LUISS

Luiss law, digital innovation, sustainability

Department of Law

Master of Science in Law, Digital Innovation and Sustainability

Course of Law & Policy of Innovation and Sustainability

Financing Nature: Questioning Emphasis on Private Sector-Driven Biodiversity Conservation via Market-Based and Blended Finance Strategies

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Academic Year: 2022/2023

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“How come the most intellectual creature to ever walk Earth is destroying its only home?”

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INTRODUCTION

Nature and related ecosystem services are at the basis of our economic system and enable the well-being of our societies. Forests, landscapes, oceans and coral reefs everyday serve vital functions of climate and water regulation, soil fertility and food production, energy and medicines provisions that fundamentally support our life on this planet. However, human-related activities are dangerously impacting the *planetary boundary* of biodiversity integrity, entering zones of high uncertainty and triggering tipping points. The World Risks Report 2023 of the World Economic Forum listed those associated with the loss of biodiversity as the most severe risks globally[1].

Despite precedent regulatory commitments to preserve natural resources, the efforts required to align with the ambitious goals and targets outlined in the new Global Biodiversity Convention (CBD) set in Montreal at the UN Biodiversity Conference (COP 15), as well as those of the EU Green Deal and the EU Biodiversity Strategy, are far more demanding and systemic. For political commitments to be translated into concrete actions, the so-called "*biodiversity funding gap*" must be reduced. In recent years, decision-makers have been developing a regulatory framework capable of bringing nature into the financial equation, shining a spotlight on the double materiality of business and financial sector in terms of nature-related risks and impacts. In the wake of the understanding that the private sector can play a key role in mobilizing the resources needed to protect biodiversity and significantly reduce negative impacts, we are progressively witnessing the creation of market-based mechanisms and nature markets linked to private entities and investors, and business led initiatives to develop new incentives, standards and metrics.

In the last decade, but to a greater degree after the CBD, sustainable finance forums and policy circles started prioritizing "mainstreaming" these instruments to finance biodiversity goals, arguing that well-designed market mechanisms can play an important and targeted role in addressing biodiversity loss and avoid nature degradation, overcoming multi-level regulatory failures. This phenomenon fits in the broader tendency in environmental governance to shift away from state to "non-state" actors, from state-centric forms of social and economic regulation to a multi-scaled one, reshaping the public–private divide.

However, over-reliance on private institutional investors to finance conservation outcomes should be treated with caution. According to the state of the art, such mechanisms do not appear to always bring clear additionality or meet expected outcomes, for multiple reasons related to specific design features that systematically interact with the socio-legal context in which the tool is implemented, but also for intrinsic frictions with the investor's mindset and requirements, information asymmetries, and the lack of metrics capable of effectively capturing impact. The OECD, the World Economic Forum, the UNDP and many other

[1] WEF, «Global Risks Report 2023», accessed 8 September 2023, https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf.

internationally influential organizations, highlight the use of 'blended finance' solutions as an innovative tool to more efficiently finance nature goals, simultaneously delivering development impact and financial returns. Blended finance, i.e., the use of public or philanthropic concessional sources and market-rate private funds, has gained prominence for its potential to mobilize and leverage private capital flows in sustainable development, catalyze new business models and design investment vehicles for biodiversity management. In particular, many scholars and decision makers consider Development Financial Institutions (DFIs) and Multilateral Development Banks (MDBs) as strategic actors in the global effort to enhance biodiversity financing.

The purpose of this research is to investigate to what extent innovative financial and market mechanisms involving the private sector are able to pursue biodiversity outcomes, identifying potentials and challenges, but mostly to contribute to the literature calling for caution and questioning the current emphasis on market approach for biodiversity conservation, that risks downgrading and deprioritizing the role of the public sector. The relevance of the study derives from the momentum globally building in recognizing this decade as fundamental to reverse biodiversity loss and to rely on private sector involvement to secure a nature-positive future by 2030. However, encouraging or even allowing trade in markets that are not sufficiently mature to ensure agreed minimum performance standards (nature-positive outcomes) carries significant risks. Markets take time to develop, and it would be difficult to get out of trouble if we move too quickly and advance poor market design.

More specifically, the aim of this empirical study is two-folded: to provide a comprehensive overview of the critical governance and implementation factors affecting Market Based Instruments (MBIs) success and to understand which are the elements that influence the appeal of investors when it comes to nature and biodiversity impact investing.

Structure of the research:

Following this research line, the paper has been structured as follows:

In order to provide the reader with a comprehensive explanation of the context and the investigational area, the first part will serve the function of a "science-policy interface". Firstly, the literature will be reviewed to provide a general definition of the terms 'Biodiversity' and 'Ecosystem Services', for a due framing of basic concepts. Subsequently, the paper will delve into the current state and drivers of biodiversity loss, drawing on the most recent and reliable scientific reports, and highlighting the fundamental interlinkages between biodiversity and climate change. Then the focus will shift on a more legal ground, going to analyze the International and European policy frameworks most relevant to the discussion, such as the Aichi Targets, the Global Biodiversity Framework (GBF), the Treaty on Biodiversity Beyond National Jurisdiction (BBNJ), the EU Biodiversity Strategy and the new EU Nature Restoration Law.

Following the comprehensive discussion of the relevant biodiversity regulatory frameworks, an in-depth look at the field of biodiversity finance will be deployed. The second section will be dedicated to set the stage for the core research, providing at the beginning an overview of the complex network of impacts and dependencies that tie our societies and economies' well-being to the natural environment. Nature-related risks and impacts, the elements that build the *economic case for nature*, will be framed, with reference to the emerging corporate and financial risks management methodologies. Then, the analysis will review the data on the current private and public spending flows towards biodiversity conservation, in order to identify the baseline and the proposed strategies to bridge the so-called "biodiversity funding gap" and meet nature positive targets.

The third section will play the pivotal role of *connecting* the general context and the specific treatment of market tools, while smoothing the transition from the theoretical to the empirical part of the paper. Despite anticipating some of the arguments to support the hypothesis, extensive space will be dedicated to address the available literature on the use of a market-led approach to nature protection, stating justifications and criticisms, such as those linked to nature commodification. After an attempt to bring clearance into the heterogeneous group of Market-Based Instruments (MBIs) for biodiversity and slaloming between competing and overlapping categorizations, the paper will focus on highlighting the principles, shapes and trends of 'nature markets', bringing forward some of the structural downsides and barriers that affect their development. In the final paragraph of the chapter, blended finance models and architectures are presented, emphasizing the role of intermediaries in the literature on conservation management and finance. In particular, special consideration will be devoted to the role of Multilateral Development Banks (MDBs) and Development Financial Institutions (DFIs) in supporting implementation through de-risking policies, technical assistance, larger scale funds, and more robust long-term evaluation mechanisms. MDBs and DFIs will be the addressee of the interviews conducted in the empirical analysis.

With the fourth section, the reader enters the hearth of the research. Through qualitative survey methods, explained in depth in the dedicated methodological part, the paper will try to test the previously advanced hypothesis through a two-folded empirical analysis. Firstly, it follows the presentation of the impact evaluation of two case studies belonging to the category of Biodiversity Offsets and Payments for Ecosystem Services, to investigate the design and implementation issues of MBIs for biodiversity protection. Subsequently, the analysis will include the interview codification of biodiversity financing experts belonging to Multilateral Development Banks (MDBs) and Development Finance Institutions (DFIs) that have implemented blended finance models.

Following a thorough analysis and discussion of the results, drawing out contributions and limitations, the concluding part of the research aims to make some recommendations for building and governing high performance biodiversity markets, emphasizing the role of public policy and regulatory interventions. Establishing the right governance should be a precondition for the formation of effective biodiversity-related markets.

Ch. I – Climate change and Biodiversity loss: the twin crisis

1.1 Biodiversity and ecosystem services

The term biodiversity was firstly coined in 1985 during the National Forum on BioDiversity held in Washington D.C. as a contraction of "biological diversity"[2]. It broadly refers to all the different forms of life present on Earth, from microbiomes and plant species to entire ecosystems like coral reefs and tropical forests, however many attempts have been made to try to capture under this umbrella term the complex interconnections underlying the natural heritage. Moreover, the term has often been used as a catch-all term for 'nature', opening the scientific and ethical debates over the definition and the values of "naturalness" as something distinguished from the human world or a result of their interaction[3].

In 1992, at the UN Earth Summit held in Rio de Janeiro, policy makers and world leaders agreed on a comprehensive definition, adopted by the landmark Convention on Biological Diversity. The CBD is renowned for its ability to grasp the different layers of biological diversity as a definition of *genetic*, *species* and *ecosystems* diversity:

'Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems[4]*. ("CONVENTION ON BIOLOGICAL DIVERSITY")*

This definition is remarkable not only for having provided a unifying concept for biodiversity, that encompass all forms, combinations and manifestations of natural variation, but also for having pointed out the concepts of *diversity* and *variability* as structural functions of biodiversity and ecosystems, while underlying the connections between the two. The integrity of animals and plant species is in fact profoundly affected by the well-being of the ecosystem in which they are embedded, understood as the physical and biological processes that maintain the habitat in equilibrium, and vice versa.

The "definition exercise" took place in parallel with scientific and political developments, that progressively widen the focus of regulation[5]. In fact, the trajectory followed by international nature conservation policies started considering these systemic connections relatively recently, moving from narrowly focusing on single-species or regions conservation programs, to increasingly adopt an "Ecosystem Approach" that takes into consideration the variability within and between species, spaces and

[2] Markku Oksanen, «Biodiversity Considered Philosophically: An Introduction», *Philosophy and Biodiversity*, 6 September 2004, 1–24, https://doi.org/10.1017/CBO9780511498527.001.

[3] Eric Katz, *Artifacts and Functions: a note on the value of nature*, Environmental Values, White Horse Press, Vol. 2, No. 3 (1993), pp. 223-224

[4] Convention on Biological Diversity (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79

[5] Matthias Schröter and others, 'Ecosystem services as a contested concept: a synthesis of critique and counter-arguments' (2014) 7 *Conservation Letters* 514.

biodiversity and their link with people[6]. The Ecosystem Approach has been endorsed by the Convention on Biological Diversity (CBD), that defines it as:

"... a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way."[7]

In other words, the Ecosystem Approach goes beyond the biodiversity conservation itself, but it recognizes natural ecosystems as a complex integrated mix of elements that continuously interact with each other. It also encompasses social, cultural and economic factors that are fully interdependent with the well-being of the natural systems in an integrated trade-off network:

"An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems"[8].

The CBD recognized the "conservation of ecosystem structure and functioning, in order to maintain ecosystem services" as the final aim of this approach.

The term Ecosystem Services (ES) refers to the role, widely recognized as the science has progressed, of ecosystems to contribute not only to the well-being of the environment, but also to provide a range of life supporting services to humanity of vital, economic and spiritual value, contributing to society's sustainability and prosperity[9]. Despite the ES approach applying to the 'natural capital', namely all of the living and non-living resources in the environment, biodiversity is an integral component that underpins or influences almost every flow of benefits coming from it. Terrestrial, marine and freshwater ecosystems, like forests, grasslands, wetlands, mangrove swamps and oceans, not only support life quality with essential services such as food, water, energy, medicines and fibers provisioning, but they also have a central role in climate regulation, air quality, freshwater quantity and quality, pollination and seed dispersal, soil regeneration, habitat creation and maintenance, and also defense against pests and diseases, the stabilization of ocean pH, and protection from natural hazards and extreme events. Moreover,

[6] Dupuy, & Viñuales, J. E. (2018). International environmental law (Second edition.). Cambridge University Press.«International Environmental Law | Higher Education from Cambridge», accessed 5 April 2023, https://www.cambridge.org/highereducation/books/international-environmental-law/8999FEA4D44B2E1BB6BB784F47443177#overview.

[7] Defined in Art.1 of the Convention

[8] Fifth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity, 15–26 May 2000, Nairobi, Kenya (CBD-COP 5), Decision V/6, para. 5, Principle 5.

[9] The Economics of Ecosystems and Biodiversity (TEEB), *Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB* (2010)

ecosystems provide physical and psychological experiences, learning and inspiration, while supporting personal identities and cultures.

