BioValue

Economic and Financial Instruments to Enhance Biodiversity Outcomes

D3.1: Economic and Financial Instruments to Enhance Biodiversity Outcomes
WP 3, T 3.1

Authors: Yuanzao Zhu (UFZ); Heidi Wittmer (UFZ); Karla Locher-Krause (UFZ)

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Project Coordinator	Maria do Rosário Partidário University of Lisbon - Instituto Superior Técnico mariapartidario@tecnico.ulisboa.pt
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1. Introduction

The BioValue project seeks to safeguard and enhance biodiversity from a transformative change perspective by better articulating 1) spatial planning instruments, 2) environmental assessment instruments, and 3) economic and financial instruments (E&FIs) during the spatial planning process. The project builds on the conceptual framework for transformative change developed by Wittmer et al. (2021), which consists of five building blocks for transformation to sustainability (see *Annex: Transformative Change Framework by Wittmer et al., 2021*), and investigates how the three instrumental perspectives interact in practice and how they can be better integrated to enable transformative change through three case studies in Portugal, Italy, and Germany. In particular, Work Package 3 (WP3) focuses on exploring the transformative potential of economic and financial instruments impacting biodiversity in spatial planning.

Economic and financial instruments are mechanisms, e.g., incentives and disincentives, to motivate behavioural changes of various stakeholders towards desired policy objectives (IPBES, 2018). They can be used to adjust for market and policy failures by capturing the value of nature's contribution to people through restoring full-cost pricing for biodiversity and ecosystem-related activities, including the environmental and social costs, and revealing the environmental benefits, such as enhanced ecosystem services, to encourage relevant actors to adopt conservation 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 can levy an ecological tax on activities potentially harming biodiversity and ecosystem services, such as taxes on pesticides and fertilisers or natural resource use. Another common example is the payments for ecosystem services, which are voluntary transactions between beneficiaries and providers of ecosystem services to generate or enhance ecosystem service provision based on agreed measures on natural resource management.

The E&FIs provide broad opportunities to address biodiversity- and ecosystem-related issues that emerge during the spatial planning process. However, in order to properly integrate E&FIs to enhance biodiversity outcomes in spatial planning, we need to have a better understanding of the various instruments, their impacts on biodiversity, and their potential interactions with spatial planning. This report documents the research work conducted under Task 3.1, WP3. Before delving into E&FIs that enhance biodiversity, we first screened the EU Biodiversity Strategy for 2030 to understand what biodiversity policies in the context of the European Union imply for spatial planning. Then, we analysed generic E&FIs with the potential to improve biodiversity in terms of their characteristics and interactions with spatial planning. The report is structured as follows: Section 2 provides an overview of key actions under the EU Biodiversity Strategy for 2030, and the implications on spatial planning; Section 3 presents the basic characteristics of generic E&FIs enhancing biodiversity and their relevance to spatial planning; and Section 4 summarises the main findings and conclusions under Task 3.1.

2. Implications of the EU Biodiversity Policies on Spatial Planning

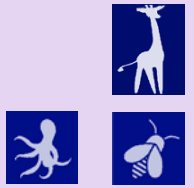
To address challenges in climate and environment-related issues, the European Commission adopted a set of policy proposals in 2020 with the overarching goal of making the European Union climate neutral by 2050, known as the European Green Deal[1]. Consisting of 47 concrete actions, the European Green Deal provides a roadmap for moving towards a clean and circular economy and tackling issues regarding climate change, biodiversity loss, and pollution. It also emphasises the importance of all EU initiatives working together to support a successful and just transition to a sustainable future for the European Union, including ensuring all the Green Deal initiatives achieve their objectives and all other EU initiatives uphold the principle of "do no harm". Particularly, under the section preserving and protecting biodiversity of the European Green Deal, the European Commission adopted the EU Biodiversity Strategy for 2030[2] in May 2020. The EU Biodiversity Strategy for 2030 is a long-term plan aiming at safeguarding nature and reversing ecosystem degradation. The strategy commits to introducing measures and actions to protect and restore nature in the European Union, enable transformative change, and tackle the global biodiversity challenges.

In order to understand the position of biodiversity in spatial planning from a policy level, we reviewed the EU Biodiversity Strategy for 2030, and summarised the key actions referred to in the strategy. We analysed the key actions from the following perspectives: 1) their direct implications on spatial planning, 2) their contribution to the "do no harm" principle proposed in the European Green Deal, and 3) the relevant building blocks from the transformative change framework.

As shown in Table 1, several actions under the strategy provide new or updated guidelines in the environmental and biodiversity regard for spatial planning. In general, the spatial planning process should be more inclusive, with a greater emphasis on the biodiversity and ecosystem aspects, e.g., through the systematic integration of green infrastructure and nature-based solutions into the spatial planning process, and application of relevant E&FIs revealing the full environmental costs and benefits of activities in spatial planning. Most actions facilitate and ensure the "do no harm" principle. In particular, the principle is operationalised by strengthening the biodiversity-proofing framework with a delegated act under the Taxonomy Regulation for establishing a common classification of sustainable economic activities. The majority of the actions are linked to the building block "transformative dynamics" of the conceptual framework.

[1] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[2] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

Table 1: Overview of the key actions under the EU Biodiversity Strategy for 2030

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
Protecting nature in the EU	Enlarging protected and strictly protected areas	New/updated regulations and guidelines regarding land and sea areas to follow; Extra protected and strictly protected areas to be considered during spatial planning	Setting up criteria and guidance, facilitating and ensuring 
	Building a truly coherent and resilient **Trans-European Nature Network** and integrating ecological corridors between protected areas	Recommended considerations on green and blue infrastructure, as well as cross-border cooperation during spatial planning	Facilitating and ensuring 
	Ensuring effective management for all protected areas with clearly defined conservation objectives and measures	Emphasised biodiversity focus on spatial planning, directly and indirectly, impacting protected areas with measures, such as area-based conservation and greening of cities	Facilitating and ensuring 
Restoring nature in the EU	Strengthening the **EU legal framework for nature restoration** with 1) legally binding EU targets for restoration, and 2) raised level of implementation of existing legislation, in synergy with the new **EU Nature Restoration Plan**	Clear and effective legislation and regulation regarding nature restoration during spatial planning, especially for the protected habitats and species involved during the process	Legislation support, monitoring 

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Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
Restoring nature in the EU	Bringing nature back to agricultural land, e.g., through the new **Farm to Fork Strategy** and the new **Common Agricultural Policy**	Updated guidelines for spatial planning involving agricultural areas	Facilitating and ensuring
	Addressing land take and restore soil systems through the **Common Agricultural Policy**, the updated **EU Soil Thematic Strategy**, the **Zero Pollution Action Plan for Air, Water and Soil**, and the upcoming **Strategy for a Sustainable Built Environment**	Additional attention on issues regarding land take, construction activities, and urban sprawl during spatial planning	Setting up criteria and guidance, facilitating and ensuring
	Reversing the decline of pollinators through the full implementation of the **EU Pollinators Initiative** and the upcoming **EU Pollinator Monitoring Scheme**	Encouraged citizen engagement and stakeholder collaboration for certain measures in spatial planning	Facilitating and ensuring, awareness raising
	Increasing the quantity of forests and improving their health and resilience through the **EU Forest Strategy, Common Agricultural Policy Strategic Plans**, the **Cohesion Policy funds**, the new **European Urban Greening Platform**, and the further development of the **Forest Information System for Europe**	More considerations on forest areas involved in spatial planning; Urban tree planting promoted	Setting up criteria and guidance, facilitating and ensuring, monitoring
	Creating win-win solutions for energy generation with strengthened sustainability criteria in the revised **Renewable Energy Directive**	New/updated criteria for spatial planning involving energy infrastructures	Setting up criteria and guidance, facilitating and ensuring

