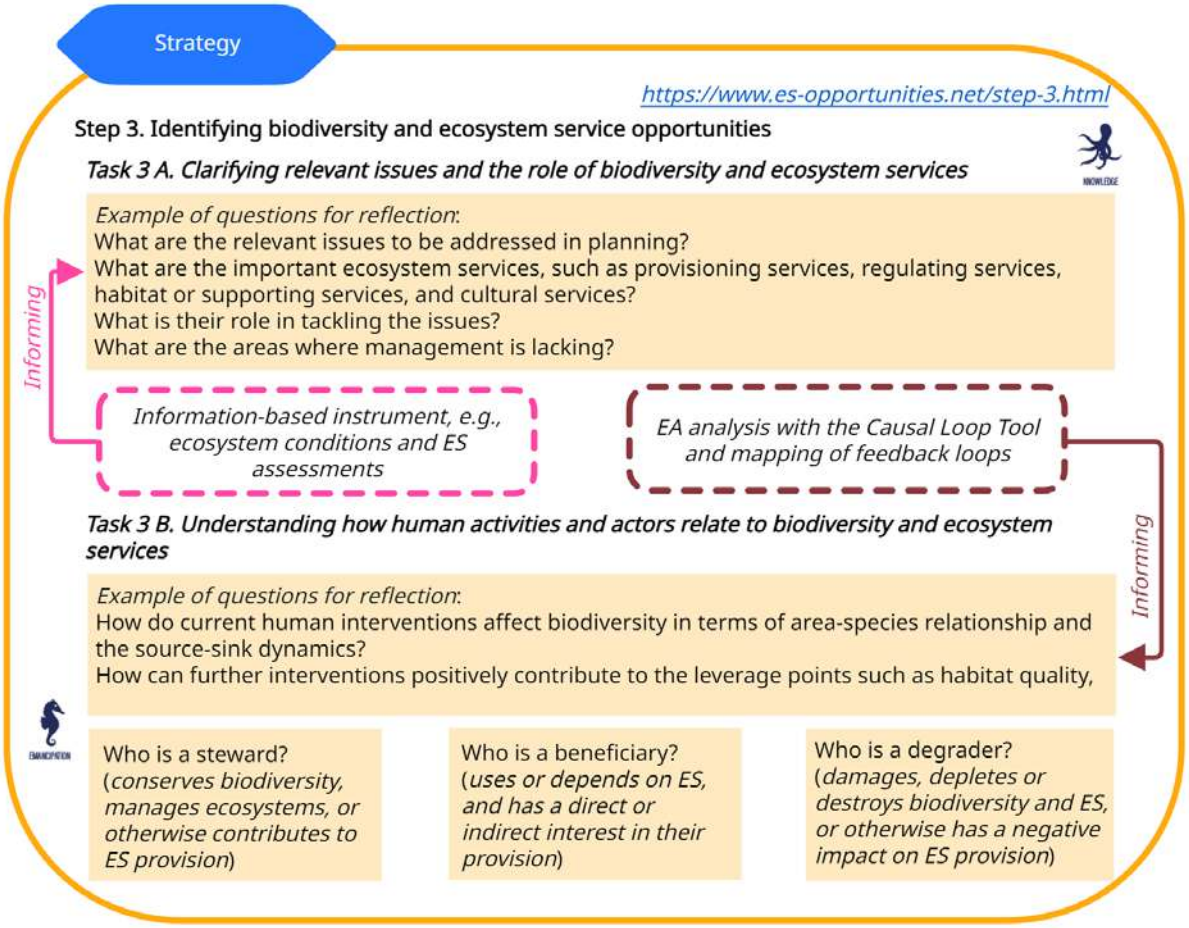
Box 1: Step 1 - Getting Organised: Visions, Goals, Team, Workplan

Once the team is prepared, a thorough understanding of the context becomes essential. Step 2 encompasses characterising stakeholders, analysing the socio-economic and biophysical

situations, and identifying current threats to ecosystems. Information and analyses from spatial planning and environmental assessment processes may support the diagnosis in this step, as shown in Box 2.