Scholars and experts agreed in classifying those services along 4 main functional categories, building up the conceptual framework for the United Nations Environmental Programme (UNEP) Millennium Ecosystem Assessment[10]. The categories used are ***regulating services*** (among which climate regulation through carbon storage, filtration of pollutants by wetlands, pollination and protection from disasters); ***cultural services*** (including recreation, spiritual and aesthetic values); ***provisioning services*** (including wild foods, crops, fresh water and plant-derived medicines); and ***supporting services*** (including soil formation and nutrient cycling)[11].

Table 1: Ecosystem Services categorization

Provisioning Services	**Regulating Services**	**Cultural Services**
Products obtained from ecosystems	*Benefit obtained from regulation of ecosystem processes*	*Non-material benefits obtained from ecosystems*
• Food • Fresh water • Fuel wood • Fibers • Biochemicals • Genetic Resources	• Climate regulation • Disease regulation • Water regulation • Water purification • Pollination	• Spiritual and religious • Recreation and ecotourism • Aesthetic • Inspirational • Educational • Sense of place • Cultural heritage
Supporting Services *Services necessary for the production of all other ecosystem services*		
• Soil formation	• Nutrient cycling	• Primary production

(Source: UNEP Millennium Ecosystem Assessment 2005)

Emerged during the 1970s in the ecological economics field of studies and extensively used since then, the ES concept remains still open to criticism of economic bias and anthropocentricity, accused of failing to capture other dimensions of nature's value[12]. Some argue that the ES framework of provisioning, cultural and regulating contributions has been surpassed by the so called "Nature's Contributions to People" (NCP)[13], proposed and adopted by the Intergovernmental Science-Policy Platform on Biodiversity

[10] «Ecosystems and Human Well-Being: A Framework for Assessment», s.d. https://www.millenniumassessment.org/documents/document.300.aspx.pdf

[11] Ibid.

[12] Diaz et al. (2018). Assessing nature's contributions to people. In Science image in action: proceedings of the 7th International Workshop Data Analysis in Astronomy "Livio Scarsi and Vito Digesu", Erice, Sicily, Italy, 15-21 April 2011 / (Vol. 359). World Scientific Pub Co.

[13] Ibid.

and Ecosystem Services (IPBES)[14], that better emphasizes the social component introducing the material, non-material and regulating categories. However, studies have pointed out that the two approaches have very similar meanings and that their use may often overlap[15].

Scientific and theoretical contributions have underlined the interlinkages between biodiversity and ecosystem functioning (BEF), meaning that changes in number and identity of species may considerably affect how the habitat works and provides ecosystem services[16]. The concept of "functional redundancy" represents the key indicator in measuring the level of predictability of the benefits provided, referring to the substitutability of species within functional groups in an ecosystem, such that the impact created by the loss of one or more species is compensated for by others[17]. While changes in the biodiversity of an ecosystem may not necessarily alter its functioning or can be compensated for by other species (i.e., exhibiting a high redundancy rate), there are specific species that make unique and indispensable contributions to the environment. Consequently, the loss of these species is a matter of greater concern.

1.2 Biodiversity and Climate crisis

The range of ecosystem services described in the previous paragraph is positioned in a critical framework of mutual impacts and dependencies between nature and society. As animal and plant species depend on the integrity of the habitat they live in, the ability of humans to benefit from nature-related services depends on the well-being of the ecosystem.

However, according to the most reputable scientific data providers, biodiversity is declining at unprecedented levels globally. According to the WWF Living Planet Report 2022, wildlife populations have declined by an average of 69% in the past 50 years[18]. The Living Planet Index 2022 (LPI) measures the change in relative abundance of 32,000 populations representing 5,230 animal species across the globe, monitored between 1970 and 2018. Trends vary regionally, with higher peaks of decline in tropical areas, specifically in Latin America (94%), and in population type, with freshwater species seeing the greatest global decline (83%). Among this overall decline, the International Union for Conservation of Nature (IUCN) Red List of Threatened Species reveals that up to one million species are threatened from

[14] Díaz. (2015). The IPBES Conceptual Framework - connecting nature and people. Current Opinion in Environmental Sustainability., 14, 1–16. https://doi.org/10.1016/j.cosust.2014.11.002

[15] De Groot. (2018). Biodiversity: sparring makes us strong. Nature., 561(7723). https://doi.org/10.1038/d41586-018-06736-z

[16] BJ Cardinale, MA Palmer, SL Collins, Species diversity enhances ecosystem functioning through interspecific facilitation. *Nature* 415, 426–429 (2002)

[17] S Naeem, Ecosystem consequences of biodiversity loss: The evolution of a paradigm. *Ecology* **83**, 1537–1552 (2002).

[18] WWF (2022) Living Planet Report 2022 – Building a nature positive society. Almond, R.E.A., Grooten, M., Juffe Bignoli, D. & Petersen, T. (Eds). WWF, Gland, Switzerland.

extinction. Data of the Food and Agriculture Organization (FAO) estimate a 34% share of land degraded globally due to erosion, salinization, compaction, acidification, and chemical pollution, with urgent impacts on water and food security[19].

In order to convey a visual representation of where humanity is operating now, scientists and ecologists commonly refer to the *Planetary Boundaries Framework* (PBs). Developed by a group of 28 leading Earth System scientists led by the scholar Jhoan Rockstrom[20.] It was firstly published in 2009, and continuously refined and updated by the scientific community. According to the framework, the biosphere integrity is highlighted to be the single environmental limit (after biogeochemical flows) where current rates of biodiversity extinction and ecosystems damage are pushing the Earth system furthest beyond the so-called "safe operating space for humanity", namely at a high risk of triggering "tipping points"[21] and feedback loops. Scientists recognized that two of the nine PBs, climate change and biosphere integrity, are "core" to the whole framework based on their fundamental importance for ES and higher potential to change their state[22]. In fact, an analysis of the interactions among the boundaries suggested that they are system-level phenomena that not only are connected to all the other PBs, but also provide the planetary-level system in which the other boundaries operate, positioning at a higher hierarchical level. On the one hand, the climate system regulates the distribution of energy flows over land and sea surfaces, but also in the ocean and the atmosphere, controlling biogeochemical flows that are at the basis of ecosystems' functioning. On the other hand, the integrity of the biosphere, namely the terrestrial, marine and freshwater ecosystems and their biota, is responsible for the capacity of the Earth system to persist even under changes in other boundaries based on its diversity and genetic code. As observed in precedent Earth transitions from a time period to another, substantial shifts in climate and/or biosphere have the potential to push the Earth system out of the Holocene[23].

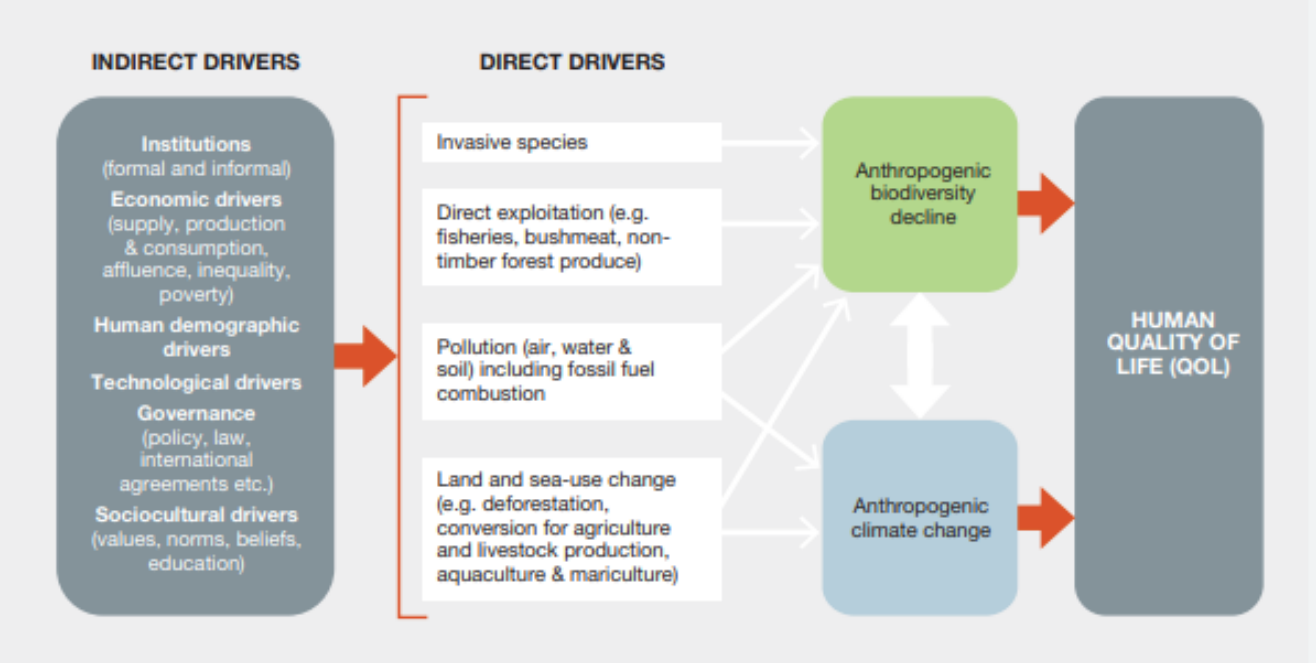
Despite some features of the framework opened a discussion over the biodiversity boundary, questioning the weaknesses of the underlying aggregated metrics and the existence itself of a global biodiversity

[19] *The State of the World's Land and Water Resources for Food and Agriculture – Systems at Breaking Point (SOLAW 2021)* (FAO, 2021), https://doi.org/10.4060/cb7654en.
[20] Rockström, J., Steffen, W., Noone, K. *et al.* A safe operating space for humanity. *Nature* **461**, 472–475 (2009). https://doi.org/10.1038/461472a
[21] Tipping points refer to critical thresholds in a system that, when exceeded, can lead to a significant change in the state of the system, often with an understanding that the change is irreversible (IPCC, 2018)
[22] Will Steffen et al., Planetary boundaries: Guiding human development on a changing planet. *Science* 347, 1259855 (2015). DOI:10.1126/science.1259855
[23] Ibid.

threshold[24],it remains a useful comprehensive tool to convey the degree of human ecological footprint and relate it with the concept of risk and uncertainty.

The main direct drivers of biodiversity loss and damage are human-related: land and sea-use changes in areas and intensity (e.g., deforestation, conversion for agriculture and livestock production, aquaculture & mariculture); air, water and soil pollution; direct exploitation (e.g., fisheries, bushmeat, non timber forest produce) and invasive species[25]. These are the consequences of more distant but root causes of biodiversity decline, related to social, economic and cultural contexts as well as the key institutional and governance structures that drive human behaviors[26]. Values, norms, technology, economic and demographic growth have always driven human patterns of demand and consumption of energy, food and other materials that directly impact natural ecosystems[27].

Figure 1: Indirect and direct drivers of biodiversity loss and climate change due to human activities



Source: IPBES Report 2019

[24] Georgina M. Mace et al., «Approaches to Defining a Planetary Boundary for Biodiversity», *Global Environmental Change* 28 (1 September 2014): 289–97, https://doi.org/10.1016/j.gloenvcha.2014.07.009.
[25] IPCC, 2019: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.
[26] IPBES (2019): Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany
[27] Ibid.

Scholars agree on recognizing that biodiversity decline and climate change share common underlying drivers and they jointly impact people's quality of life. However, is roughly recent, with respect to the history of environmental studies, the effort and interest of the international community in analyzing the interconnections and synergies among the two phenomena[28].

In fact, despite not being the main direct driver of biodiversity loss, in the last few decades climate change emerged as a dominant threat to biodiversity, due to its role in altering marine, terrestrial and freshwater ecosystems. Anthropogenic climate change is responsible for direct alteration of abiotic conditions, like shifts in both climatic features (e.g., temperatures, seasonality, extreme weather), physical environment (e.g., sea level, fire frequency, glacial extent, oxygen concentration) and GHG concentrations in the atmosphere (e.g., CO2). However, these elements interact and often exacerbate biotic features, influencing species abundances and distribution, reframing biological communities and food webs. Climate threats may also result in habitat degradation and ecosystem shifts, es. desertification processes (from woodlands to savannah), which poses serious concerns in a global warming scenario.