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
Restoring nature in the EU	Restoring the good environmental status of marine ecosystems, including the full implementation of the **EU's Common Fisheries Policy**, the **Marine Strategy Framework Directive,** and **the Birds and Habitats Directives**	National maritime spatial plans by Member States; Area-based conservation-management measures preferred during marine spatial planning	Setting up criteria and guidance, facilitating and ensuring 
	Restoring freshwater ecosystems in line with the objectives of the **Water Framework Directive**	Taking into account the environmental benefits, especially the enhanced ecosystem services, of investments in the restoration of floodplains and wetlands during spatial planning	Setting up criteria and guidance, facilitating and ensuring, financial and technical support 
	Bringing nature back to urban and peri-urban areas through developing **Urban Greening Plans** and setting up an **EU Urban Greening Platform**	Value of green spaces emphasised during spatial planning in the urban and peri-urban areas; Systematically integrating healthy ecosystems, green infrastructure, and nature-based solutions into urban planning	Setting up criteria and guidance, facilitating and ensuring 
	Reducing pollution by 1) putting forward a new **EU Chemical Strategy for Sustainability** along with a **Zero Pollution Action Plan for Air, Water and Soil**;2) developing and implementing a series of strategies and plans, e.g., an **Integrated Nutrient Management Action Plan, Integrated Pest Management**, the **European Strategy for Plastics**, the new **Circular Economy Action Plan**, and the **Marine Strategy Framework Directive**; and 3)	-	Setting up criteria and guidance, facilitating and ensuring, monitoring 

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Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
	developing indicators and establishing baselines for monitoring		
	Addressing invasive alien species through the implementation of the **EU Invasive Alien Species Regulation** and other relevant legislation and international agreements	-	Legislation support, setting up criteria and guidance, facilitating and ensuring 
Enabling transformative change	Creating a new **European biodiversity governance framework** and setting up a monitoring and review mechanism with a clear set of agreed indicators	Ensured co-responsibility and co-ownership by all relevant actors regarding biodiversity commitments in spatial planning	Setting up criteria and guidance, facilitating and ensuring, monitoring 
	Ensuring the full and timely implementation of the **EU Nature Directives** by completing the **Natura 2000 network** and ensuring the implementation of environment-related legislation with an impact on biodiversity	Emphasised biodiversity and ecosystem perspective during spatial planning	Legislation support, setting up criteria and guidance, facilitating and ensuring 
	Ensuring the full implementation and enforcement of EU environmental legislation, improving compliance assurance, and proposing a revision of the **Aarhus Regulation**	Spatial planning should aim at participatory processes, be inclusive, and pay more attention to environmental issues	Legislation support, facilitating and ensuring  
	Building on an integrated and whole-of-society approach through the development of a new **initiative on sustainable corporate governance**, the review of the reporting obligations of businesses under the **Non-Financial Reporting Directive**, and a European Business for Biodiversity movement with the B@B platform	-	Legislation support, setting up criteria and guidance, facilitating and ensuring, developing and sharing practices 

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
Enabling transformative change	Unlocking funding for nature through strengthening the **biodiversity proofing framework** with criteria established under the EU taxonomy to ensure that EU funding supports biodiversity-friendly investments, mobilising both private and public funding at national and EU levels for investments on Natura 2000 and green infrastructures, promoting investments on biodiversity and nature-based solutions with the **European Green Deal Investment Plan**, and establishing a dedicated **Natural-capital and Circular-Economy Initiative**	Emphasised considerations on the integration of green infrastructure, and nature-based solutions during spatial planning; Use of relevant economic and financial instruments that reveal the full environmental costs and benefits to promote biodiversity-related investments during spatial planning	Legislation support, setting up criteria and guidance, facilitating and ensuring, financial and technical support, operationalisation 
	Ensuring the sustainability of the financial system by establishing the **EU sustainable finance taxonomy**, developing a **Renewed Sustainable Finance Strategy**, promoting tax systems and pricing that reflect environmental costs, and proposing further legislation and guidance on green public procurement	Guidelines for sustainable investments and construction in spatial planning; Use of relevant economic and financial instruments to deal with environmental externalities to mitigate impacts on biodiversity or improve biodiversity during spatial planning	Setting up criteria and guidance, facilitating and ensuring, operationalisation 
	Measuring the environmental footprint of products and organisations on the environment, and supporting the establishment of an international natural capital accounting initiative	Guidance on valuing biodiversity during spatial planning	Setting up criteria and guidance, facilitating and ensuring  

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
Enabling transformative change	Investing in research, innovation, and knowledge exchange to gather the best data and develop the best nature-based solutions, including setting up a **long-term strategic research agenda for biodiversity**, promoting and facilitating partnerships, e.g., a **dedicated Biodiversity Partnership**, establishing a new **Knowledge Centre for Biodiversity**, and increased support to the **Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services**	Knowledge support for biodiversity- and nature-based solution-related practices in spatial planning	Setting up criteria and guidance, facilitating and ensuring, developing and sharing practices, awareness raising 
	Improving education and skills by proposing a **Council Recommendation on encouraging cooperation in education for environmental sustainability**, providing support materials and facilitating the exchange of good practices in EU networks of teacher-training programmes, and helping individuals and businesses with capacity-building practices within the new **Skills Agenda**	Supporting awareness raising of the general public on biodiversity- and ecosystem-related issues during spatial planning	Facilitating and ensuring, developing and sharing practices, awareness raising 
EU action to support biodiversity globally	Raising the level of ambition and commitment worldwide and working with like-minded partners in a high-ambition coalition on biodiversity	-	Awareness raising 

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
EU action to support biodiversity globally	Protecting marine biodiversity by supporting the conclusion of the legally binding agreement on marine biological diversity of areas beyond national jurisdiction, helping broker an agreement on the designation of international marine protected areas, working with partner countries and regional organisations, applying zero tolerance towards illegal, unreported and unregulated fishing and combating overfishing, and funding research on the impact of deep-sea mining activities and on environmentally-friendly technologies	Biodiversity- and ecosystem-related guidance for marine spatial planning	Facilitating and ensuring 
	Strengthening EU trade agreements by ensuring full implementation and enforcement of the biodiversity provisions in all trade agreements, better assessing the impact of trade agreements on biodiversity and strengthening the biodiversity provisions of existing and new agreements, and presenting a legislative proposal and other measures to avoid or minimise deforestation or forest degradation related products in the market	-	Legislation support, facilitating and ensuring 
	Cracking down on illegal wildlife trade by revising the **EU Action Plan against Wildlife** Trafficking, proposing a further tightening of the rules on EU ivory trade, reviewing the **Environment Crime Directive,** and strengthening the coordinating and investigative capacities of the **European Anti-Fraud**	-	Legislation support, facilitating and ensuring 