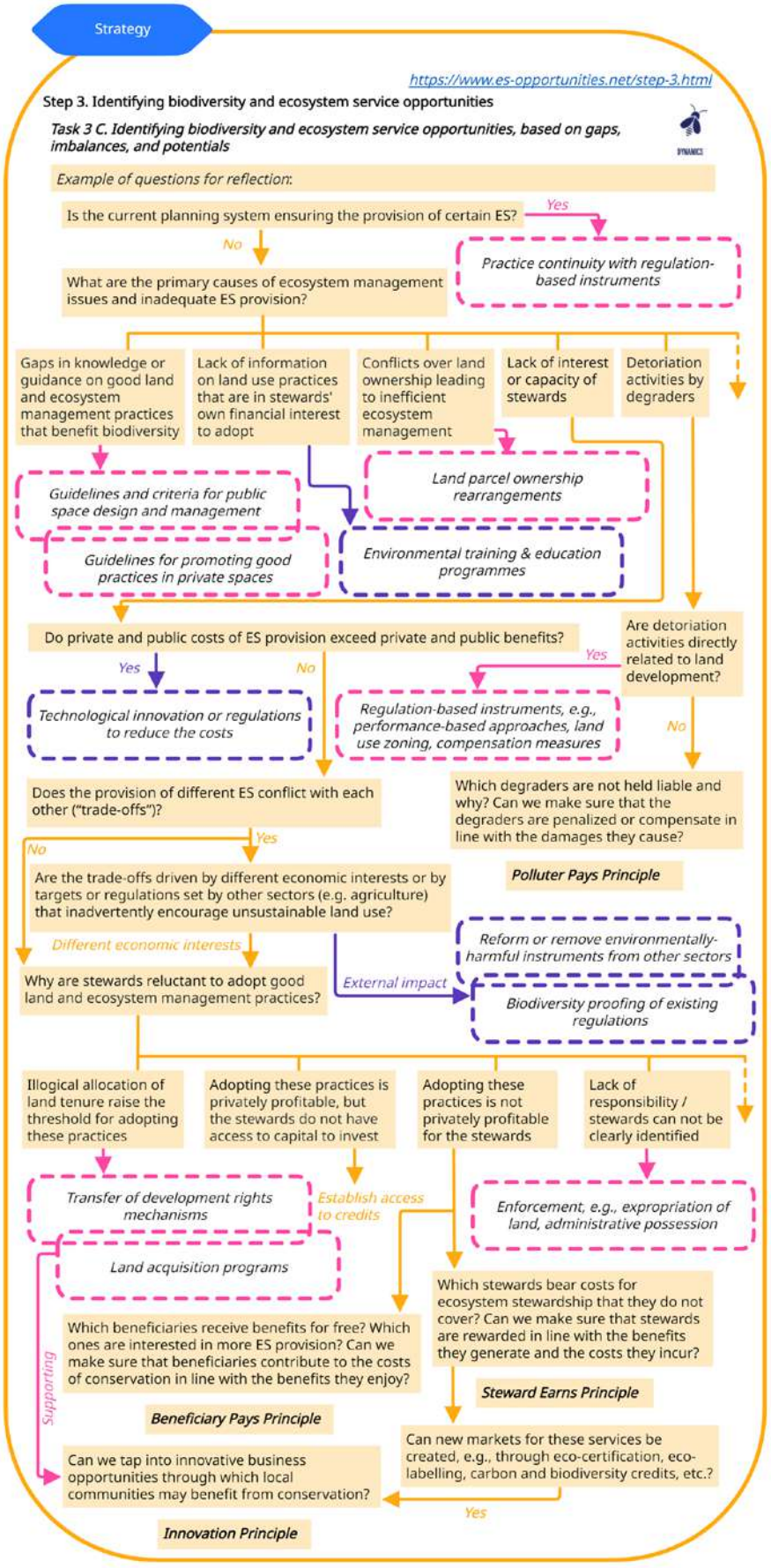
Box 2: Step 2 – Scoping the Context and Stakeholders

After the comprehensive scoping of context and stakeholders, the more specific analysis of the situation starts with Step 3, as shown in Boxes 3 and 4. This step aims at identifying opportunities to enhance conservation and development goals, which provides entry points for improving current instruments or selecting new ones in Step 4.



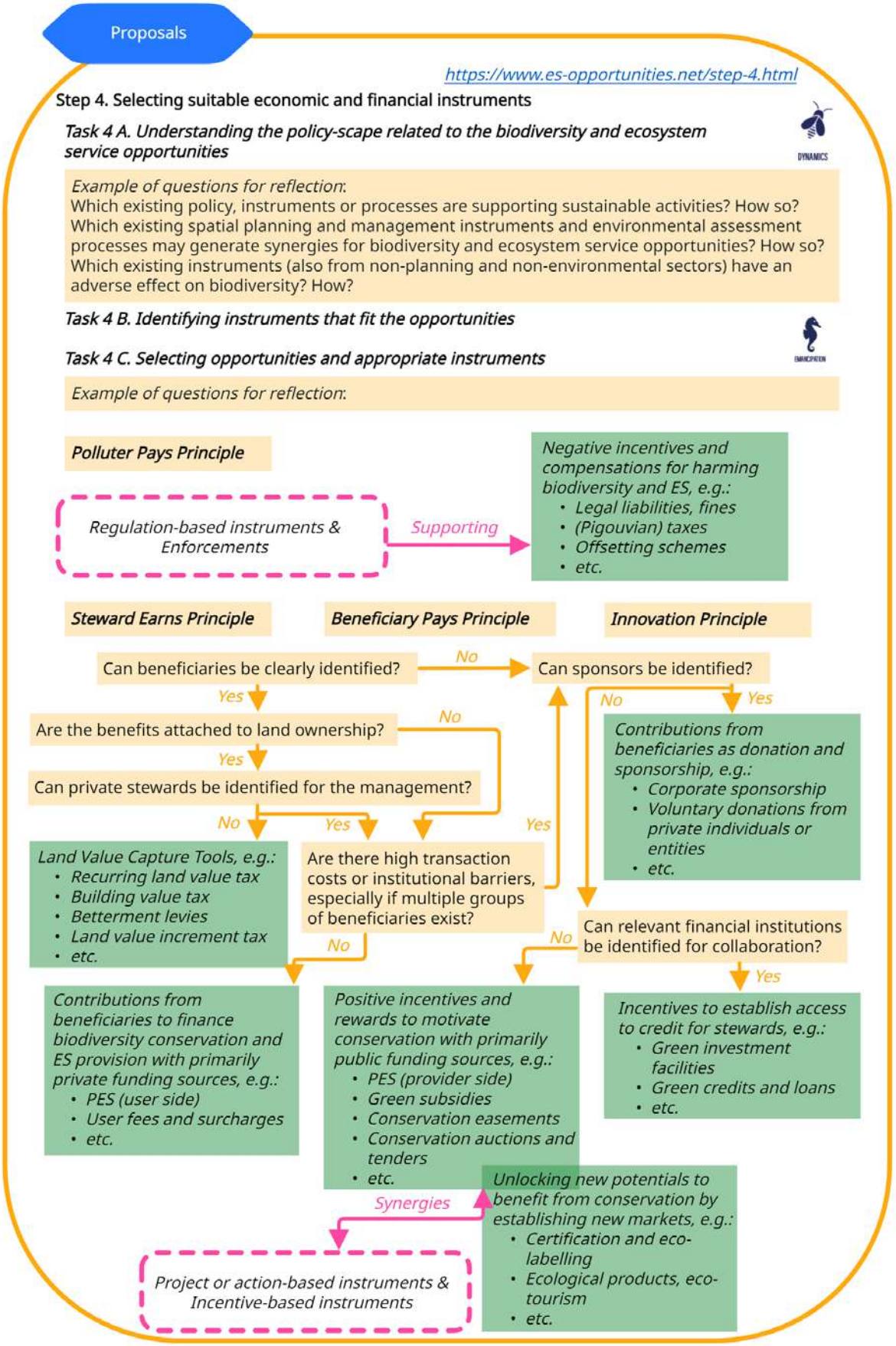
Box 3: Step 3 – Identifying Biodiversity and Ecosystem Service Opportunities, Task 3A and 3B