Under present warming conditions of +1,2°, Species in water and land are already responding with latitudinal (or depth) shifts, with far reaching consequences for biophysical and biochemical processes. This can also create increased opportunities for animals to spread diseases and facilitate the spill over of viruses to humans. Corals reef ecosystems have nearly halved in the last 150 years due to ocean acidification [29].

Rapid climate change can be a key driver of animal and plant species extinction, hindering their adaptive potential to tolerate current and future extreme weather events (floods, drought, heatwaves, cyclones). This has led scientists to try to assess and define the risk of biodiversity loss under different global warming scenarios. Under a global warming scenario of 1.5°C warming above the pre-modern GMT, 6% of insects, 8% of plants and 4% of vertebrates are projected to lose over half of their climatically determined geographic range. For global warming of 2°C, the comparable fractions are 18% of insects, 16% of plants and 8% of vertebrates; for a future global warming of 3.2°C above pre industrial levels is projected to lead to loss of more than half of the historical geographic range in 49% of insects, 44% of plants, and 26% of vertebrates[30].

Climate change impacts on biodiversity and ecosystem functioning are inexorably interconnected. Every change happens in a complex set of interdependencies and multiple drivers, that make difficult to foreseen

[28] Almut Arneth et al., «Post-2020 biodiversity targets need to embrace climate change», *Proceedings of the National Academy of Sciences* 117, fasc. 49 (8 December 2020): 30882–91, https://doi.org/10.1073/pnas.2009584117.

[29] Tyler D. Eddy et al., «Global Decline in Capacity of Coral Reefs to Provide Ecosystem Services», *One Earth* 4, fasc. 9 (17 September 2021): 1278–85, https://doi.org/10.1016/j.oneear.2021.08.016.

[30] Intergovernmental Panel on Climate Change (IPCC). 2018. Summary for Policymakers of Special Report on Global Warming of 1.5°C. IPCC Secretariat. Bonn, Germany.

and anticipate the outcomes[31]. Resulting effects of this interaction can be synergistic, antagonistic, gradual or direct. Examples of nonlinear and synergistic impacts include ocean warming and acidification resulting in a reduction in the fitness of tropical corals and subsequent degradation of tropical coral reef ecosystems, as well as interactions between deforestation and droughts, which can promote fire, causing forests to be replaced by savannas or secondary forests that are fire prone. The major risk for humanity is the one of potentially crossing critical thresholds and tipping points, leading to unprecedented and emergent socio-ecological conditions.

However, climate and biodiversity may also interact antagonistically (i.e., the combined effect is smaller than the sum of their individual effects). Half of the GHG emissions released in the atmosphere are in fact absorbed by ocean and land ecosystems. As natural carbon-sinks, those ecosystems, and the biodiversity they host, are strategic solutions to limit climate change (nature-based solutions) (UNEP, 2021)[32]. Despite deforestation losses, forests still cover 30% of our planet's surface, therefore managing, protecting and restoring forests have the potential to reduce CO2 emissions by more than 4 gigatons a year. Moreover, scientific evidence demonstrates that peatlands and ocean habitats, like mangroves and seagrasses, are capable of carbon sequestration and storage rates four times higher than the terrestrial forests (UNFCCC, 2022), that makes them highly valuable elements in climate mitigation and adaptation policies towards Paris Agreement Commitments.

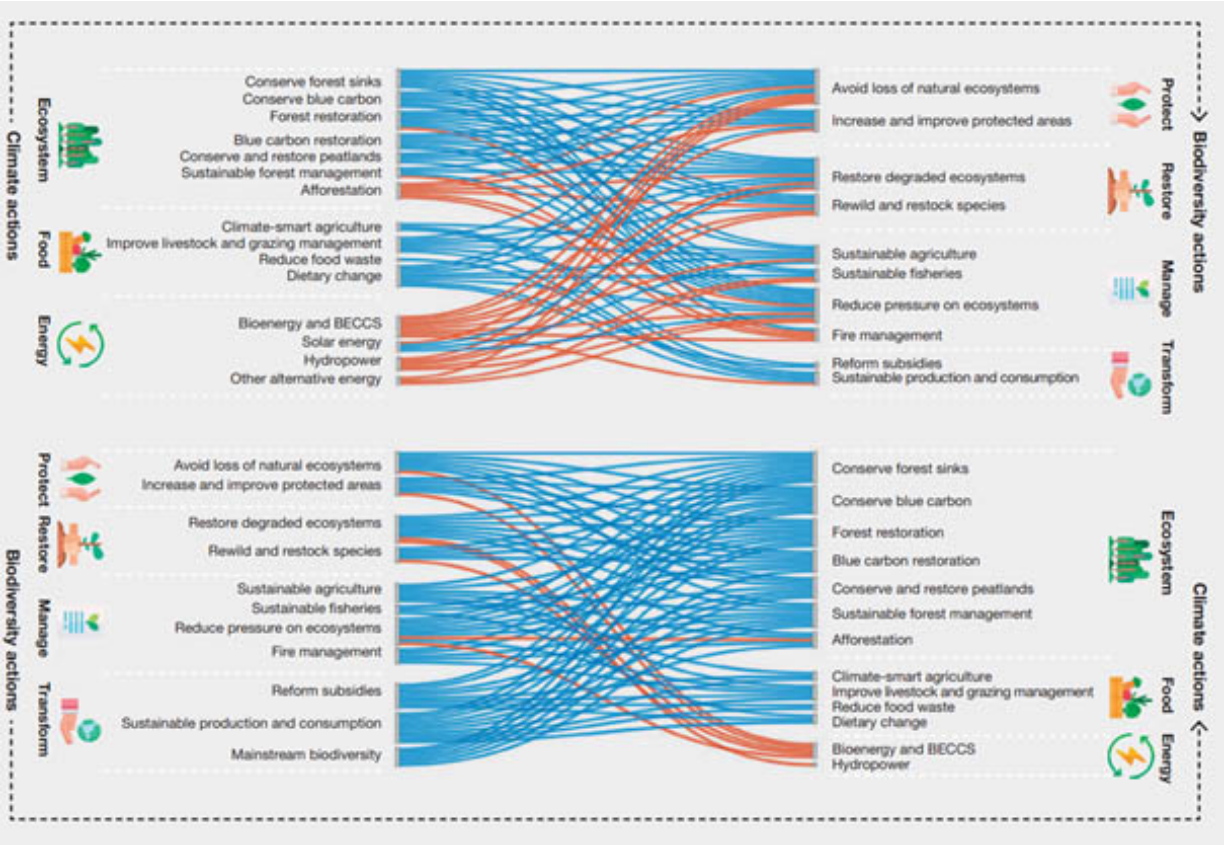
A recent assessment report by the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services stresses the fact that **"**protection and restoration of carbon rich ecosystems is the top priority from a joint climate change mitigation and biodiversity protection perspective" [33], highlighting the co-benefits of climate and nature protection. On the other hand, they warn of the potential drawbacks of certain climate mitigation actions on ecosystems. The main warnings are related to poor afforestation, bioenergy, solar plants construction, BECCS and hydropower, that may increase pressure on land and alter habitats. However, graphs show that biodiversity action is quite always associated with positive impacts on climate.

[31] Miguel Berdugo et al., «Global ecosystem thresholds driven by aridity», *Science* 367, fasc. 6479 (14 February 2020): 787–90, https://doi.org/10.1126/science.aay5958.

[32] United Nations Environment Programme. (2021). Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies. https://www.unep.org/ resources/making-peace-nature

[33] «IPCC & IPBES: Tackle Climate Change & Biodiversity Together», 25 June 2021, https://eco-act.com/climate-change/ipcc-ipbes-climate-change-biodiversity/.

Table 2: Positive and negative effects of actions to mitigate climate change on actions to mitigate biodiversity loss (top), and of actions to mitigate biodiversity loss on actions to mitigate climate change (bottom)



Source: IPBES Report 2019

1.3 Legal and Policy frameworks towards a Nature Positive future

As demonstrated by scientific reports, tackling climate change and biodiversity loss together is far more effective than the traditional siloed and static approach of environmental and conservation governance. International policy forums, but also national decision makers, are recently recognizing this connection as impossible to ignore in the global effort towards the goal of limiting global average temperature under 2° of increase related to preindustrial levels and meeting the SDG's[34]. Momentum is globally building in recognizing this decade as fundamental to reverse biodiversity loss and secure a nature-positive future by 2030.

[34] "Paris Agreement," conclusion date: December 12, 2015, United Nations Treaty Series Online, registration no. I-54113, https://treaties.un.org/pages/AdvanceSearch.aspx?tab=UNTS&clang=_en

Scenarios of future biodiversity loss based on different levels of political commitment reveal that bending the curve of biodiversity loss is possible[35], but it implies the setting of more ambitious targets that not only aim to increase conservation and restoration efforts, but also to address the drivers of biodiversity loss by adopting an integrated action portfolio that includes sustainable production and consumption models and decarbonization in all sectors.

1.3.1 International Framework

At the international level, governments deal with the twin challenge of climate change and biodiversity loss through two different agreements established at the Rio Earth Summit in 1992: the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Biological Diversity, that together with the United Nations Convention to Combat Desertification (UNCCD) represent the so-called "Rio Conventions"[36]. Under each of them, contracting state parties adopted international targets to align with, however, if the Paris Agreement in 2015 has been widely recognized as historical and have gained global resonance, the Aichi Biodiversity Targets set by the CBD in 2010 (COP10 in Nagoya, Japan) have long remained a concern of small groups of experts.

The Aichi Biodiversity Targets consist of 20 specific targets, mostly set for 2020, that work systemically to protect wildlife and ecosystems[37] and meet 5 strategic goals. The most relevant are (i) the prevention of extinction of identified threatened species, (ii) at least the halving of the rate of all natural habitats as well as (iii) the elimination of harmful subsidies and economic incentives that hurt biodiversity and ecosystems.

However, according to the fifth edition of the *Global Biodiversity Outlook*, published by the United Nations in 2020 on the state of nature, none of the Aichi Biodiversity Targets have been achieved at a global level for the second consecutive decade[38]. The Outlook reports in facts that, despite a few of them have been partially achieved, like those on protected areas and invasive species, natural habitats have kept disappearing, large numbers of species remain threatened by extinction from human-related activities, and $500bn of environmentally damaging government subsidies (for agriculture, fossil fuels and fishing industries) have not been eliminated[39].

The Kunming-Montreal Global Biodiversity Framework

[35] «Living Planet Report | Pubblicazioni», WWF Italia, consultato 14 aprile 2023, https://www.wwf.it/cosa-facciamo/pubblicazioni/living-planet-report/.
[36] «The Rio Conventions | UNFCCC», consultato 14 aprile 2023, https://unfccc.int/process-and-meetings/the-rio-conventions.
[37] Biosafety Unit, «Aichi Biodiversity Targets» (Secretariat of the Convention on Biological Diversity, 18 September 2020), https://www.cbd.int/sp/targets/.
[38] «Global Biodiversity Outlook 5», Convention on Biological Diversity, accessed 14 April 2023, https://www.cbd.int/gbo5.
[39] Patrick Greenfield, «World Fails to Meet a Single Target to Stop Destruction of Nature – UN Report», *The Guardian*, 15 September2020, sez. Environment, https://www.theguardian.com/environment/2020/sep/15/every-global-target-to-stem-destruction-of-nature-by-2020-missed-un-report-aoe.

With the aim to revise the goals and deliver a more ambitious and effective post-2020 global biodiversity framework, on 19 December 2022, at the 15th Conference of the Parties (COP15) over 190 parties of the Biodiversity Convention agreed on a landmark framework to halt terrestrial and marine biodiversity loss, known as the *Kunming-Montreal Global Biodiversity Framework*[40]. The UN Secretary General claimed that the proposed new framework "should work in synergy with the Paris Agreement on climate change and other multilateral agreements on forests, desertification and oceans", recognizing that no environmental and sustainable development goal can be tackled singularly and that their achievement paths are cross cutting.