Pillar	Action	Direct implication on spatial planning	Relation to the "do no harm" principle and transformative change framework
	Office as well as international collaboration for biodiversity-friendly trade		
	Enhancing international cooperation, neighbourhood policy, and resource mobilisation with commitments to double financial flows to developing countries for biodiversity, enhanced support to global efforts to apply the **One Health Approach**, launching the **NaturAfrica initiative**, supporting the Western Balkans and EU Neighbourhood countries to protect biodiversity, and promoting biodiversity coalitions with partners and civil society around the world, e.g., by launching the **Global Biodiversity Coalition**, launching or joining other High Ambition Coalitions	-	Facilitating and ensuring, technical and financial support, awareness raising 

** The animal visuals in the table refer to the different building blocks of the transformative change framework (Annex, Wittmer et al. 2021) as follows:*  *- Transformative vision,*  *- Transformative knowledge,*  *- Transformative dynamics,*  *- Emancipation and agency.*

3. Generic Economic and Financial Instruments for Biodiversity

Overview of the Generic Economic and Financial Instruments Enhancing Biodiversity

We analysed in detail 24 generic E&FIs identified by Rode et al. (2016) as instruments with the potential to enhance biodiversity outcomes with various criteria to ensure compatible analysis for use in spatial planning. In addition to the original criteria on beneficiary-pays, polluter-pays, and steward-earns principles applied by Rode et al. (2016), we analysed the various instruments based on their common implementation scale, the scale of legislation origin, and source of finance from the instrument specificities perspective. Regarding the impacts on biodiversity, we analysed 1) at which stage(s) of the mitigation hierarchy each instrument can be applied, 2) whether the instrument addresses the direct or indirect drivers of biodiversity loss, and 3) which heavily-impacting-biodiversity sector(s) can be involved in the implementation of the instrument. We also identified seven criteria on the relevance of the instrument to spatial planning:

1) Targeted area: the regions (i.e., urban, peri-urban, rural) in which the instrument is commonly applied;
2) Land ownership: the ownership of the land where the status of the ecosystem and biodiversity is affected or changed (e.g., where ecosystem management measures take place);
3) Landowner as steward: whether the landowner can also act as a steward for ecosystem management;
4) Nature of implementation: whether the implementation of the instrument is commonly government-led, by a public-private partnership, or privately-led. If the implementation of an instrument relies on public-private partnerships, the planning authority needs to define concrete agreements with private partners. This broadens the inclusiveness of the spatial planning process but adds to the transaction costs for communication, which can be mitigated with relevant institutional infrastructure and governance measures;
5) Approaching strategy: whether the instrument is commonly initiated by government or societies/citizens;
6) Main interaction stage in spatial planning cycle: the instrument could be designed, discussed, negotiated, integrated, or implemented within which stage of the spatial planning cycle[3];
7) Cross-authority collaboration: whether the instrument can be decided and implemented by the spatial planning authority alone or requires collaboration between the planning authority and other management authorities.

[3] We applied the five stages of the spatial planning cycle defined by Taylor (1998).

Table 2 summarises all the criteria and respective categories applied in the characterisation of the 24 generic E&FIs enhancing biodiversity outcomes.

Table 2: Criteria for the characterisation of the generic E&FIs enhancing biodiversity

Criteria		Categories
Instrument specificities	**Scale of implementation**	Block; Neighbourhood; Municipal; Intermunicipal; Subnational; National; Cross-border
	Scale of legislation origin	International-level; EU-level; National-level; Municipal-level
	Who pays	Beneficiary; Polluter
	Steward Earns	Yes; No
	Source of finance	Public; Private- financial institutions; Private- property developers; Private- individuals; Private- business; Private- charity and others
Impacts on biodiversity	**Position on mitigation hierarchy**	Avoid; Minimise; Restore; Offset
	Impact on drivers of biodiversity loss	Direct; Indirect; Depends
	Sectors impacting biodiversity involved	Mobility; Energy; Agri-food; Forestry; Tourism; Construction; Fisheries; All
Relevance to spatial planning	**Targeted area**	Urban; Peri-urban; Rural
	Land ownership	Public; Private
	Landowner as steward	Yes; No; Depends
	Nature of implementation	Government-led; Public-private partnership; Privately-led and others
	Approaching strategy	Top-down; Bottom-up
	Main interaction stage in spatial planning cycle	1- Definition of problems and/or goals; 2- Identification of alternative plans/policies; 3- Evaluation of alternative plans/policies; 4- Implementation of plans/policies; 5- Monitoring of effects of plans/policies
	Cross-authority collaboration	Yes; No

** NA is used when certain criteria do not apply to the instrument*

Based on the criteria (table 2), we reviewed the 24 E&FIs with positive impacts on biodiversity. Figure 2 presents an overview of the generic E&FIs along the mitigation hierarchy according to their main interaction stage. Most of the instruments operationalise at the minimise stage, which is often applied to the restore stage as well. Two instruments, respectively *voluntary donations and*

corporate sponsorship, and *prizes, awards & other recognition*, are missing from the figure as they do not hold a clear position on the mitigation hierarchy.