Box 4 presents examples of operational checklists to identify biodiversity and ES opportunities based on different issues and contexts, supplementing resources available on the ESO website. The major opportunities align with economic principles of "polluter pays", "beneficiary pays", "stewards earn", and innovations for new business opportunities or markets.



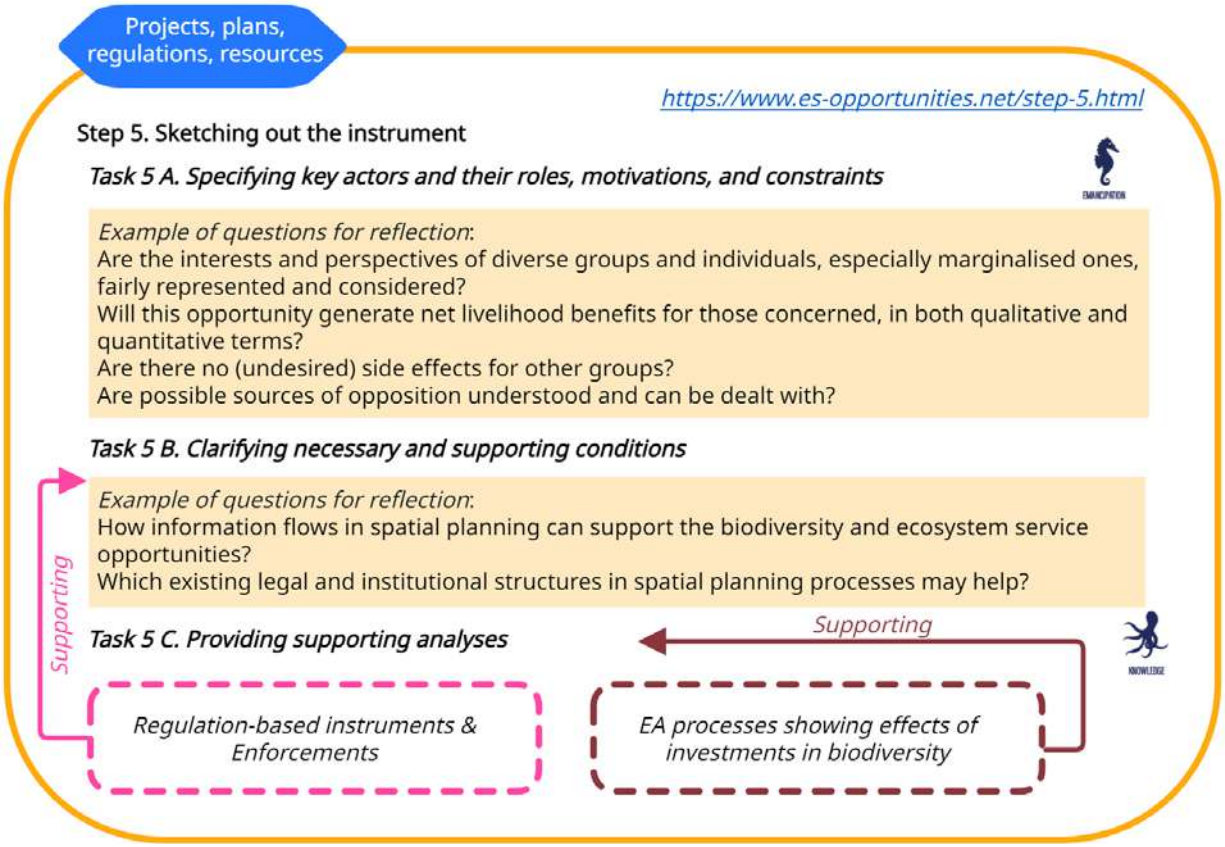
Box 4: Step 3 – Identifying Biodiversity and Ecosystem Service Opportunities, Task 3C

Following the characterisation of opportunities to enhance biodiversity and ES provision in Step 3, Step 4 focuses on selecting suitable E&FIs that can seize these opportunities towards the desired changes. The economic principles employed in Step 3 serve as a starting point for the selection of appropriate instruments, as illustrated in Box 5, with different conditions leading to different groups of E&FIs. The full list of E&FIs that promote biodiversity can be found can be found in Rode et al. (2016) and further elaboration of the instruments in spatial planning contexts in BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity.