The new GBF comprises 4 goals and 23 action-oriented milestone targets with a mission by 2030 and a long-term vision to 2050, whose main commitments are[41]:

- Protect at least 30% of terrestrial, inland water, coastal and marine ecosystems (Target 2 and 3)
- Use ecosystem-based approaches or nature-based solutions to contribute to mitigation and adaptation to climate change, contributing at least 10 GtCO2e per year to mitigation; and ensure that all mitigation and adaptation efforts avoid negative impacts on biodiversity (Target 8).
- Redirect, repurpose, reform or eliminate incentives harmful for biodiversity in a just and equitable way, reducing them by at least $500 billion per year (Target 18).
- Increase financial resources from all sources to at least US$ 200 billion per year, including new, additional and effective financial resources, increasing by at least US$ 10 billion per year international financial flows to developing countries, leveraging private finance, and increasing domestic resource mobilization, taking into account national biodiversity finance planning (Target 19).

With specific reference to the last goal, at COP15 the parties of the convention adopted a specific decision for a new Strategy for Resources Mobilization (Decision 15/7)[42], building on the strategy and targets adopted under Aichi Biodiversity Target 20. The CBD recognizes the urgency to scaling up international biodiversity finance, in alignment with the goals and targets of the Convention. For this reason, it establishes in 2023 a dedicated and accessible fund, the Global Biodiversity Framework Fund, to quickly mobilize additional resources, while supporting the "leverage of financial resources from all sources and deploying a full suite of instruments, including new and innovative approaches such as private capital mobilization and blended finance" (art 17(d) Dec/15/7).

[40] «COP15: Nations Adopt Four Goals, 23 Targets for 2030 In Landmark UN Biodiversity Agreement», Convention on Biological Diversity, accessed 14 April 2023, https://www.cbd.int/article/cop15-cbd-press-release-final-19dec2022.
[41] CBD/COP/DEC/15/4, Kunming-Montreal Global Biodiversity Framework
[42] CBD/COP/DEC/15/7, Strategy for Resource Mobilization

Building on the lessons learned from the Strategic Plan for Biodiversity 2011-2020, the major novelty of the Montreal Framework is its more flexible and dynamic approach to conservation. In fact, in order to ensure that the "living in harmony with nature" vision is fulfilled by 2050, it recognizes that radical transformative actions imply the transformation of social, economic and financial models that must be implemented at international, regional and local level.

In particular, the Framework is built upon the recognition that its effective implementation depends on multiple partnerships with different stakeholders and the active engagement of actors beyond the government. A special relevance in the post-2020 framework is given to Indigenous People, as right-keepers and stewards of nature, and the Finance community, as a tool to align the financial flows with nature, towards sustainable investments. These actors are considered to have the potential and responsibility to leverage transformative practices.

The agreement on Biodiversity Beyond National Jurisdiction (BBNJ)

To meet the targets of the new GBF, on 4 March 2023, during the 5th Session of the Intergovernmental Conference under the UN Convention on the Law of the Sea (UNCLOS), governments agreed on a landmark treaty on the conservation and sustainable use of marine Biodiversity in areas Beyond National Jurisdiction (BBNJ). Following over a decade of negotiations, the General Assembly, in its resolution 72/249 of 24 December 2017, decided to convene an IGC to elaborate the text of an international legally binding instrument (ILBI) under UNCLOS, to apply to those areas of the oceans that lie outside of any nation's exclusive economic zone (EEZ). The BBNJ Treaty, also knowns as "Treaty of the High Seas", has been adopted by consensus on a further resumed fifth session of the Conference on 19 and 20 June 2023 in New York[43].

In case of adoption, the new treaty will allow to:

- address exploitation of marine genetic resources, developing a benefit-sharing mechanism and digital sequence tools for collection, use and commercialization of genetic resources
- establish area-based management tools, such as marine protected areas (MPAs), that before under UNCLOS did not have a clear establishment mechanism, to facilitate the achievement of the CBD target to conserve 30% of seas by 2030.
- set procedures for environmental impact assessments of economic activities both inside and outside national boundaries, where the project could cause substantial pollution/significant or harmful changes

[43] A/CONF.232/2023/4, Agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, UN General Assembly resolution 72/249, New York (20 June)

to the marine environment in the high seas (es: offshore energy, deep-sea mining, and submarine cable-laying projects)

- provide capacity-building and marine technology-transfer to developing countries, supporting them achieving the objectives laid out above.

Despite the BBNJ Treaty being derivative from the UNCLOS, signatory states are not automatically bound. However, the fact that negotiating states agreed on including the principle of Common Heritage of Humankind and bears themselves legally responsible to act for the protection of biodiversity outside their national waters out of individual national or economic self-interest, leaves hope for a more cooperative approach to oceans.

1.3.2 European Framework

The European legislative framework concerning biodiversity protection is built on two cornerstones of legislation, the Birds[44] and Habitat[45] Directives, respectively adopted in 1979 and 1992 as a response to the Berne Convention[46]. Together they aim to protect over a thousand species among mammals, reptiles, amphibians, fish invertebrates, and plants, and 230 characteristic habitat types. Moreover, they established the Natura 2000 network of European sites, concerning Special Protection Areas (SPAs) and Special Areas of Conservation (SCAs) under European legislation.

EU Biodiversity Strategy 2030

Of more recent development is the EU Biodiversity Strategy by 2030, that aims to receipt and complement the UN global targets discussed above[47]. In May 2020, the European Commission presented a first draft of strategy for nature protection and restoration in Member States, whose main deliverables are:

- the creation of protected areas covering at least 30% of the EU's land and sea area (thus extending the coverage of existing Natura 2000 areas).
- the restoration of degraded ecosystems across the EU by 2030 through a series of specific commitments and measures, among which the reduction in the use and risk of pesticides by 50% by 2030 and the planting of 3 billion trees.
- the allocation of €20 billion per year to protect and restore biodiversity through EU funds, national and private funding.

[44] The Birds Directive (Directive 79/409/EEC)
[45] Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora
[46] Bern Convention on the Conservation of European Wildlife and Natural Habitats
[47] «Biodiversity: How the EU Protects Nature», 24 January 2023, https://www.consilium.europa.eu/en/policies/biodiversity/.

Adopted as a cornerstone of the European Green Deal agenda, actions under the strategy will access a pool of financial resources equivalent to the 30% of the EU budget and Next Generation EU expenditure allocated to addressing climate action, invested in biodiversity and nature-based solutions. EU Council conclusions highlighted the call to fully integrate these targets into driving sectors such as forestry, fishery and agriculture. With a specific reference to the latter, building on the significant impact that the agri-food sector has on nature and ecosystem's health, the EU Biodiversity Strategy is strictly related to the targets outlined in the Farm to Fork Strategy and the Common Agricultural Policy of the European Union, presented as complementary proposals. They share multiple goals such as pesticides and fertilizers reduction (50% cut by 2030), restoration of agricultural land and efficient water management[48].

EU Nature Restoration Law

After the adoption of the Post-2020 Global Biodiversity Framework in December 2022, in which the EU played a decisive negotiating role, the Council declared full commitment of the Member States to give legislative reception, with an unprecedented support of the corporates and business European groups. After previous regulatory implementations, such as the Birds and Habitat Directives, the Water Framework Directive[49] and the Marine Strategy Framework Directive, on June 22nd, 2022 the EC launched a proposal for a new law, narrowly passed on July 13, 2023, that adds legal strength to the biodiversity and climate objectives defined in the Strategy.

The EU Nature Restoration Law, supported by corporates appeals and business European groups[50], represents a landmark achievement for the introduction of continent-wide binding restoration targets on pollinators and forest, agricultural, marine, river and urban ecosystems, pointing out specific habitats and species[51]. On the other hand, its approval did not come without debates and criticism. In fact, the law proposal nearly risked sinking due to months of opposition campaigns and misinformation from lobby organizations and the rightwing European parties, guided by the center-right group EPP (European People's Party). In particular, it had been previously rejected by the EU Parliament's fisheries and agriculture committees. An Italian MEP from the far-right Identity and Democracy group reacted by saying: "*Less land for farmers, less sea for fishermen, less activity for businesses, and fewer European products and jobs for our citizens,"* accusing the proposals to be permeated with ideology

[48] EC, «Farm2Fork Action Plan 2020 Strategy », accessed 14 April 2023

[49] Amendment proposal 26 October 2022

[50] «Our Nature, Our Business», Our nature, our business, accessed 5 July 2023, https://www.ournatureourbusiness.eu.

[51] «The EU #NatureRestoration Law», 5 April 2023, https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en.

and counterproductive for nature itself[52]. However, 6.000 scientists signed an open letter saying that opponents' claims *"not only lack scientific evidence, but even contradict it.*[53]*"*

The overarching obligations set by the Commission by 2030 include: the restoration of 20% of EU's land and sea area by 2030 and all ecosystems in need of restoration by 2050. Within that, restore 25,000 km of free-flowing rivers and reverse the decline of pollinator populations, both by 2030. It also provides for an increasing share of high-diversity landscape features in agricultural land and soil organic carbon, as well as targets to increase the populations of grassland butterflies and farmland birds. Marine habitats must be restored, in particular seagrass beds and dolphins, sharks and seabirds' ecosystems. For what concerns the implementation, EU member States are expected to submit National Restoration Plans to the EC after two years from the Regulation coming into force, and follow the common guidelines for effective mapping, monitoring and reporting.
However, European green groups claimed they were disappointed by the changes in the final text approved by the EC, criticizing that it cut a proposal to restore agricultural ecosystems and was framed in a way that will delay implementation of the law until after a formal assessment of Europe's food security.[54]

A novelty in the EU discourse on biodiversity conservation, that reflects the trend at international level, is a general shift in the narrative from *No Net Loss* to *Nature Positive*. The two approaches should refer to different outcomes of mitigation and conservation activities related to biodiversity. If the first aims to counterbalance the direct operational impacts, the latter involve an idea of natural recovery and growth. Many initiatives, such as UNEP, the WEF and the SBTN, are exploring and supporting the concept of Nature Positive, but, as showed by a recent study of the Biodiversity Consultancy, its definitions, interpretations and criteria are usually inconsistent[55]. However, whether they adopt a conceptual, target or processed based definition, the term emerges from the urgent need to restore nature and implies further coordination for transformative shifts.

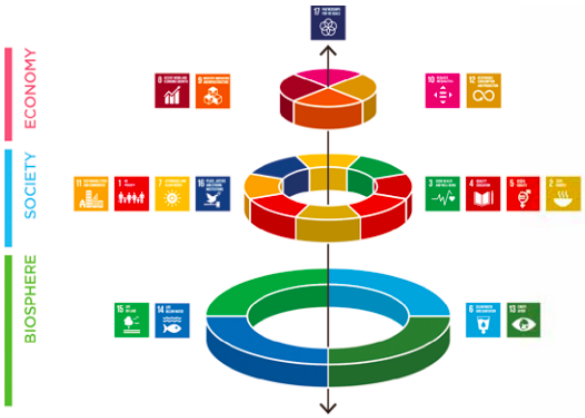
[52] Ajit Niranjan e Ajit Niranjan European environment correspondent, «EU Passes Nature Restoration Law in Knife-Edge Vote», *The Guardian*, 12 July 2023, sez. World news, https://www.theguardian.com/world/2023/jul/12/eu-passes-nature-restoration-law-vote-meps.
[53] Ibid.
[54] Ibid.
[55] «Net Positive to Nature Positive: Evolution of Corporate Strategies for Nature», accessed 14 April 2023, https://www.thebiodiversityconsultancy.com/knowledge-and-resources/net-positive-to-nature-positive-part-one-144/.

Ch. II - Financing Nature: challenges and trends

2.1 The economic case for nature

As discussed in the precedent chapter, biodiversity sustains the provisioning of vital services, making the ecosystems more productive and resilient to shocks. In other terms, it is responsible for creating and sustaining an environment in which communities and economies can thrive and prosper. Therefore, it is unthinkable to keep nature out of any financial and business equation.