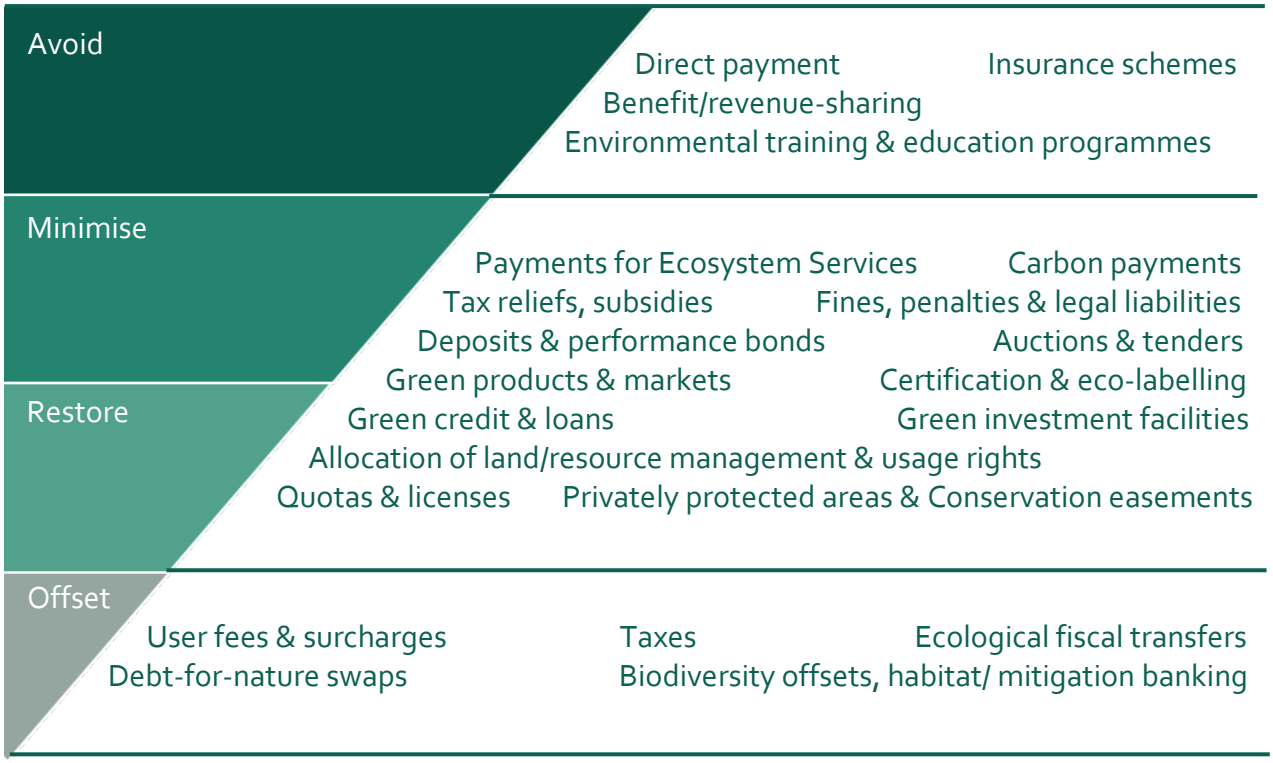

Figure 1: E&FIs along mitigation hierarchy regarding their main interaction stage

Tables 3a, 3b, and 3c summarise the characteristics of the 24 generic E&FIs that improve biodiversity regarding instrument specificities, impacts on biodiversity, and relevance to spatial planning as defined previously, as well as examples of application in the region of the European Union. In a few cases, we include application examples from New Zealand as a reference for the integrated and whole-of-society approach.

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Table 3a: Overview of the generic E&FIs enhancing biodiversity- instrument specificities

Instrument	Scale of implementation	Scale of legislation origin	Who pays	Steward earns	Source of finance
User fees & surcharges	Neighbourhood	National-level	Beneficiary, Polluter	Yes	Private- individuals, Private- business
Payments for Ecosystem Services (PES)	Neighbourhood, Municipal, Intermunicipal, Subnational, National, Cross-border	EU-level, National-level	Beneficiary	Yes	Public, Private- individuals, Private- businesses, Private- charity and others
Carbon payments	Neighbourhood, Municipal, Intermunicipal, Subnational	National-level, Municipal-level	Beneficiary, Polluter	Yes	Public, Private- financial institutions, Private- property developers, Private- individuals, Private- business
Direct payment (e.g. conservation concessions & contracts, compensation etc.)	Neighbourhood, Municipal, Intermunicipal, Subnational, National, Cross-border	EU-level, National-level	Beneficiary	Yes	Public, Private- financial institutions, Private- businesses, Private- charity and others
Taxes	Subnational, National	National-level	Beneficiary, Polluter	No	Private- individuals, Private- business
Tax reliefs, subsidies	Municipal, National	EU-level, National-level	*NA*	Yes	Public
Voluntary donations and corporate sponsorship	Neighbourhood, Municipal, Intermunicipal, Subnational, National, Cross-border	National-level, Municipal-level	Beneficiary, Polluter	Yes	Private- individuals, Private- businesses, Private- charity and others

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Instrument	Scale of implementation	Scale of legislation origin	Who pays	Steward earns	Source of finance
Insurance schemes	Neighbourhood, Municipal	National-level, Municipal-level	Beneficiary	Yes	Public, Private- financial institutions
Ecological fiscal transfers	National	EU-level, National-level	Beneficiary	Yes	Private- individuals, Private- businesses
Debt-for-nature swaps	Cross-border	International-level	Beneficiary, Polluter	Yes	Public
Benefit/revenue-sharing	Neighbourhood, Municipal	National-level, Municipal-level	Beneficiary	Yes	Public, Private- individuals, Private- businesses
Prizes, awards & other recognition	Cross-border	*NA*	*NA*	Yes	Public, Private- charity and others
Fines, penalties & legal liabilities	National	EU-level, National-level	Beneficiary, Polluter	No	Private- property developers, Private- individuals, Private- businesses
Deposits & performance bonds	Subnational, National	National-level	Polluter	No	Private- property developers, Private- individuals, Private- businesses
Auctions & tenders	Block, Neighbourhood, Municipal, Intermunicipal	National-level, Municipal-level	Beneficiary, Polluter	Yes	Public
Biodiversity offsets, habitat/ mitigation banking	National, Cross-border	International-level, EU-level	Polluter	Yes	Private- property developers, Private- businesses
Green products & markets (alternative	Municipal, Intermunicipal, Subnational, National	National-level, Municipal-level	*NA*	Yes	Public

Instrument	Scale of implementation	Scale of legislation origin	Who pays	Steward earns	Source of finance
income & employment sources)					
Certification & eco-labelling	Municipal, Intermunicipal, Subnational, National	National-level, Municipal-level	*NA*	Yes	Public
Green credit & loans	Municipal, Subnational, National	National-level, Municipal-level	*NA*	Yes	Public, Private- financial institutions
Green investment facilities (conservation bonds, green investment funds, blended finance, etc.)	Municipal, Subnational, National, Cross-border	EU-level, National-level, Municipal-level	*NA*	Yes	Public, Private- financial institutions
Allocation of land/resource management & usage rights	National	National-level	Beneficiary	Yes	Public
Environmental training & education programmes	Neighbourhood, Municipal, Subnational, National	EU-level, National-level, Municipal-level	Beneficiary, Polluter	Yes	Public, Private- charity and others
Quotas & licenses	Neighbourhood, Municipal, Intermunicipal, Subnational, National	National-level	Beneficiary, Polluter	No	Private- individuals, Private- businesses
Privately protected areas (PPAs) & Conservation easements	Municipal, Subnational, National	National-level	Beneficiary	Yes	Public, Private- businesses, Private- charity and others

Table 4b: Overview of the generic E&FIs enhancing biodiversity- relevance to spatial planning

Instrument	Targeted area	Land ownership	Landowner as steward	Nature of implementation	Approaching strategy	Main interaction stage in spatial planning cycle	Cross-authority collaboration
User fees & surcharges	Peri-urban, Rural	Public, Private	Depends	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Payments for Ecosystem Services (PES)	Urban, Peri-urban, Rural	Public, Private	Depends	Government-led, Public-private partnership, Privately-led and others	Top-down, Bottom-up	4- Implementation of plans/policies	Yes
Carbon payments	Rural	Public, Private	Yes	Government-led, Public-private partnership	Top-down, Bottom-up	4- Implementation of plans/policies	Yes
Direct payment (e.g. conservation concessions & contracts, compensation etc.)	Rural	Private	Yes	Government-led, Privately-led and others	Top-down, Bottom-up	4- Implementation of plans/policies	Yes
Taxes	Urban, Peri-urban, Rural	*NA*	*NA*	Government-led	Top-down	4- Implementation of plans/policies	Yes
Tax reliefs, subsidies	Rural	Private	Yes	Government-led	Top-down	4- Implementation of plans/policies	Yes