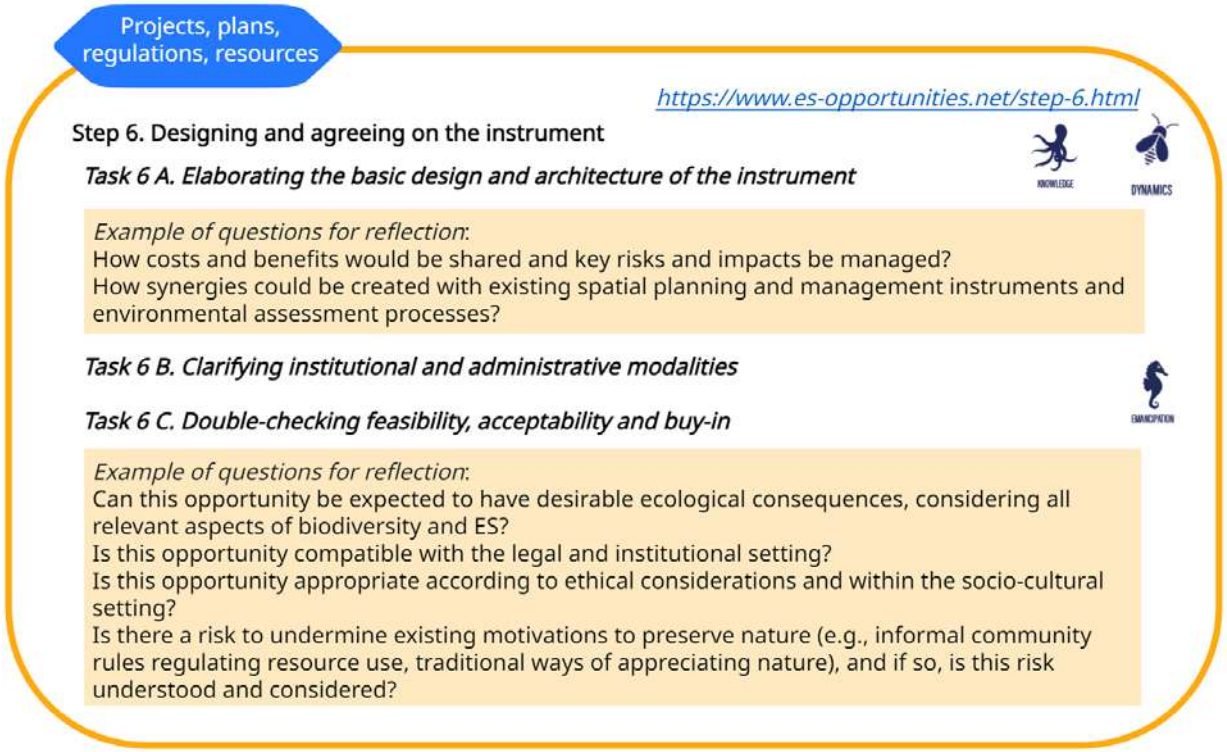
Box 5: Step 4 – Selecting Suitable Economic and Financial Instruments

Step 5 focuses on specifying the structure and main components of the selected E&FI(s), including determining key actors along with their roles and motivations and clarifying broader requirements and supporting conditions, as depicted in Box 6. The list of suitable instruments derived from Step 4 requires detailed revision. By the end of Step 5, clarity must be established regarding which instrument(s) or combined arrangements will be pursued.



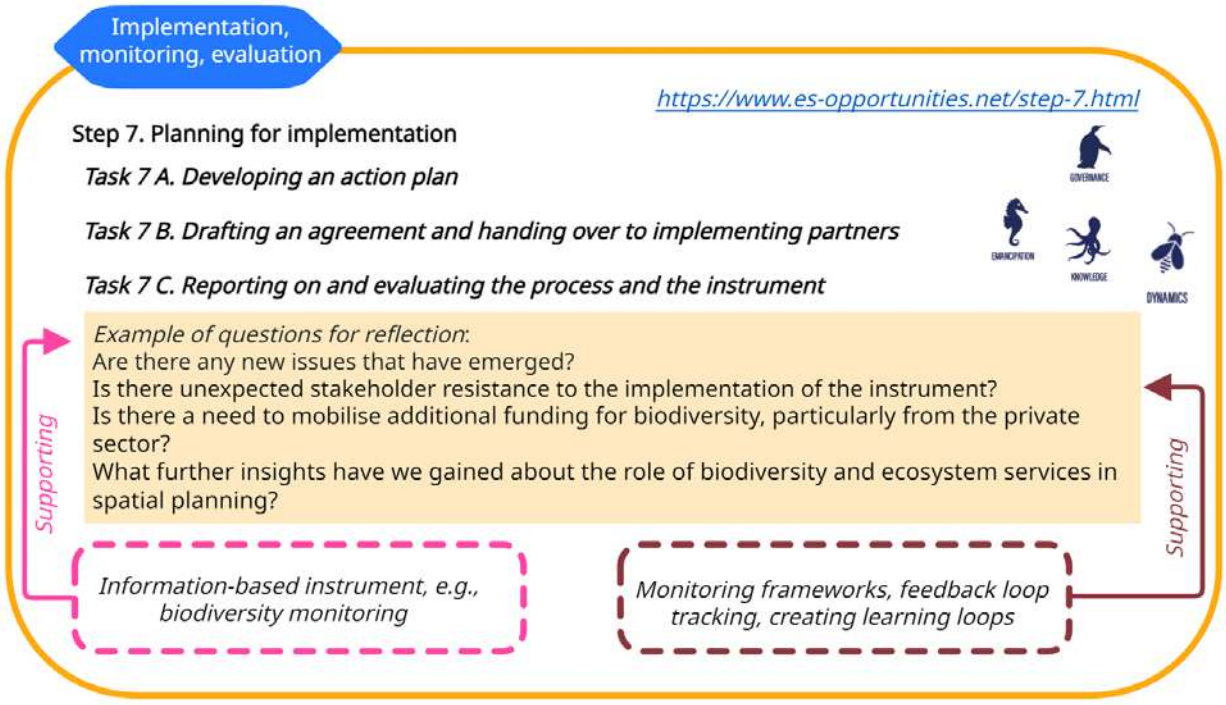
Box 6: Step 5 – Sketching out the Instrument

To gain approval from key actors, it is essential that the instrument is feasible and acceptable to relevant stakeholders. Step 6 involves presenting a convincing model that illustrates how the instrument would function while clarifying institutional and administrative details and confirming the feasibility and effectiveness of the design, as shown in Box 7. By completion of Step 6, the team, ideally with active participation of key stakeholders, should be able to decide which instrument or package to develop within spatial planning.