Figure 3: Biodiversity and Ecosystem Services are the Foundation of Economies



(Source: Stockholm Resilience Centre, Stockholm University)

2.1.1 Biodiversity as an asset:

Economists recognize its importance in thinking of nature in terms of capital stocks, namely an asset that provides a certain flow of services over time.

Along with the financial, the built and the human capital, the category of 'natural capital' emerged to define the flow of services that lands, waters, animals and plants provide human societies. Biodiversity, as the living part of the natural capital, is an asset of crucial value.

- Soils: is a natural capital of both non-living and living components. Even if not visible, a vast range of microorganisms are at the basis of soil productivity, influencing the tradable prices of food.
- Crop pollination: around one third of the food we eat would be not available without pollinators, generally bee and bats with birds also important)[56]. Currently we are witnessing a sharp drop in pollinator insects' populations (due to habitat destruction and extensive use of pesticide).

[56] Aizen, M. A., Garibaldi, L. A., Cunningham, S. A., & Klein, A. M. (2009). How much does agriculture depend on pollinators? Lessons from long-term trends in crop production. *Annals of botany*, *103*(9), 1579-1588

- Forests: they capture and store CO2 from the atmosphere. Research groups worldwide are investing huge resources trying to develop technologies for Carbon Capture and Storage (CCS), when trees provide an efficient one available at zero costs.
- Watersheds: they not only channel the flow of water but also act as a high-effective filter, removing fine particles and contaminants. Watershed soils are a key natural infrastructure to maintain water quality avoiding building filtration plants.
- Genetic resources: most of the food we eat today comes from historical genetic variation, which allowed our predecessors to selectively breed the livestock and crops on which we depend today. Moreover, within-species genetic variability provides insurance against pests and disease that threatens food supplies and security in most parts of the world. In addition, many pharmaceuticals have been derived from natural sources. Many modern medicines developed from pharmacologically active molecules present in plants, insects and other animals. Most have been then synthesized, but biodiversity loss will mean the loss of opportunities to discover new molecules of life-changing value for humanity.

The services mentioned above provide an evident economic contribution. An analysis by the WEF suggest that implementing nature-positive policies could generate ~$10 trillion in new annual business value and create 395 million jobs by 2030[57].

However, biodiversity as an asset is intrinsically difficult to value. Many Natural Capital Accounting (NCA) attempts have been made in order to try to assign at least a partial value to them[58]. For example, lower bound estimates made for pollinators, tell that they worth as an asset at least US$14 trillion[59]. The Social Cost of Carbon capture made by forests is worth at least US$9.5 trillion[60]. These numbers are just partial approximations, because not every contribution of nature can be measured and converted into a monetary value. The SEEA Experimental Ecosystem Accounting is an internationally accepted integrated statistical framework measuring and organizing data on ecosystem assets[61]. Their measurement encompasses two perspectives: (i) Ecosystem condition and extent account; (ii) Ecosystem services and monetary asset account. Monetary evaluation is by no means required when doing natural capital accounting. “Putting a price on nature” raises a range of important ethical and

[57] «395 Million New Jobs by 2030 If Businesses Prioritize Nature, Says World Economic Forum», World Economic Forum, consultato 5 luglio 2023, https://www.weforum.org/press/2020/07/395-million-new-jobs-by-2030-if-businesses-prioritize-nature-says-world-economic-forum/.

[58] «Understanding NCA», *The Economics of Ecosystems and Biodiversity* (blog), consultato 17 May 2023, http://teebweb.org/our-work/nca/understanding-nca/.

[59] «Financing Nature: Closing the Global Biodiversity Financing Gap», Paulson Institute, consultato 16 May 2023, https://www.paulsoninstitute.org/conservation/financing-nature-report/. Pag. 39

[60] «Financing Nature».

[61] UN Statistical Commission of the System for Environmental and Economic Accounts (SEEA) established in 2012 «Ecosystem Accounting | System of Environmental Economic Accounting», consultato 17 May 2023, https://seea.un.org/ecosystem-accounting.

cultural considerations, generating accusations of "commodification" and "marketisation"[62]. Although monetary evaluations are far from being the only reason to preserve biodiversity, in certain contexts are considered of help for decision makers to understand its immense value and the underlying tradeoffs. In fact, because of the large uncertainty over the exact benefits of biodiversity, now and in the future, studies tend to omit them, as if they are set to zero. Weak cost-benefits analysis should start working on possible range of values, not the exact one, but the rough minimum and maximum[63]. To pursue this scope, in partnership with client countries, the World Bank Group has developed a system of Wealth Accounting and Valuation of Ecosystem services (WAVES) to help developing countries to incorporate natural capital into national income accounts and consider it into national strategic economic decision[64]. However, measurement challenges are not the only reasons why the market fails in reflecting the value of biodiversity. This in fact occurs at the intersection of multiple 'market failures[65]. A concept useful to understand is the one of 'commons' and 'global public goods'. Many of the services provided by biodiversity are public goods, meaning that everyone can benefit from them disregarding the fact they paid for conservation or not. Public goods, being by nature non-rival and non-excludable, are subjected to the "Tragedy of the Commons" and markets alone are not able to efficiently manage them[66]. Another useful concept is the one of 'external costs and benefits' that, if not internalized in the transaction, lead the market to inefficient outcomes. As the burning of fossil fuels leads to uncounted pollutant emissions (costs), conserving tropical forests leads to benefits that are available to all. As a result, since the economic incentives are roughly invisible, the market fails in optimally allocating the resources towards their conservation. Efforts have been made by the international community to compensate forest owners for their Carbon Capture and Storage through REDD+ projects established by the Paris Agreement[67].

Even if barriers are there in giving precise economic value to biodiversity and its vital services, it is an asset to humanity. It is also worth noting that, unlike most of the assets, it does not depreciate over time and its loss can't be replaced, leading to irreversible changes.

[62] Jacob Smessaert, Antoine Missemer, e Harold Levrel, «The Commodification of Nature, a Review in Social Sciences», *Ecological Economics* 172 (1 June 2020): 106624, https://doi.org/10.1016/j.ecolecon.2020.106624.
[63] Heal, G., 2016. Endangered economies: How the neglect of nature threatens our prosperity. Columbia University Press.
[64] Wealth Accounting and the Valuation of Ecosystem Services. Available at: https://www.wavespartnership.org (Accessed: 31 July 2020)
[65] Heal, G., 2000. Nature and the marketplace: Capturing the value of ecosystem services. Island Press.
[66] Hardin, G (1968). The Tragedy of the Commons. *Science* 162: 1243–1248. DOI: 10.1126.162.3859.1243
[67] UN Framework for the implementation of activities for Reducing Emissions from Deforestation and Forest Degradation (REDD+) recognized in Art.5 of the Paris Agreement

2.1.2 Managing Nature-related risks

The relationship between nature and economy is a double way road. In fact, on the one hand, the accelerated economic growth has delivered impressive improvements in human welfare and benefits. However, it has come at a heavy cost to the natural resources that sustained the economic achievements too, underpinning its same foundations.

(i) Physical dependency of businesses on nature

According to the World Economic Forum New Nature Economy Report (2020), 44$ trillion of economic value generation, corresponding to over half of world's GDP, is generated by industries whose supply chains are moderately dependent ($31 trillion) or highly dependent ($13 trillion) on nature and its ecosystem services[68].

The three largest sectors among the highly dependents are construction, agriculture, and food and beverage, that together generate close to $8 trillion of GDP. These industries depend on either extracting resources directly from forests and oceans or the provision of ecosystem services like fertile soil, unpolluted water, pollination, and a stable climate:

- the agricultural sector on pollination services: USD 235-577 billion (US dollars) worth of annual global food production relies on the direct contribution of pollinators[69].
- the timber, pulp and paper sectors on forestry: forest products account for USD 247 billion in global trade exports[70].

As the environment loses its ability to deliver such services, these industries could face substantial setbacks. As a case of example, 60% of coffee varieties are at risk of extinction due to climate change, invasive pests and diseases and deforestation[71]. This would represent for the global coffee market a drastic drop in crop productivity and consequently in retail sales, in addition to a threat for many smallholder farmers' livelihood.

However, dependency rates on nature are a feature of all businesses and vary between different industries and sectors. While the risk to primary sectors is of easy understanding, the threats and costs for the secondary and tertiary industrial sectors can also be relevant. In fact, for chemicals and

[68] «WEF_New_Nature_Economy_Report_2020.pdf», accessed 14 May 2023, https://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf.
[69] IPBES (2016), Assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.
[70] FAOSTAT-Forestry database (2017), Global production and trade of forest products in 2017, 2017, http://www.fao.org/forestry/statistics/80938/en/ (accessed on 15 April 2019).
[71] Euromonitor International, 2018, "Five most promising markets in coffee", http://go.euromonitor. com/rs/805-KOK-719/images/Five_Most_Promising_Markets_in_Coffee.pdf?mkt_ tok=eyJpIjoiT1RrME56TTFNalUxWmpoaSIsIn (link as of 16th Dec 2019).

materials; aviation, travel and tourism; real estate; mining and metals; supply chain and transport; retail, consumer goods and lifestyle the dependency is not direct but "hidden dependency" through the supply chain. A significant example is represented by the case of coral reefs for the tourism industry. They provide economic value for 36$ billion a year through tourism activities ("on-reef" - diving and wildlife watching, and "reef-related" - ocean views, beaches and local seafood) but, under a global warming scenario, the loss of 99% of coral reefs would represent also a threat for the industry itself, besides putting at risk of flooding millions of people living in coastal areas[72].

An additional perspective on dependency-impact rates of businesses on nature is also given by a regional analysis. Studies found a significant correlation between some of the fastest growing economies in the world and the risk of exposure to nature loss[73]. The World Bank comprehensive wealth estimates reveal that natural capital constitutes nearly 50% of all the wealth in low-income countries. In fact, approximately 33% of India's and Indonesia's GDP is produced in industries that rely heavily on natural resources, while the African continent generates 23% of its GDP in such sectors. However, even if most developed and larger economies like US, EU and China have a relatively smaller share at high exposure, they hold the highest absolute amount of GDP in nature-dependent sectors, at over $7 trillion.

(ii) Fallout of business impacts on nature

In addition to dependency features, nature can generate new forms of direct and indirect risks for businesses in terms of regulatory, legal, market and reputational risks

- *Regulatory and legal pressures:*

In the last decade, new policies and regulations have been enhanced in terms of commitment in preserving nature loss. A variety of government tools like strict rules on commercial use of land resources, taxes and subsidies reform, trade directives and science-based targets are increasing the regulatory exposure of many companies and financial institutions holding nature-related assets. Some countries like Costa Rica started redirecting subsidies towards paying farmers for ecosystem services[74], France introduced a regulation for assessing environmental impacts of supply chains and many are following[75]. More significantly on a global level, the new post-2020 Global Biodiversity Framework

[72] M. Spalding et al., 2017, "Mapping the global value and distribution of coral reef tourism", Marine Policy, 82, 104–113, https://thought-leadership-production.s3.amazonaws.com/2017/05/18/19/52/44/c655fbeeb0a5-4e48-a34f-2806ff724061/paper_coralreeftourism_spalding_2017.pdf (link as of 16th Dec 2019).

[73] «WEF_New_Nature_Economy_Report_2020.pdf».

[74] The Food and Land Use Coalition (FOLU), 2019, "Growing better: Ten critical transitions to transform food and land use", https://www.foodandlandusecoalition.org/wp-content/uploads/2019/09/FOLUGrowingBetter-GlobalReport.pdf (link as of 16th Dec 2019).

[75] S. Cossart, 2017, "The French law on duty of care: A historic step towards making globalization work for all", Business and Human Rights Journal, 2 (2), 317–323, https://www.cambridge.org/core/journals/ business-and-human-rights-journal/article/french-law-on-duty-of-care-a-historic-step-towards-makingglobalization-work-for-all/7C85F4E2B2F7DD1E1397FC8EFCFE9BDD/core-reader (link as of 16th Dec 2019).

represents the "Paris moment" for nature, introducing new targets and responsibilities. As regulatory pressure intensifies, the risk for businesses and the financial systems is to be rapidly exposed to "stranded assets", like, for example, billions of dollars in deforestation-linked commodities[76]. Besides that, the risk of stranding is also increased by climate change and nature loss trends.