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Instrument	Targeted area	Land ownership	Landowner as steward	Nature of implementation	Approaching strategy	Main interaction stage in spatial planning cycle	Cross-authority collaboration
Voluntary donations and corporate sponsorship	Rural	Public, Private	Yes	Public-private partnership, Privately-led and others	Bottom-up	4- Implementation of plans/policies	Yes
Insurance schemes	Rural	Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Ecological fiscal transfers	Urban, Peri-urban, Rural	Public	Yes	Government-led	Top-down	4- Implementation of plans/policies	Yes
Debt-for-nature swaps	Urban, Peri-urban, Rural	Public	Yes	Government-led	Top-down	4- Implementation of plans/policies	Yes
Benefit/revenue-sharing	Rural	Private	Yes	Government-led, Privately-led and others	Top-down, Bottom-up	4- Implementation of plans/policies	Yes
Prizes, awards & other recognition	Urban, Peri-urban, Rural	Private	Yes	*NA*	*NA*	*NA*	*NA*
Fines, penalties & legal liabilities	Urban, Peri-urban, Rural	*NA*	*NA*	Government-led	Top-down	5- Monitoring of effects of plans/policies	Yes
Deposits & performance bonds	Urban, Peri-urban, Rural	*NA*	*NA*	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes

Instrument	Targeted area	Land ownership	Landowner as steward	Nature of implementation	Approaching strategy	Main interaction stage in spatial planning cycle	Cross-authority collaboration
Auctions & tenders	Rural	Private	Yes	Government-led	Top-down	4- Implementation of plans/policies	No
Biodiversity offsets, habitat/ mitigation banking	Urban, Peri-urban, Rural	Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Green products & markets (alternative income & employment sources)	Peri-urban, Rural	Public, Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Certification & eco-labelling	Peri-urban, Rural	Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Green credit & loans	Urban, Peri-urban, Rural	Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Green investment facilities (conservation bonds, green investment funds, blended finance, etc.)	Urban, Peri-urban, Rural	Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes

Instrument	Targeted area	Land ownership	Landowner as steward	Nature of implementation	Approaching strategy	Main interaction stage in spatial planning cycle	Cross-authority collaboration
Allocation of land/resource management & usage rights	Urban, Peri-urban, Rural	Public, Private	Yes	Government-led	Top-down	2- Identification of alternative plans/policies	No
Environmental training & education programmes	Urban, Peri-urban, Rural	Public, Private	Yes	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Quotas & licenses	Peri-urban, Rural	Public, Private	Depends	Government-led, Public-private partnership	Top-down	4- Implementation of plans/policies	Yes
Privately protected areas (PPAs) & Conservation easements	Rural	Private	Yes	Government-led	Top-down	4- Implementation of plans/policies	Yes

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Table 5c: Overview of the generic E&FIs enhancing biodiversity- impacts on biodiversity and example of application

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
User fees & surcharges	Offset	Direct	Forestry, Tourism, Fisheries	**Estonia**: In Estonia, recreational fishing and hunting fees have been established by national Acts since the 1990s. For example, the fishing fees are classified based on the purpose of fishing and the time period according to the Estonian Fishing Act. The revenue generated by these user fees is used to support the country's conservation efforts through the Environmental Investment Centre (Kettunen & Illes, 2017).
Payments for Ecosystem Services (PES)	Avoid, Minimise	Direct	Agri-food, Forestry, Tourism, Fisheries	**Sweden:** The KOMET Programme is a publicly funded PES scheme initiated by the Swedish government in 2010. The initiative focuses on supporting services in terms of habitat provision and forest biodiversity. Agreements were signed between the government and private forest landowners, defining fixed-rate payments to landowners for measures that protect high nature-value forests on their lands (Viszlai et al., 2016).
Carbon payments	Avoid, Minimise	Direct	Agri-food, Forestry	**Romania**: The Romanian NGO Fundatia ADEPT, in collaboration with the Biodiversity Credit Company, develops a combined biodiversity and carbon credit scheme in Transylvania. Through the sale of both credits, additional funding will be raised to support the small-scale farmers to

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
				maintain their management of the high-biodiversity grasslands and sustain traditional agricultural communities (ADEPT & BCC, 2022; ENPLC, 2022).
Direct payment (e.g. conservation concessions & contracts, compensation etc.)	Avoid	Direct	Agri-food, Forestry, Tourism	**Ireland and Spain**: The RBAPS project developed a mechanism to reward farmers based on the tangible biodiversity outcome on the ground in three pilot regions in Ireland and Spain. The payments are based on two-year contracts. The level of payments is directly connected to the habitat condition, which is graded on a scale of 1 to 10 as a measurement of the quality of the desired environmental performance that is delivered on their farmland (Byrne et al., 2018).
Taxes	Offset	Direct	All	**Norway**: In Norway, pesticide tax is regulated based on various rates for eight categories of plant-protection goods depending on their potential harm to the environment and human health. Since the adoption of the tax, both the sales of these goods and the health and environmental risks have decreased (EEA, 2005).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
Tax reliefs, subsidies	Avoid, Minimise	Direct	Agri-food, Forestry, Construction	**France:** For more than ten years, France has implemented a number of tax incentives and reductions to support biodiversity conservation goals. For example, if the landowner agrees to follow certain management practices, undeveloped land on Natura 2000 sites can be exempted from property tax; inheritance tax may also be exempted for the transfer of these lands through succession or gift; and tax can also be waived for Natura 2000 site management costs (Kettunen & Illes, 2017).
Voluntary donations and corporate sponsorship	Avoid, Minimise, Restore, Offset	Depends	All	**Global**: Since 2010, the Climate & Biodiversity Initiative, established by the corporate foundation of the European bank BNP Paribas, has been financing research on climate change and biodiversity worldwide. It also announces financial support for IPBES activities as a contribution to biodiversity science and policy starting in 2022 (IPBES, 2022).
Insurance schemes	Avoid	Direct	Agri-food, Forestry, Tourism	**Italy:** In 2005, the Regional Administration of Tuscany implemented an insurance scheme to compensate for livestock losses caused by predators. Farmers who participated in the program could be reimbursed a portion of the market value of depredated livestock, as well as abortions or missing livestock. The scheme has been modified since 2010, with lower