Box 7: Step 6 – Designing and Agreeing on the Instrument

The final step (see Box 8) entails formulating an action plan with necessary formal agreements, and transferring responsibility from the designing team to implementing partners. Ideally, Step 7 should be led or co-coordinated by the implementing partners who are expected to take full responsibility by the end of the step to ensure the implementation of the instruments. The designing team may then adopt a facilitating role to support implementation.



Box 8: Step 7 – Planning for Implementation

4. Exploring Economic and Financial Instrument Options with BioValue Arenas for Transformation

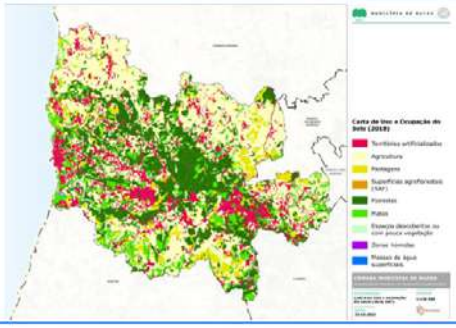
In this section, we explore E&FI options using the adapted framework for biodiversity and ES opportunities in spatial planning outlined in Section 3 with the three BioValue Arenas for Transformation. The BioValue Arenas for Transformation are three case studies at different scales, located respectively in the Municipality of Trento, Italy; the Municipality of Mafra, Portugal; and the federal state of Mecklenburg-Vorpommern, Germany. Our analysis and proposals in this section are derived from the results of interactive discussions and workshops held throughout 2024 among the BioValue consortium members, in particular with the respective Arena partners and spatial planning experts, as well as the work carried out in WP4 for each Arena. Box 9 presents the expected outcomes of the three BioValue Arenas for Transformation, developed through extensive dialogue with local stakeholders. These expected outcomes provide a starting point for the E&FI proposals presented in this section.

Further context information on the BioValue Arenas for Transformation and details of the work conducted in each Arena to date can be found on the webpage of the BioValue Arenas (https://biovalue-horizon.eu/arenas-for-transformation/) and in the previous Transformation Action Workshop reports (i.e., Transformation Action Workshop I, Transformation Action Workshop II, Transformation Action Workshop III).

MV

Observe and facilitate mainstreaming of biodiversity in rewetting as a policy option for the **Mecklenburg-Vorpommern** (MV) under the Climate Act. Consider the multi-level aspects of planning while bringing together different actors from different sectors of society in the co-creation of the desirable future of the peatlands.

MAFRA



Promote a planning system in **Mafra Municipality** focused on protecting and valuing biodiversity and natural values beyond current legislations/regulations, while recognizing the high touristic pressure. It also considers the inclusion of natural heritage, ecological structure, and green infrastructures in the next planning cycle.

FERSINA RIVER

Promote a planning system that incorporates the principles of ecological transition in the **Fersina River**, while recognizing the diversity of spatial characteristics. Also, expects to support the development of a coding system that incorporates biodiversity protection into spatial development by focusing on developing an intervention project on the Fersina River as a pilot project that integrates the implementation of biodiversity protection policies (from a multi-level perspective).

Box 9: Expected Outcomes of the Three BioValue Arenas for Transformation (Source: BioValue Transformation Action Workshop II Report)

The Fersina- Regenerating an Urban River in Trento, Italy

The BioValue Trento Arena focuses on plans to revitalise the Fersina river in the municipality of Trento. The river course varies, flowing through a canyon area rich in natural values upstream, then between high stone embankments along routes in the urban area, and finally into a delta area where the construction of a new hospital with parks is planned. The municipality has identified five hotspots for biodiversity enhancement, primarily natural and urban parks: Parco dell'Orrido, Parco Cornicchio – liceo Galileo Galilei, Nuovo Parco Rio Salé, Belvedere Fersina Salé, and Parco del Nuovo Ospedale.

In the canyon area, plans include creating a new nature park (Parco dell'Orrido) to regulate visitor behaviour. Local residents regularly visit the area for recreational purposes, especially in summers, while the area is formally not accessible to the public. Unregulated use of the area leads to littering and water pollution. The new park aims to formalise the access to the area of high natural values to avoid negative impacts of these unregulated visitors on the biodiversity and ecosystems. The main ES focus in this case is on cultural services. The land in the area is owned by different public entities with a small proportion privately owned. The primary landowner is the regional authority

Provincia Autonoma di Trento (PAT) - Servizio Bacini Montani, which has limited capacity to manage the new park. The Eco-Museo "Orrido Ponte Alto" has been identified as an ideal steward for the management of the new nature park through possible public domain leasing. The assessment is based on the museum's existing experience in managing a nature park-style museum under a lease agreement with the public authorities in the adjacent area. However, further details need to be defined, and interests in participation must be confirmed. The identified beneficiaries are the visitors to the eco-museum and the new nature park. No entrance fees will be charged for the new park to ensure the access to biodiversity benefits for all. However, an admission fee has been applied for the eco-museum. It is envisaged that the revenue from the eco-museum could cover the management costs of both the museum and the new park area. In order to increase the flow of visitors to the areas and thus ensure the income of the eco-museum, the municipality has planned civil constructions to facilitate the beneficiaries' access to biodiversity and ES, e.g. through cycle paths and the Valsugana railway, as well as the creation of rest areas, illustrative maps, and information points in the parks.

The urban section of the river faces the challenges of connectivity between the water course and the neighbourhoods and surrounding green areas, the maintenance of the vegetation in the riverbed balancing between hydraulic safety and biodiversity, and the vehicular pressure on the embankments. The PAT's Waterways Management Department currently manages the river banks for safety reasons, but lacks competence and willingness to improve management practices. The Municipality of Trento is willing to take over management responsibilities with its Parks and Gardens Department for regular maintenance and Civil Protection Department for emergency management in case of flood risks. However, agreements need to be made between the municipality and PAT. The ES focus here is mainly on cultural services and potentially regulating services for flood risk management. The beneficiaries could be citizens in general for the cultural services, and in particular, residents living close to the riverbank for the regulating services. Although ecological and engineering solutions as planned by the municipality are more relevant to address the problems along Fersina in the urban area, E&FI interventions are also possible, such as a PES scheme with nearby residents or insurance companies for flood risk management. However, further context analysis is needed for appropriateness check. In addition, once all the engineering works planned by the municipality along the river banks have been carried out, there are beneficiaries, i.e., the land or property owners in the affected area, who benefit from the increased land value due to the public development for the revitalisation of the Fersina river; here, land value capture tools may be relevant, e.g., through infrastructure levies or betterment contributions.