- *Reputation and investors pressure:*

  Consumers, especially among millennials and generation Z, are becoming increasingly aware and sensitive to the environmental footprint of industries and supply chains, in terms of resources-intensity and waste generation, demanding action. Businesses that stand at the forefront of this shift in consumers preferences are those that would benefit from them, while those remaining in the business-as-usual framework will be penalized. This is true especially in the fashion and the meat industry. However non only consumers, but also financial investors are demanding more from business behavior. Rating agencies have started to include nature-related disclosure in financial evaluations, and investors are attracted by more accountability and transparency of business operations in terms of their environmental long-term risks. An example of this trend is the growing presence of quality standards in the food industry causing deforestation (Rainforest Alliance or FSC), where reputational risks and market are closely linked. In the palm oil sector in Europe, concerns over environmental and health impact of palm oil production quickly triggered a trade dispute[77].

(iii) Impact of nature loss on society:

Besides their economic value, natural assets like fresh water, fertile soils and staple ecosystems, sustain vital social and geopolitical equilibria. The degradation of nature can aggravate the disruption of the society within which the economy operates, potentially creating in turn physical and market risks. Risks to global health may arise from the outbreak of infectious zoonotic diseases that are connected to ecosystem disturbance and deforestation, whose rate has increased markedly since the 1940s[78]. To name the most recent case in point, the recent COVID-19 pandemic reminded the powerful link between human and planetary health, following Ebola and SARS outbreaks. Such phenomena have devastating human but also economic costs for societies. the economic cost of the 2002 SARS outbreak

[76] B. Caldecott et al., 2013, "Stranded assets in agriculture: Protecting value from environment-related risks", https://www.smithschool.ox.ac.uk/publications/reports/stranded-assets-agriculture-report-final.pdf (link as of 16th Dec 2019).
[77] World Trade Organization (WTO), 2018, "WTO members continue review of technical barriers to trade agreement, discuss new concerns", https://www.wto.org/english/news_e/news18_e/tbt_20mar18_e.htm (link as of 16th Dec 2019).
[78] World Economic Forum, 2019, "The Global Risks Report 2019", http://www3.weforum.org/docs/WEF_ Global_Risks_Report_2019.pdf

was estimated at $41.5 billion[79], while COVID-19 pandemic will cost the global economy $12.5 trillion through 2024[80].

Global peacekeeping may be also at risk due to the degradation of nature. Together with climate change, it contributes in fact to shortages in fundamental resources like food and water, exacerbating geopolitical tensions and civil violence[81]. Most sensitive areas are located in sub-Saharan Africa (Kenya and Mali) but the well-known role that drought played in the Syrian civil war is an example of a problem of a wider regional concern.

Therefore, stemming from the above considerations and with reference to the climate-related risks typologies defined by Governor of the Bank of England Mark Carney in its famous speech "The tragedy of the Horizons"[82], it is possible to briefly classify biodiversity-related risks as follows:

- Ecological risks
- Liability Risks
- Regulatory risks
- Reputational risks
- Market risks
- Financial risks

The WEF defined biodiversity as a systemic risk, namely "the risk of collapse of an entire financial system or entire market, as opposed to risk associated with any one individual entity, group or component of a system"[83]. These types of risks have material consequences on businesses and investors but are highly unpredictable and therefore hard to translate into specific risks.

As the global business community progressively takes awareness of the financial materiality of nature on businesses and the urgent need to reframe the financial equation[84], new business initiatives and regulatory tools and frameworks are emerging in order to help companies, asset managers, financial institutions and governments to identify and manage these risks. This trend is consistent with Target 15 of the CBD, which expects all businesses and financial institutions to *"regularly monitor, assess and transparently disclose their risks, dependencies and impacts on biodiversity [...] along their operations, supply and value chains and*

[79] UNEP. 2016. UNEP Frontiers 2016 Report: Emerging Issues of Environmental Concern. Nairobi: United Nations Environment Programme

[80] Reuters, «IMF Sees Cost of COVID Pandemic Rising beyond $12.5 Trillion Estimate», *Reuters*, 20 January 2022, sez. Business, https://www.reuters.com/business/imf-sees-cost-covid-pandemic-rising-beyond-125-trillion-estimate-2022-01-20/.

[81] N. Uexkull, 2014, "Sustained drought, vulnerability and civil conflict in sub-Saharan Africa", Political Geography, 43, 16–26, https://www.sciencedirect.com/science/article/abs/pii/S0962629814000985

[82] «Mark Carney: Breaking the Tragedy of the Horizon - Climate Change and Financial Stability», s.d.

[83] (WEF 2010b, 10)

[84] Smith, T. et al. (2018), Mainstreaming International Biodiversity Goals for the Private Sector: Main Report & Case Studies, JNCC, Peterborough, http://jncc.Defra.gov.uk/default.aspx?page=6675. (Accessed on 15 April 2019).

portfolios, [...] in order to progressively reduce negative impacts on biodiversity and increase positive impacts."[85]

In particular, the concept of "Double Materiality", introduced by the European Commission, mainstreamed in the financial sector the need to consider simultaneously two major perspectives, overcoming traditional reporting. Not just the impact of biodiversity on a company's development, performance and position is considered material (Financial Materiality), but also the impact that the company's activities have on nature (Environmental Materiality). Companies in the EU will be required to disclose in a more detailed way how sustainability-related factors influence their operations and vice versa, and the new Corporate Sustainability Reporting Directive (CSRD) is a key pillar in this ambition. With the CSRD, entered into force on January 5, 2023, the double materiality reporting is set to become mandatory for a wider range of firms and on a wider set of material factors. In fact, beyond climate (Scope 1, 2 and 3 included), but also water/marine, circular economy and biodiversity will be mandatory disclosed by 2024[86]. Detailed disclosure requirements and common standards are being developed by the European Financial Reporting Advisory Group (EFRAG). Beside the CSRD, the Sustainable Finance Disclosure Regulation (SFRD - Reg 2018, 2088) aims at defining a regulatory framework for transparent disclosure of companies' activities related to social and environmental objectives, both at entity and product level.

Both the CSRD and the SFDR are fundamental implementing tools for achieving the objectives under the EU Sustainable Finance Strategy. Stemming from the need to align the EU economy with the sustainability goals under the Green Deal agenda, in 2021 the Commission released a new policy toolbox, the EU Sustainable Finance Action Plan, under which the Eu Taxonomy Regulation represents the most promising legislative achievement[87]. The EU Taxonomy Regulation provides investors, companies and policy makers with a new classification system able to help them identify sustainable economic activities, protecting them from risks and helping shift investment flows towards sustainable goals. Among the 6 environmental objectives, all interconnected, the 5th and the 6th aim specifically to direct capital toward the protection of marine resources, biodiversity and ecosystems. The activities are required to "make a substantial contribution to at least one of the EU's climate and environmental objectives, while at the same time not significantly harming any of these objectives and meeting minimum safeguards"[88]. It is worth noting that the EU Taxonomy is not a mandatory list to invest in, but aims to provide a shared framework of reference for supporting companies in their transition and encouraging a sustainable future.

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[85] Biosafety Unit, «Target 15» (Secretariat of the Convention on Biological Diversity), 15, accessed 20 September 2023, https://www.cbd.int/gbf/targets/15/.

[86] Corporate Social Responsibility EU Directive (CSRD), 19 December 2022

[87] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088

[88] Ibid.

Besides legislative development, several business and civil society initiatives are emerging to integrate biodiversity across supply chains and business operations, at domestic, regional or international level, even if the degree of awareness remains limited compared to climate change[89]. In 2016 over 100 companies signed the Biodiversity Pledge, while in 2018 banks and institutional investors gathered under the Natural Capital Financial Alliance or the Finance for One Planet Initiative. International organizations such as the International Union for Conservation of Nature (IUCN) are offering their support to business initiatives.

Following the framework proposed by the G20-initiated Task Force on Climate-related Financial Disclosures (TCFD), in 2020 a new risk management and disclosure framework named Task Force on Nature-related Financial Disclosures (TNFD) has been launched to enable companies and financial institutions to integrate nature into decision-making[90]. Having reached the final version of the Recommendations in September 2023, after several open beta versions, the TNFD is an attempt to provide a comprehensive guiding framework to map, assess, respond and disclose nature-related risks, beyond typical non-financial sustainability metrics. Based on those discussed in this same section, they are categorized into (i) physical risks; (ii) transitional risks; (iii) systemic risks. However, the TNFD contribution is that it does not only define risks, impacts and dependencies, but aims to also help companies to assess and manage nature related opportunities, providing Strategy and Governance guidance through the so-called LEAP approach[91].

2.2 Private and Public flows: current global biodiversity financing

To ensure the integrity of natural ecosystems and reverse biodiversity loss, biodiversity conservation actions require financial resources and economic incentives, as well as investments to maintain and restore environments. The whole group of practices of leveraging and managing financial capital and deploying economic incentives to support biodiversity conservation, restoration and sustainable management is called "Biodiversity Finance"[92].

Financial sources devoted to biodiversity stem from three main sectors: government funds (domestic public funds), Official Development Aid (ODA – International Public funds) and private capital. Diverse types of funds are then mobilized through different flows that include (i) traditional conservation and restoration

[89] OECD, *Biodiversity: Finance and the Economic and Business Case for Action* (OECD, 2019), https://doi.org/10.1787/a3147942-en.

[90] «TNFD – Taskforce on Nature-Related Financial Disclosures», TNFD, accessed 15 May 2023, https://tnfd.global/. The TNFD is formally at a pilot stage - 0.4 beta version consultations phase,

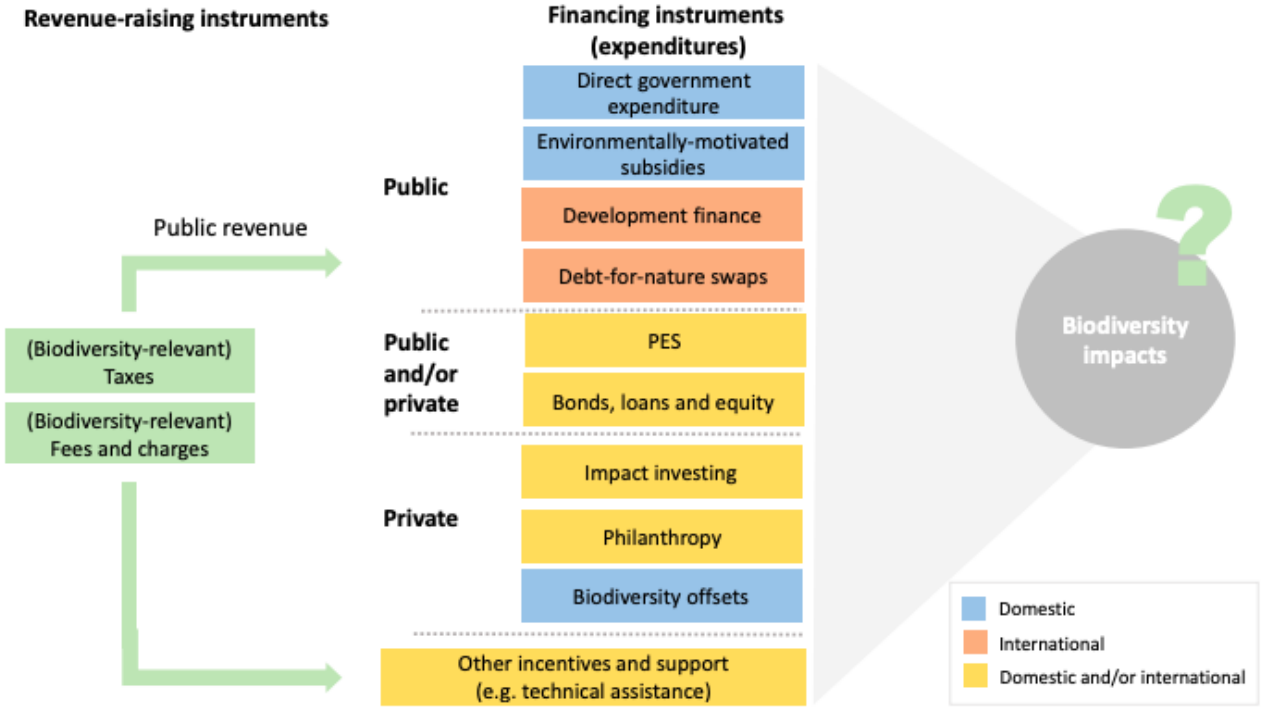
[91] The LEAP approach is a voluntary guidance for internal risk and opportunity assessment made up of 4 phases: Locale, Evaluate, Assess and Prepare

[92] Clark, S. (2012). A field guide to conservation finance. Island Press. The term is like the more commonly used "Conservation Finance" but avoids the connotation of a focus on "conservation" as the primary or only objective.

practices, (ii) investments in commercial activities that have positive outcomes on the biosphere and (iii) transactions in biodiversity-related markets[93]. Moreover, these can be channeled through intermediaries such as public finance institutions or private asset managers.