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
				compensation and increased premiums for livestock owners who suffered significant losses in previous years (Marino et al., 2016).
Ecological fiscal transfers	Offset	Direct	All	**Portugal:** Portugal has implemented an Ecological Fiscal Transfers scheme since 2007 to assist municipalities with land designated as nature conservation and protected areas. In the reformed Local Finances Law, ecological indicators were added to the distribution plan of fiscal transfers from the central government to the municipalities (Kettunen & Illes, 2017).
Debt-for-nature swaps	Offset	Direct	All	**Poland:** The Polish Ecofund is an independent non-profit foundation established by Poland's Ministry of Finance to manage the proceeds of Poland's debt-for-environment agreement with the Paris Club of creditor nations. From 1991 to 1997, countries such as the United States, France, Switzerland, Sweden, and Norway agreed to transfer a portion of their Polish debt to Ecofund in order to fund projects in Poland addressing air, water, and soil pollution, climate change, and biodiversity conservation (OECD, 1998).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
Benefit/revenue-sharing	Avoid	Direct	Agri-food, Forestry, Tourism, Fisheries	**Cook Islands** (original case study from Rode et al., 2016)**:** Takitumu Conservation Area, a community-owned ecotourism enterprise, has been established under the auspices of the South Pacific Regional Environment Programme. Only local people own the land and resources, and ecotourism has now become the area's main economic activity. Profits are shared between the Conservation Area Coordinating Committee (for reinvestment in conservation activities) and landowning families (as dividends). Part of the revenue earned from ecotourism activities is paid to locals in compensation for reducing the local harvest of prawns and eels and the hunting of the Pacific fruit bat and Pacific pigeon (Tiraa & Wilmott, 2001).
Prizes, awards & other recognition	*NA*	Indirect	All	**Romania** (original case study from Rode et al., 2016)**:** The village of Sinca Noua has declared itself to be the first 'ecological village' in the country, and the local council has elaborated a sustainable development strategy. This includes measures to strengthen small-scale traditional agriculture by certifying it as organic, the development of eco-tourism, the creation of Protected Areas, and the implementation of an environmental education plan for the local population. In recognition of these efforts, Sinca Noua was awarded the

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
				'European Village' prize by the EU in 2005 (Sinca Noua Foundation & Stroming Ltd, 2005).
Fines, penalties & legal liabilities	*If effective*: Avoid, Minimise; *Else*: Offset	Direct	Forestry, Fisheries	**Bulgaria:** The national Liability of Prevention and Remediation of Environmental Damages Act and two associated regulations were adopted in Bulgaria in response to the EU Environmental Liability Directive. Sectoral Acts are also in effect to address soil contamination, water pollution, and damage to protected species and natural habitats (Deloitte & Bilbomática, 2019).
Deposits & performance bonds	*If effective*: Avoid, Minimise; *Else*: Offset	Direct	Construction	**Finland:** To avoid the prospect of an additional packaging tax, Finland established industry-run deposit-refund arrangements for drink containers. There are two deposit-refund systems in place: some manufacturers and retailers collect and recycle bottles and cans from their own customers, while other agencies operate the deposit-refund system based on container types regardless of the manufacturer (OECD, 2014).
Auctions & tenders	Avoid, Minimise	Direct	Agri-food, Forestry, Tourism	**Germany:** The county Steinburg in Schleswig-Holstein implemented a series of payment-by-results biodiversity conservation procurement auctions for the conservation of regional endangered plant species. Landowners with grassland sites in the case study region were

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
				allowed to participate in the reverse auction with a separate bid for each site. They would not be paid, however, if the pre-defined ecological conditions were not met (Groth, 2009).
Biodiversity offsets, habitat/ mitigation banking	Offset	Direct	All	**Germany**(original case study from Rode et al., 2016)**:** The law obliges project developers to offset impacts on landscapes and biodiversity by renaturalising comparable habitats (eftec et al., 2010).
Green products & markets (alternative income & employment sources)	Minimise	Indirect	Agri-food, Forestry, Tourism, Fisheries	**Spain:** The NGO Fundación Global Nature developed an initiative to promote biodiversity-friendly farming practices in Natura 2000 sites in Castile-La Mancha and Castile-Leon. Farmers practised organic farming while adhering to agreed-upon environmental guidelines for biodiversity protection. The products are packaged, labelled, and differentiated as nature-friendly agricultural products, with explicit references to their origin and environmental benefits (Kettunen & Illes, 2017).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
Certification & eco-labelling	Minimise	Indirect	Agri-food, Forestry, Tourism, Fisheries	**Latvia** (original case study from Rode et al., 2016)**:** An eco-labelling initiative named the Green Certificate is being implemented by the Latvian Country Tourism Association and the Latvian Environment Protection Fund. It aims to promote environmentally-friendly tourism in rural areas and also to improve the quality of life of local communities. The Green Certificate is assigned to enterprises that conserve biodiversity, minimise resource use, offer environment-friendly tourist activities, serve locally produced food, and provide extensive information on local natural, cultural, and historical attractions (Latvian Country Tourism Association, 2004).
Green credit & loans	Minimise	Indirect	Agri-food, Forestry, Tourism, Construction, Fisheries	**Netherland:** In collaboration with the banking sector, the Dutch Ministries introduced a green fiscal program in 1995 which combined green loans with tax relief measures to encourage nature-friendly investments. Businesses that engage in green activities such as organic farming and green housing could obtain low-interest green loans from banks and specialised green funds. As a result of the frequently lower return on investment with green funds, the government would offer a fiscal advantage for those who invest in green funds to make it financially viable (Alony, 2010).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
				EU: Through Natural Capital Financing Facility, the European Investment Bank offers loans and investments to support nature conservation initiatives, such as payments for ecosystem services, green infrastructure, innovative pro-biodiversity and adaptation investments, and biodiversity offsets (EC, 2018).
Green investment facilities (conservation bonds, green investment funds, blended finance, etc.)	Minimise	Depends	Construction	**New Zealand:** Westpac entered into the New Zealand green bond market in 2019 through its Euro Medium Term Note funding programme. The bond will finance a variety of projects, including energy, transportation, green buildings, and adaptation (Boulle & Nolan, 2019). **EU:** The EU green bond market has grown rapidly. The market is particularly significant in Nordic countries such as France, the Netherlands, Germany, and Switzerland. Green bond profits are used to fund initiatives in a variety of areas, including renewable energy, low-carbon transportation, water and waste management, biodiversity, agriculture, and forestry (Eisinger et al., 2016).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
Allocation of land/resource management & usage rights	Minimise	Indirect	Agri-food, Forestry, Tourism, Construction, Fisheries	**Slovenia** (original case study from Rode et al., 2016)**:** The Nature Protection Law allows PAs to be managed via commercial management concessions and stewardship agreements run by companies or NGOs. For example, the management of the Nature Reserve Škocjanski has been entrusted to the biggest nature protection NGO in Slovenia, while SOLINE Pridelava Soli d.o.o (Salt Production Co. Ltd.) manages Secovlje Salina Nature Park (Kus Veenvliet & Sovinc, 2009).
Environmental training & education programmes	Avoid, Minimise	Indirect	All	**Germany:** The ongoing UBi initiative was launched to support the implementation of the National Strategy on Biodiversity (NBS) in Germany. The project seeks to reduce the negative effects of entrepreneurial activities on biodiversity by encouraging biodiversity-related dialogues and networking among businesses, NGOs, and policymakers. It aims to raise corporate awareness by providing businesses and organisations the state-of-art biodiversity knowledge and enhancing its incorporation into their strategic planning through tools such as guidelines, an online self-check, and training courses (Augustin, 2022; BMUV, 2021).