In the delta area, with the construction of the new hospital and the new park (Parco del Nuovo Ospedale), the ES focus is on cultural services for recreational purposes. The main steward identified is the Municipality of Trento, and the beneficiaries are the citizens / the general public. As it concerns public goods in this case, in addition to public funding, the E&FI voluntary donations and private sponsorships could be relevant. This type of instrument can support the establishment of the park, i.e., with the purchase of equipment and the training of staff. Regarding the maintenance costs, potential options include an environmental tax from tourism dedicated to the maintenance of urban green areas, however, further context analysis is needed to determine the appropriateness of the instrument.

Figure 4 summarises a set of potential E&FI options along the Fersina river, as presented above for the BioValue Trento Arena. It should be noted that these options are based on preliminary discussions within the BioValue project and require further analysis to determine their

appropriateness and feasibility. The figure serves as a starting point for considering E&FIs that could support the revitalisation plan for the Fersina river.

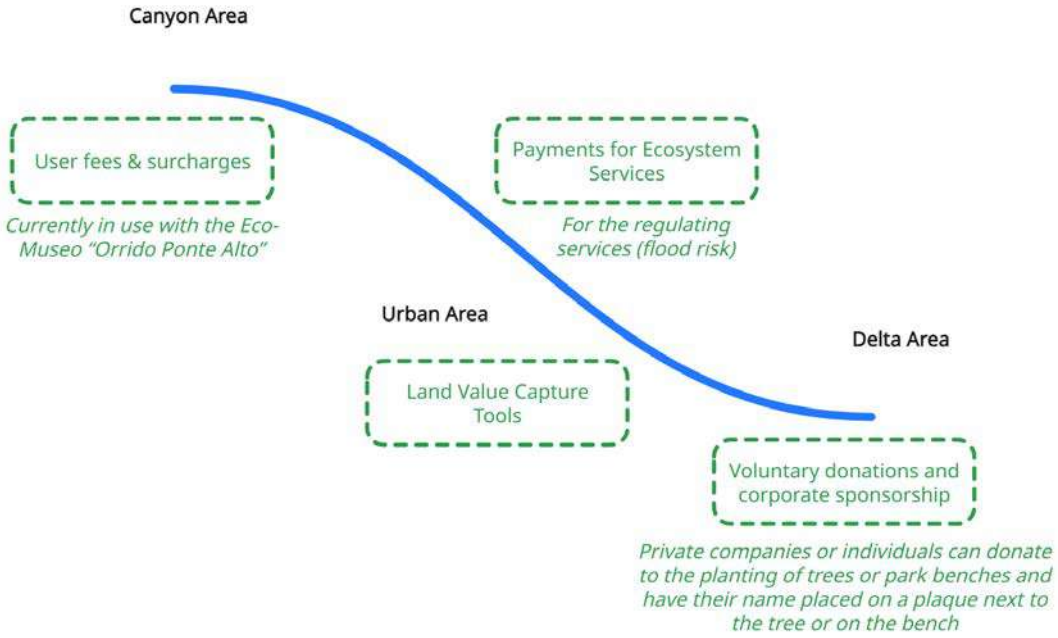


Figure 4: Potential Economic and Financial Instrument Options[7] for the BioValue Trento Arena

Municipal Spatial Planning in Mafra, Portugal

The Municipality of Mafra is currently developing the second revision of its Municipal Master Plan. With 84% rural and 16% urban areas, Mafra faces several challenges in balancing development with biodiversity conservation. The current Master Plan has vague guidelines related to biodiversity and ecosystem management. It defines land use classifications but lacks recommendations for occupation, with an imbalanced level of detail for urban and rural areas. For instance, the plan provides detailed, inflexible restrictions for urban areas, primarily linked to buildings, but offers no instructions for rural areas, particularly regarding biodiversity and ecosystem management. Many privately-owned agricultural and agroforestry areas are abandoned due to a lack of incentives for sustainable use and an absence of a profitable market for agroforestry products. The agroforestry land is under the management of the Ministry of Forestry, necessitating cross-sectoral collaborations to address this issue. In addition, increasing tourism pressure leading to housing constructions also causes loss of agricultural and agroforestry lands. The conversion of agricultural land to tourism resorts is in legal alignment with the current Master Plan. Despite a general lack of political will for biodiversity initiatives, the municipality has been making significant efforts to

[7] The detailed description and case study examples of the E&FIs presented in the figure can be found in Rode et al. (2016) and in BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity, as well as in BioValue Report D3.2: Impacts of Economic and Financial Instruments on Biodiversity in Spatial Planning for the land value capture tools.

promote biodiversity-inclusive planning in the new revision of the Master Plan, which provides a starting point for the conception and design of relevant E&FIs.