The Figure below represents an overview of the different finance instruments available both to public and private sectors for biodiversity financing, even if not fully comprehensive and sometimes overlapping.

Figure 4: Conceptual Framework for Biodiversity Finance



Source: OECD, 2019

Biodiversity conservation finance has been historically dominated by the public sector, representing roughly 50% of the available resources through domestic budgets, fiscal reforms and taxes to discourage harmful activities and the establishment of public protected areas such as national parks or marine reserves. ODA has also always played an important role, particularly in developing countries. Despite the crucial government expenditure, in light of the increasing environmental degradation and climate change trends, the portfolio of instruments needs diversification and innovation, involving public, philanthropic and private sectors. Recent advancements in public-private financing include green bonds, sustainability linked loans, nature-based solutions, environmental impact bonds and many other approaches that will be better explained in the next chapter. Also new partnerships are emerging between NGOs and the philanthropic sector, and a strategic mix of private-public resources ('blending') into environmental impact funds.

[93] «Financing Nature: Closing the Global Biodiversity Financing Gap», Paulson Institute, accessed 16 May 2023, https://www.paulsoninstitute.org/conservation/financing-nature-report/.

When taking a global overview of the trends of Green Finance, despite the overall growth and interest in the sector in the last decades, biodiversity finance remains a small percentage of the total. The Global Survey of Impact Investors in 2018 found out that just 3% of respondents' investment portfolios included investments in "conservation"[94]. Similarly, just 4% of the earnings from green bonds in 2019 were used to fund initiatives that support the incorporation of nature concerns in industrial sectors like agriculture, forestry and fishery[95].

Estimates of global biodiversity conservation financing have been calculated starting from the benchmark of US$ 52 proposed by the Global Canopy Programme in 2012[96]. Since then, to update current financial flows, different clearinghouses methodologies and data collections have been used by many organizations, including among others the Organization for Economic Cooperation and Development (OECD) and the United Nations Development Program Biodiversity Finance Initiative (UNDP BIOFIN). It should be noted that, due to considerable data gaps between private-public biodiversity finance and a lack of harmonized and comparable biodiversity expenditure reporting standards across countries, these numbers should be treated with caution, even if together they suggest consistency and can help in providing a baseline for policy makers and stakeholders in keeping track of biodiversity conservation finance over time. The lower and upper limits are considered based on different methodological approaches.

Based on the most recent data of 2019, the Paulson Institute, The Nature Conservancy and the Cornell Atkinson Center for Sustainability at Cornell University, took a deep look at the global biodiversity expenditure from public, private and philanthropic sectors. The authors estimated it at 124-143$ billion per year, corresponding to 0.12–0.14% of global GDP in 2019[97]. In 2020, the OECD released its report "Biodiversity: Finance and the Economic and Business Case for Action", estimating global biodiversity finance at US$ 78–91 billion per year, based on available 2015–2017 data[98], and providing an extremely detailed picture of domestic (USD 49 billion in 2015) and international (USD 39 billion/year) expenditures. In the same year, the UNDP BIOFIN calculated the increase in global public biodiversity investments between 2008 and 2007, from around $100 billion to $123-140 billion[99].

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[94] Global Impact Investing Network (GIIN). 2018. Annual Impact Investor Survey 2018

[95] Climate Bonds Initiative (CBI). 2020. 2019 Green Bond Market Summary. February 2020. https:// www.climatebonds.net/files/reports/2019_annual_ highlights-final.pdf

[96] The available funding for biodiversity is estimated at approximately US$ 52 billion per year. Parker, C., Cranford, M., Oakes, N., & Leggett, M. (2012). The little biodiversity finance book. Global Canopy Programme, Oxford. http://globalcanopy.org/sites/default/files/documents/resources/LittleBiodiversityFinanceBook_3rd%20edition.pdf

[97] «Financing Nature».

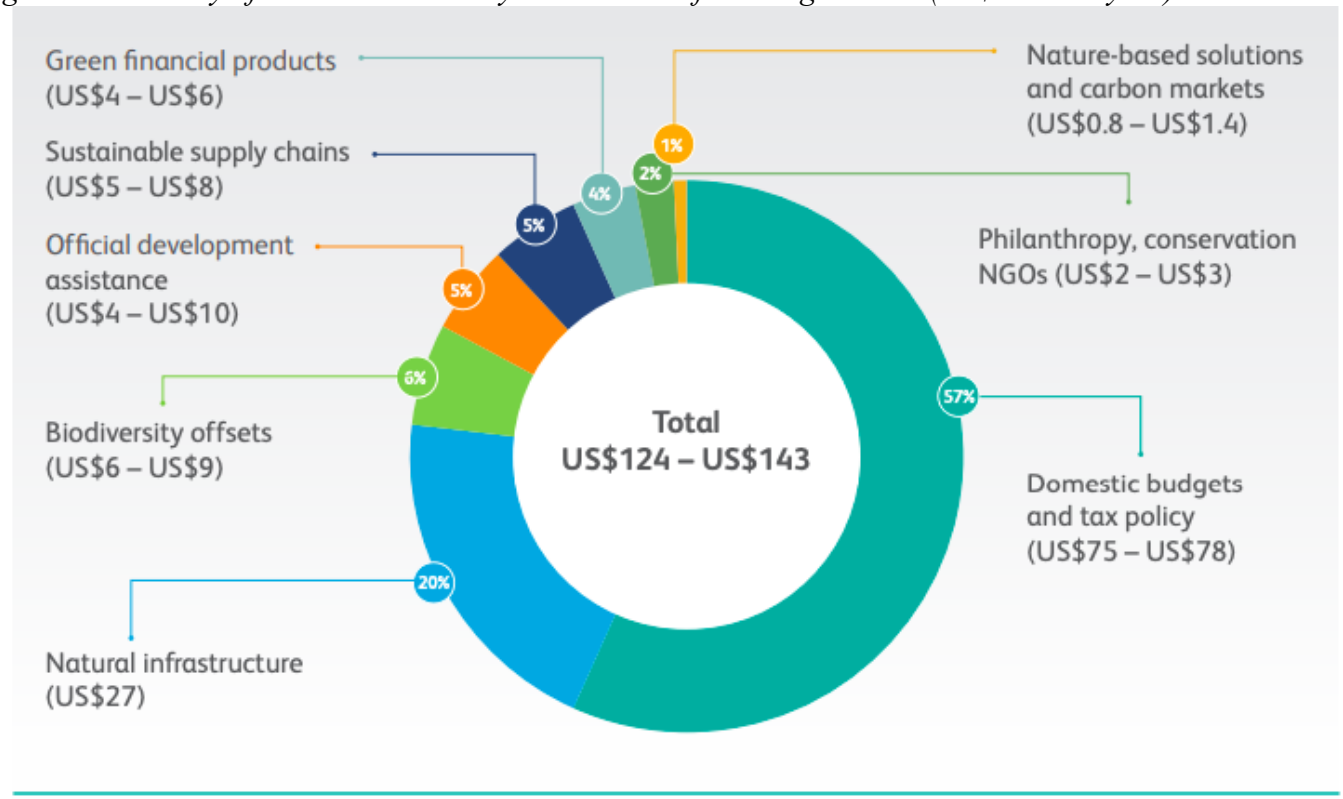
[98] OECD, 2020. A Comprehensive Overview of Global Biodiversity Finance. Final report prepared by the Organization for Economic Cooperation and Development (OECD). Available at: https://www.oecd.org/ environment/resources/biodiversity/report-a-comprehensive-overviewof-global-biodiversity-finance.pdf (Accessed: 26 July 2020).

[99] Seidl, A., et al., Forthcoming 2020. Pennies for Pangolins: A global estimate of public biodiversity investments. United Nations Development Program (UNDP) Biodiversity Finance Initiative (BIOFIN)

OECD findings also underline the weaknesses of these calculation attempts. In order to be accurate and reliable, estimates of the global biodiversity financing should distinguish between[100]:

- Finance flows for type of actor (public: national, regional and local; Private: companies, philanthropic foundations, households)
- Different flows at domestic and international level
- Biodiversity- relevant sectors (agriculture, fishery, forestry and tourism)
- Biodiversity as a primary objective, secondary objective or co-benefit of the investment

Figure 5: Summary of Global biodiversity conservation financing in 2019 (US$ billions/year)



Source: Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability, 2020

What is clearly shown by the graph, and confirmed by OECD and UNDP BIOFIN calculations, is that the public sector (primarily domestic) continues to dominate the biodiversity conservation total funding, with 54-60% of shares. Based predominantly on data from the CBD Financial Reporting Framework and BIOFIN expenditure reviews, the OECD reported that the EU, during the period 2015-2017, spent roughly USD 14.5 billion in direct and indirect biodiversity financing[101].

[100] OECD, 2020. A Comprehensive Overview of Global Biodiversity Finance. Final report prepared by the Organisation for Economic Cooperation and Development (OECD). Ch.2
[101] Ibid.

Public finance mobilized internationally is estimated at 3.9 – 9.3 billion a year and covers the biodiversity expenditure from bilateral and multilateral Official Development Assistance (ODA) and non-concessional flows. OECD statistics reveal that the majority of biodiversity-related development funds target land and freshwater biodiversity as primary or significant objective, while ocean and marine conservation remain relatively collateral and underfunded[102].

Data on public domestic and international flows reveal at the same time a lack of alignment of private investments towards biodiversity goals (due to lack of data ad investment taxonomies), estimated at USD 6.6-13.6 billion per year[103]. However, interest from the private sector is on the rise, with a noteworthy portion of tracked private investments channeled into biodiversity offset schemes, primarily through habitat mitigation and conservation banks in the United States [104]. Other instruments available are forest carbon finance, payments for ecosystem services, water quality trading and offsets, philanthropic spending, private contributions to non-governmental organizations (NGOs), and private finance leveraged by bilateral and multilateral public development finance.

Despite different results, all the estimates record a consistent increase in funding since the Global Canopy benchmark. However, when put into context, they represent from half to one fourth of the government subsidies to harmful activities in agriculture, forestry and fishery, respectively accounting to $451, $51 and $36[105]. The global flow of subsidies potentially harmful to biodiversity in 2019 has been estimated to be US $274-542 [106]. This means that the current positive financing continues to be widely counterbalanced and overshadowed by the negative ones, with the agricultural sector being the most impactful and damaged in turn[107]. In fact, governments support to farmers based on prices and outputs levels is considered to be the most environmentally harmful, and despite it has declined since 1990s, it remained constant over the past decade[108]. Even if not directly impacting, it is due to the fact that fossil fuels government support is the largest flow of public finance harmful for biodiversity. Incentives to fossil fuels can in fact contribute to climate change, notably the third largest driver of global biodiversity loss. Therefore, leveraging positive finance for biodiversity should go along with scaling back harmful expenditures.