Instrument	Position on mitigation hierarchy	Impact on drivers of biodiversity loss	Sectors impacting biodiversity involved	Example of application
Quotas & licenses	Minimise, Offset	Direct	Forestry, Tourism, Fisheries	**New Zealand** (original case study from Rode et al., 2016)**:** To ensure sustainable management of fish stocks, the government has introduced a system of tradable fishing quotas under the Fisheries Act 1986. Every year the Fisheries Ministry sets a new Total Allowable Catch (TAC), based on the biological assessment of the stock, which is handed out as 'individual tradable quotas' to fishing companies. Companies are free to decide whether to use their quota (catch fish) or to sell or buy remaining quotas depending on their profits per catch (TEEB, 2009).
Privately protected areas (PPAs) & Conservation easements	Avoid, Minimise	Direct	Tourism	**Spain** (original case study from Rode et al., 2016)**:** "Foundation Catalunya - La Pedrera" (FCLP) owns a network of 24 natural sites (7,800 ha purchased), called Xarxa Espais Natura, which is Spain's largest privately owned network, almost all within the Natura 2000 Network and other lands with conservation agreements. The total land equals 5.18% of the Catalonia region (Stolton et al., 2014).

Application Potentials of Economic and Financial Instruments in Spatial Planning

Based on the analysis of generic E&FIs enhancing biodiversity, we identified four main potential integration points of the E&FIs into the spatial planning process (Figure 3):

1. E&FIs positioned at the early stages of mitigation hierarchy (i.e., avoid and minimise) for safeguarding biodiversity, e.g., *auctions & tenders*;
2. E&FIs positioned at the late stages of mitigation hierarchy (i.e., restore and offset) for mitigation, e.g., *biodiversity offsets*, *habitat/mitigation banking*;
3. E&FIs with a conditional position on the mitigation hierarchy for monitoring, e.g., with the instrument *fines, penalties & legal liabilities*, it is commonly designed to avoid and minimise negative impacts of certain activities on biodiversity; however, in practice, when this instrument comes into force, the revenue collected from the penalties will be used to offset the detrimental effects of these activities on biodiversity;
4. E&FIs for awareness raising, e.g., *environmental training & education programmes*.

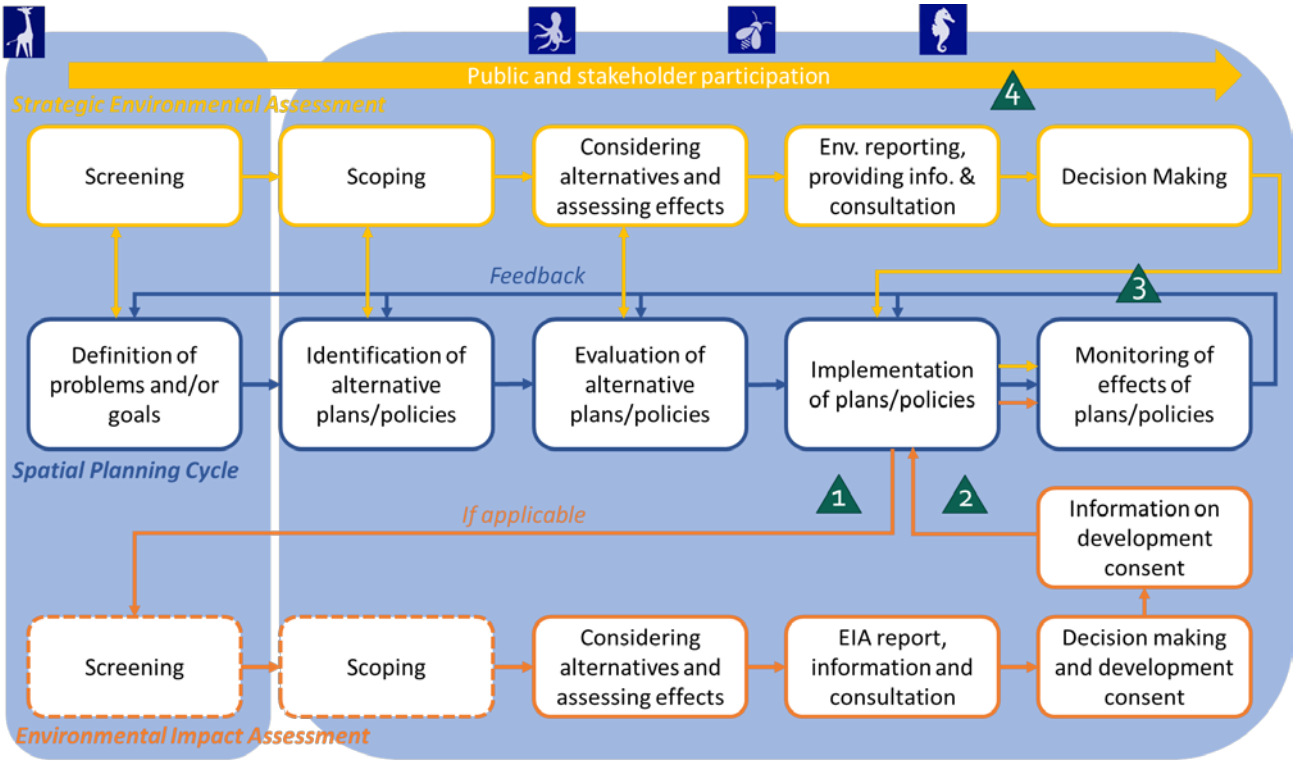


Figure 2: Spatial planning process in connection with environmental assessment processes, integrated from the spatial planning cycle (Taylor, 1998), environmental impact assessment process (EC, 2017), and strategic environmental assessment process (EC, 2013)

Each type of E&FIs with application potential in spatial planning contributes to the levers for transformative change defined in the Global Biodiversity Outlook 5 (CBD, 2020) to different extents, as shown in Figure 4. For example, E&FIs for safeguarding biodiversity ensure the development of incentives for environmental responsibility and biodiversity conservation. Most

instruments under this category require collaboration from different actors, which enforces integrated planning and management process across sectors. Since these instruments are positioned at the early stages of the mitigation hierarchy, they also contribute to precautionary actions to avoid and minimise biodiversity and ecosystem deterioration. In addition, the E&FIs for safeguarding biodiversity may increase resilience, e.g., through incorporating green infrastructure and nature-based solutions, into the social and ecological systems.