The ES focus for the BioValue Mafra Arena is on the regulating services of carbon sequestration and prevention of soil erosion. The beneficiaries of carbon sequestration are Portuguese citizens, contributing to meeting international carbon targets, while the local publicly-owned water management company benefits from soil erosion prevention. The main challenge is to develop E&FIs for public goods that channel other, preferably private, funding sources. Portuguese law allows for the establishment of a Municipal Fund for Environmental and Urban Sustainability ("Fundo Municipal de Sustentabilidade Ambiental e Urbanistica"). Despite limited practical use, there is an opportunity to structure a set of instruments around this fund. Potential financing sources for the sustainability fund could include a percentage of tax revenue from urban development fees as well as land and development taxes, and voluntary donations and corporate sponsorships. However, challenges exist as Portuguese law prohibits earmarking tax revenue for specific purposes. Additionally, the national law on local municipal financing defines tax revenue sharing among municipalities as bonuses for the municipalities with high nature value, but complex problems persist with its implementation. This needs to be addressed at national level to prioritise biodiversity conservation, potentially by defining new criteria for fund sharing. To optimise the limited funding of the sustainability fund, E&FIs such as conservation auctions and tenders could be applied. Figure 5 presents an overview of a conceptual set of instruments centered around the sustainability fund. It is important to note that the appropriateness of all instruments depicted in the figure requires further in-depth analysis. The figure serves primarily to illustrate preliminary ideas derived from discussions within the BioValue project for the BioValue Mafra Arena. These conceptual instruments and their potential applications should be viewed as a starting point for more comprehensive research and evaluation.

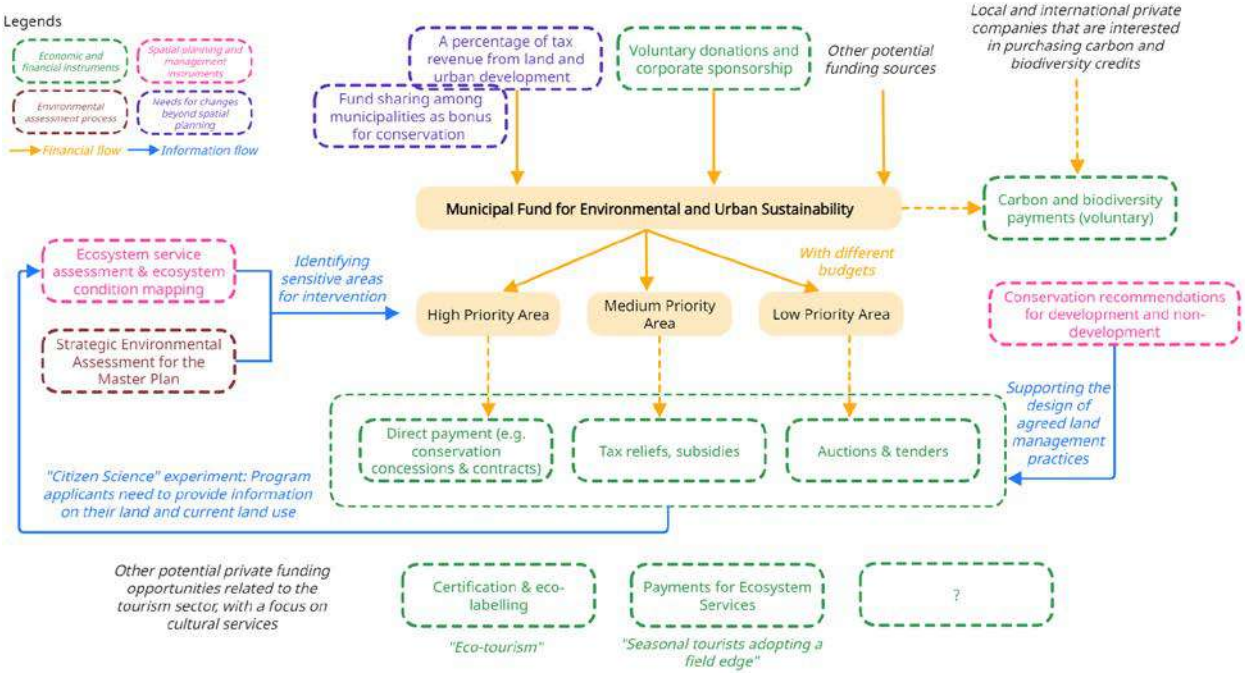


Figure 5: Potential Economic and Financial Instrument Options[8] for the BioValue Mafra Arena

[8] The detailed description as well as case study examples of the E&FIs presented in the figure can be found in Rode et al. (2016) and in BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity. Regarding the potential PES scheme on "seasonal tourists adopting a field edge", it could be a program where tourists can donate

Rewetting Peatlands under the Climate Initiative in Mecklenburg-Vorpommern, Germany

In the BioValue Mecklenburg-Vorpommern Arena, large-scale rewetting has been identified as a transformative process. However, several challenges persist in its implementation. Whilst areas designated for climate protection would foster rewetting practices, the overall prioritisation of climate protection and mitigation objectives over biodiversity goals, particularly driven by the national policy agenda emphasising energy transition, raises risks of overlooking biodiversity in the area. In addition, there exists a high opportunity cost associated with rewetting for private landowners, as it significantly decreases land value in terms of agricultural potential. Land value is primarily determined by its agricultural utility, with arable land being the most valuable and rewetted land being less valuable due to its limited capacity for profitable farming practices. This decrease in land value has a direct impact on the leasing arrangements between private landowners and farmers. From farmers' perspective, the economic viability of paludi-biomass produced from rewetted land poses a considerable challenge. Currently there is no market or value chains for paludi-biomass. Even if such biomass market were to be established, it may face potential competition from the global market, further complicating its economic prospects. Consequently, the absence of tangible private profit from rewetting practices has led to a dearth of motivation for both private landowners and farmers to participate in the programme.

The primary ES focus in this case is the regulating service of carbon sequestration and habitat services, with the farmers as stewards, and the general public as beneficiaries. Existing subsidy programmes for wet peatland production have attracted significant interest, with demand outstripping available funds. Current incentives include governmental measures such as the Second Pillar Common Agricultural Policy resources for agri-environment-climate measures, investment aid for paludiculture harvesting technology, and investment grants for young innovative companies, and private initiatives such as the NABU Climate+ funding and the AECO initiative, promoting emission certificates, and the "alliance of pioneers", led by the large German online retailer OTTO, which develops and operationalises paper packaging with paludi-biomass admixture. Further E&FI option could be to explore new business opportunities, as the "alliance of pioneers", to support the establishment of the paludiculture value chain, or to establish a functioning emission trading system favouring European peatland restoration through certification. However, cautions are needed in designing the emission trading system to avoid potential double-counting of carbon credits, as the rewetting obligations defined by the climate protection law contribute to the state's commitment to meeting its carbon targets and should be compensated through government subsidies. Only additional carbon credits generated by rewetting practices beyond these obligations could be eligible to enter the trading market, ensuring the integrity of carbon accounting and the additionality in establishing carbon credit schemes. Further innovation could involve incentivising activities along the paludiculture value chain at the state level both with regard to biomass cultivation as well as biomass processing. With regard to the former, for example, the investment support for machinery should be simplified and

money to "adopt" a field edge, which they would virtually own for a limited period of time; they can then choose a number of plant species with farmers, which farmers would plant in the adopted field edges, and can enjoy their garden or harvest when they come to visit. This type of PES scheme has been developed and applied in the Netherlands since 1995 (EC, 2017; Molenaar, 2013).

adapted to the needs of applicants. Subsidies should not be tied to a specific type of machinery, allowing applicants to choose equipment that best suits their operational requirements. The use of subsidised machinery should not be restricted to the land cultivated by the applicant. Allowing its use for contract work with other farmers could significantly rise the potential return on investment for the applicants. These measures could potentially increase the economic viability of rewetting practices and encourage participation. Figure 6 summarises potential E&FI options and their contribution to large-scale rewetting for the BioValue Mecklenburg-Vorpommern Arena. Some of the instruments are already being used in the area. Further adaptation and identification of innovative strategies, in particular to support the establishment of the paludiculture value chain should be considered.

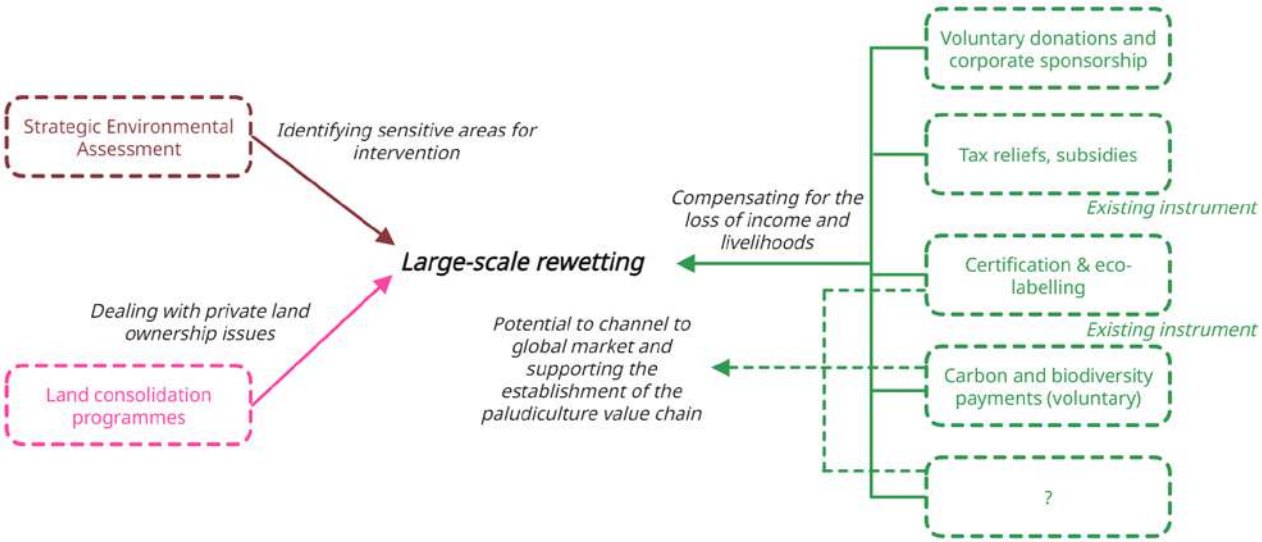


Figure 6: Potential Economic and Financial Instrument Options[9] for the BioValue Mecklenburg-Vorpommern Arena

[9] The detailed description as well as case study examples of the E&FIs presented in the figure can be found in Rode et al. (2016) and in BioValue Report D3.1: Economic and Financial Instruments to Enhance Biodiversity.

5. Summary and Outlook

The transformative potential of E&FIs can be enhanced by building on synergies with spatial planning and management instruments as well as environmental assessment processes within the spatial planning cycle. The inherent flexibility in E&FI design offers significant opportunities to contribute to the BioValue transformative change ambitions and building blocks. For example, E&FIs can be designed and implemented at multiple scales. This scalability allows insights gained from pilot projects or local planning experimentations to potentially drive changes at higher levels and across different areas and sectors.

To improve the use of E&FIs for biodiversity in spatial planning and enhance their transformative potential, guided by the BioValue transformative change framework, we adapted the Ecosystem Service Opportunities framework developed by Rode et al. (2016) for the spatial planning context with explicit biodiversity considerations. The adapted framework aims to assist planning professionals in identifying and leveraging biodiversity and ecosystem service opportunities in spatial planning. It provides guidance on selecting, designing, and implementing appropriate E&FIs, while also identifying potential synergies with spatial planning and management instruments guided by the BioValue transformative change framework. We apply this adapted framework to explore potential E&FI options for the three BioValue Arenas for Transformation at different scales, offering preliminary proposals for E&FI interventions.

This report, along with outputs from WP 1 and WP2, respectively on spatial planning and management instruments and environmental assessment instruments, serves as a starting point for the broader integration efforts of the BioValue project. These combined insights will inform the BioValue Arenas for Transformation and contribute to the BioValue policy recommendations.

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