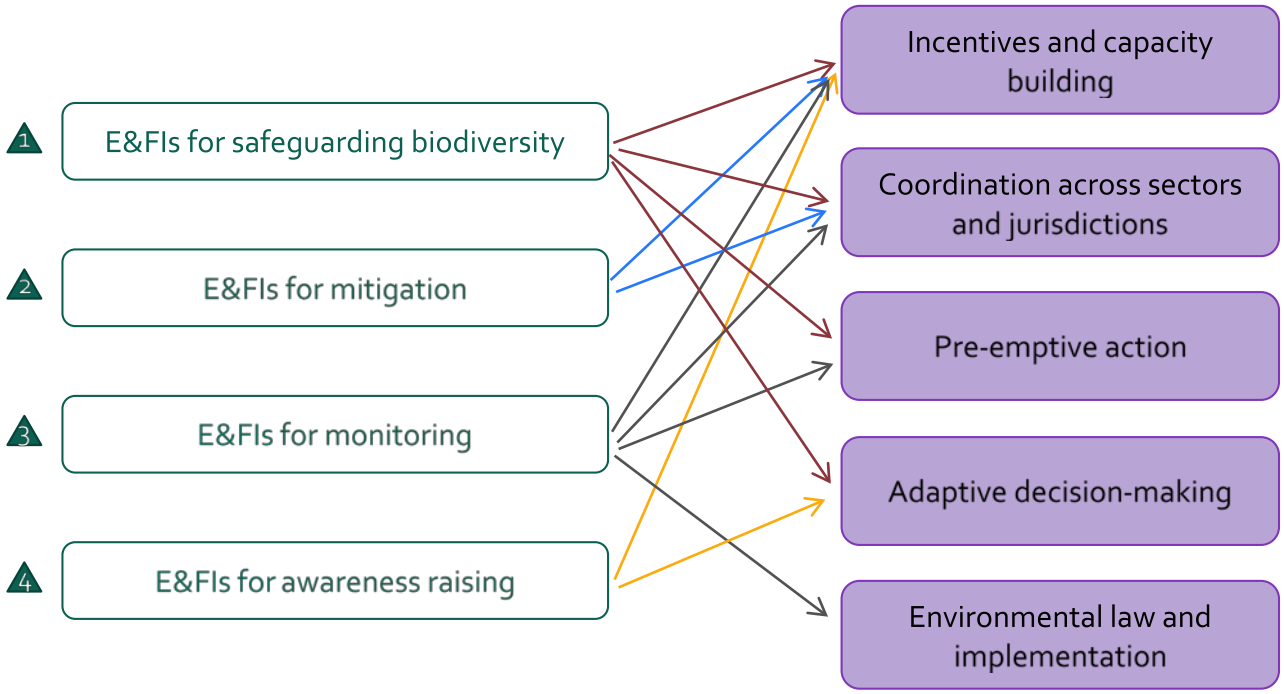


Figure 3: The linkages between E&FIs with application potential in spatial planning and the Global Biodiversity Outlook 5 levers for transformative change

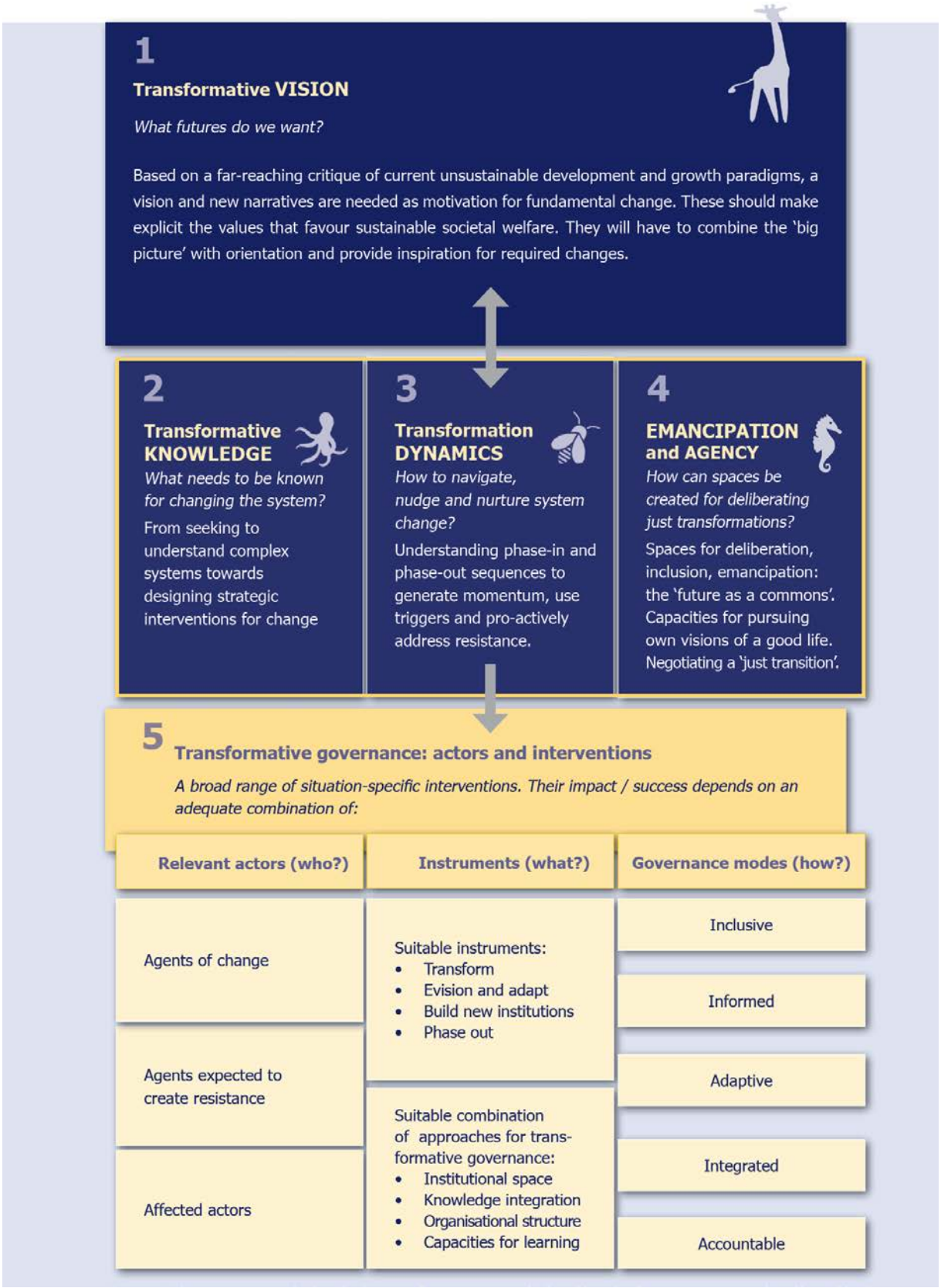
4. Conclusions

Under Task 3.1, we screened the EU Biodiversity Strategy for 2030 and identified the direct implications of the various actions on spatial planning. Effective implementation of the EU Biodiversity Strategy for 2030 would require that:

1) Spatial planning should adhere to the updated guidelines regarding specific environmental perspectives, including explicitly considering how planning decisions might affect biodiversity and ecosystems.
2) Similarly, the process of spatial planning should be more inclusive and participatory, promote cross-sector collaboration, and motivate all stakeholders to take action to safeguard biodiversity.
3) It is especially important to take the value of biodiversity and ecosystems into account during spatial planning. The broad range of E&FIs provides opportunities to internalise environmental costs and benefits at different planning stages throughout the planning process.

We conducted an in-depth analysis on the characterisation of 24 generic E&FIs with the potential to improve biodiversity from three perspectives, respectively instrument specificities, impacts on biodiversity, and relevance to spatial planning, and explored the application potential of generic E&FIs during spatial planning. Several categories might be used to group the E&FIs. To determine which E&FIs would be most appropriate for which circumstance requires further contextualisation of a concrete case. These analyses provide a basis for the upcoming work under WP3 on the development of guidelines and recommendations for the integration of E&FIs into the spatial planning process under the transformative change context. In addition to the E&FIs enhancing biodiversity that should be better integrated and promoted during spatial planning, we will investigate perverse instruments currently being used in practice that are harmful to biodiversity and should be stopped.

Annex: Transformative Change Framework by Wittmer et al., 2021



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