[102] Ibid.
[103] Ibid.
[104] OECD, 2020
[105] "Financing Nature". Excluding estimated additional US$ 395–478 billion in fossil fuel production subsidies
[106] Ibid.
[107] OECD (2013), Policy Instruments to Support Green Growth in Agriculture, OECD Green Growth Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264203525-en.
[108] Diaz, S. et al. (2019), Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, Bonn, https://www.ipbes.net/system/tdf/ipbes_7_10_add-1_advance_0.pdf?file=1&type=node&id=35245

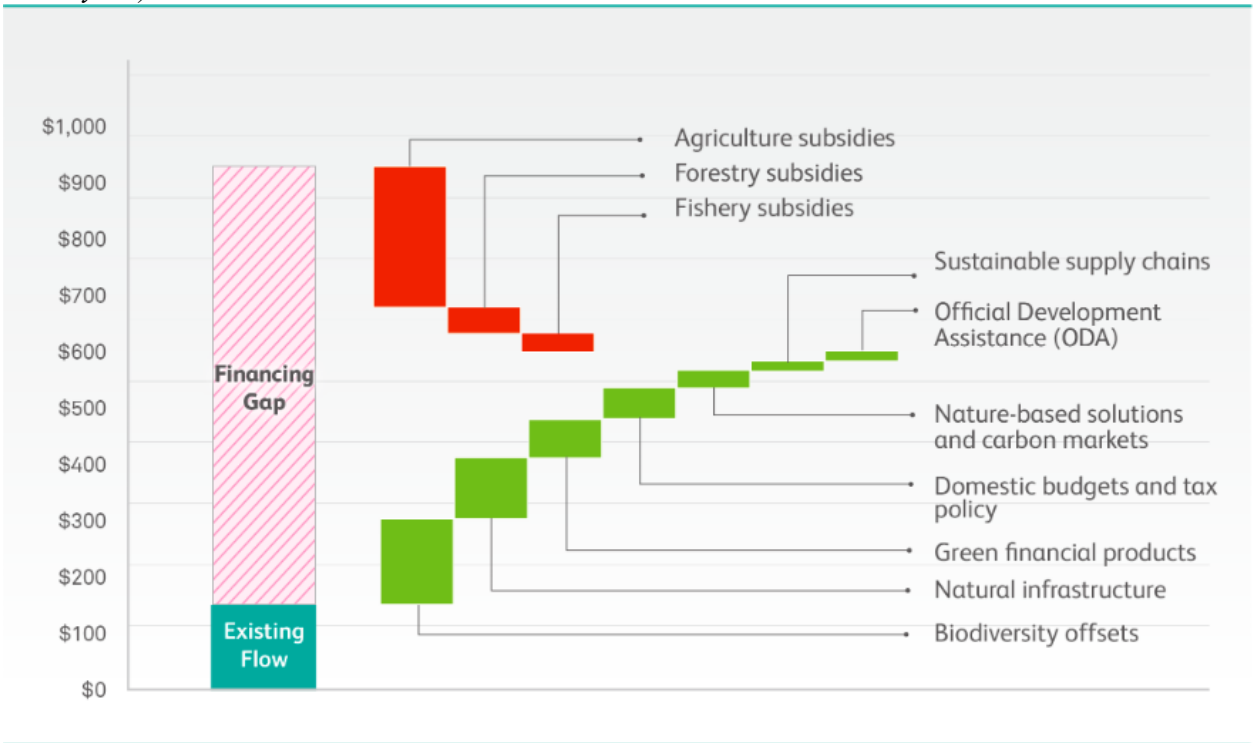
2.3 "Biodiversity Financing Gap" and future investments needs

Many attempts have been made to estimate the amount of funding that is needed globally to meet the CBD biodiversity integrity targets ("30x30" target). As per models of current financial flows, scenarios of future investment needs for biodiversity are still based on weak available data and peer-reviewed academic literature, therefore lower and upper range limits are considered. However, they are useful tools to convey the scale of the issue and set milestones for future policy and financial interventions.

Analysis of the Paulson Institute, the Nature Conservancy and the Cornell Atkinson Centre for Sustainability (2020) found that, in order to halt and reverse the loss of biodiversity by 2030, we need to spend between US$ 722-967 billion each year[109]. The relevance of this research is that it is one of the first attempts to go beyond the estimates of the global financial needs, dividing it into sub-sector and trying to calculate the costs of shifting high-impact sectors such as infrastructure and agriculture, with croplands and protected areas being the ones with the higher costs needed to support the transition (between USD 315-420 and USD 149-192).
The difference between current biodiversity expenditure and the investment needs defines the so-called "biodiversity funding gap", set at an average US$ 711 billion per year (2019) or between a range of US$ 598-824 billion per year. What could appear as a large commitment, once put into context, represents a small fraction of global GDP. More precisely, the global biodiversity funding needed to close the gap is equivalent to between 0.73% and 0.97% of global GDP in 2019. This means that, despite the resources required are higher than those committed to climate-related investments, it is not a matter of availability, rather than distributions and deployment of existing funds[110]. The underlying reasons of under-investment in nature lie in fact in a consistent flow of capital towards harmful activities that, if redirected by governments, could close around half of the identified gap (US $273.9 billion). A key finding of the same report shows that the global biodiversity conservation gap will not be closed even with increased capital flows toward biodiversity conservation of USD 446-632 billion annually by 2030, unless substantial efforts occur to reform adverse support to biodiversity and scale up private investments toward biodiversity protection.[111]

[109] «Financing Nature: Closing the Global Biodiversity Financing Gap», Paulson Institute, accessed 20 May 2023, https://www.paulsoninstitute.org/conservation/financing-nature-report/.
[110] «1.3 the state of biodiversity finance - Biofin - The Biodiversity Finance Initiative», accessed 20 May 2023, https://www.biofin.org/sites/default/files/content/publications/workbook_2018/1-2.html.
[111] «Financing Nature».

Figure 6: Estimate of growth in financing resulting from scaling up proposed mechanisms by 2030 (in 2019 US$ billion/year)



Source: Financing Nature Report

Strategies to 'bridge the gap' have become a hot topic in international business and policy forums. Goal D of the CBD is focused entirely on the attempts to close "the gap between available financial and other means of implementation, and those necessary to achieve the 2050 vision"[112]. The authors of the report divided them into three different approaches[113]:

1. Reducing harmful economic activities: this approach is estimated to mobilize 280-287 billion a year. This involves not only reforming harmful subsidies and incentives to agriculture fisheries and forestry, but also a shift toward more sustainable supply chain and increased understanding from financial institutions of negative impacts and risks of their investments
2. Generating new revenues: this approach is estimated to mobilize US $169-416 billion a year. Mechanisms to deploy new funds include the use of domestic budgets and tax policies to positively influence the economy (taxes, fees, debt relief, loans, and tariffs); green financial products leveraging private funds like green bonds, low-interest green loans, environmental impact bonds and the development of standards and frameworks.
3. Investing smarter: how to invest and channel existing public and private funds has been also identified as a key approach. Smart investments can take the form of: Official Development Assistance for biodiversity rich countries through debt-swaps and direct grants; investments in Natural Infrastructures

[112] CBD
[113] Ibid.

and Nature Based solutions restoring habitat while delivering precious ecosystem services, like forests and wetlands, linking emissions reductions from restored natural landscapes to enhanced carbon markets.

The Resources Mobilization Strategy adopted at COP15 to mobilize investments towards the post-2020 milestones targets, set an amount of USD 200 billion per year leveraged from all sources and an increase in ODA to 20$ billion per year by 2025 and $30 billion per year by 2030[114]. Delegates also agreed to establish a Special Trust Fund set by the Global Environmental Facility to support the implementation of the GBF and a predictable flow of funds. In order to align and implement the mission, contracting parties are committed to define their National Biodiversity Strategies and Actions Plans (NBSAPs) due to take place in 2024.
The UNDP and the European Commission launched the Biodiversity Finance Initiative (BIOFIN), a global partnership whose role is to support countries to develop comprehensive strategic plans to implement the Global Biodiversity Framework targets[115]. BIOFIN is committed to doing detailed country-level assessments in order to provide baseline information, identify the biodiversity funding gap and suggest the resource mobilization strategies that best suit the national context to protect biodiversity. by providing baseline information, capacity and institutional arrangements.

This is done by following a dedicated methodology built on 5 pillars:

1. Biodiversity Finance Policy and Institutional Review (PIR)
2. Financial Needs Assessment (FNA)
3. Biodiversity Expenditure Review (BER)
4. Biodiversity Finance Plan (BFP)
5. Finance Solutions Implementation

[114] Kunming-Montreal Global Biodiversity Framework
[115] «Biodiversity Finance Initiative (BIOFIN) | United Nations Development Programme», UNDP, accessed 21 May 2023, https://www.undp.org/georgia/projects/biofin.

Ch III - Innovative Financial Mechanisms for biodiversity conservation

3.1 A market-based approach to biodiversity conservation

Goal D of the CBD is entirely focused on the attempts to close "the gap between available financial and other means of implementation, and those necessary to achieve the 2050 vision"[116]. This goal is not new in the Convention, since the everlasting struggle of environmental regulation has always been the efficient allocation of resources towards nature conservation. The novelty relies on the emphasis surrounding the need to *leverage private finance* and *increase resources mobilization.*

Nature and wildlife conservation law has developed over time[117]. The traditional approach has always followed the model of "command and control" regulation. While in the last decades of the 19th century a global shift occurred in the recognition of the need to preserve wildlife from cruelty and areas of exceptional beauty, that led to the creation of the firsts National Parks, it was only from the last decades of the 20th century that the modern nature conservation law took shape[118]. States typically identified sensible habitats and species deserving protection and preservation, setting up regulatory agencies to monitor compliance, then imposing restrictions and penalties in case of harm. This involved the creation of criminal offenses and rules for enforcement, but progressively these provisions have also been accompanied by the promotion of positive behaviors. Stricter and wider regulation applied to different habitats and species, with a different scope of protection and with different legal tools at local, national and international level.
However, despite some recognized achievements of the traditional regulatory approach, in light of the missing targets, new interest has emerged towards new mechanisms capable to enhance biodiversity protection, leveraging on assumptions of increased cost-efficiency and environmental effectiveness[119].

Scientists started recognizing the limitations and weaknesses of the "command and control approach", in line with Hawkins thought in 1998:

"Twenty or thirty years ago we were secure in our assumption that the most appropriate legislative response to the undesirable consequences of industrialized life for the natural environment was the use of legal

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[116] Convention on Biological Diversity, Art.

[117] For a discussion of the evolution of the law in one jurisdiction see Colin T. Reid, 'Towards a biodiversity law: the changing nature of wildlife law in Scotland' (2012) 15 *Journal of International Wildlife Law and Policy* 202.

[118] Reid, Colin T. "The Privatisation of Biodiversity? Possible New Approaches to Nature Conservation Law in the UK." *Journal of Environmental Law* 23, no. 2 (2011): 203-231.

[119] Charles E. Di Leva, «The Conservation of Nature and Natural Resources through Legal and Market-Based Instruments», *Review of European, Comparative & International Environmental Law* 11, fasc. 1 (2002): 84–95, https://heinonline.org/HOL/P?h=hein.journals/reel11&i=86.

regulation backed by the criminal sanction. This reliance upon command-and-control regulation was, however, soon to be threatened by a growing belief that it was both ineffective and inefficient[120].

All the emerging approaches showed a preference to be grounded on economic assumptions, as a reaction to the dissatisfaction with the rigid, inefficient and bureaucratic traditional state regulation and a general ideological wave towards deregulation and market-based approaches. Under a neoliberal analysis of environmental problems, nature is a common good resource, and its ecosystems provide benefits that are non-excludable and non-rival, leading to the situation renowned under Hardin's heading "The Tragedy of the Commons"[121]. The current climate and biodiversity crisis is conceived to be predominantly a result of the human failure to internalize benefits and costs in the economic equation and avoid free riding at multiple scales.

The correction of market failures has been the first advantage claimed for the use of "market-based instruments" for biodiversity conservation. MBIs is an ubiquitous and broad concept, whose definition raised discussion and criticism in the literature[122]. There is still not a consensual list, but it is vaguely used to refer to a wide range of tools like: taxes and subsidies, cap-and-trade permits, payments for ecosystem services, carbon and biodiversity offsets, eco labels and certifications, biodiversity bonds. As the economic scholar Pirard noted:

"[T]he instruments presented in the literature as 'market-based instruments' (MBIs) constitute an extremely heterogeneous group with loose and contrasted links to markets as defined by economic theory ... In fact, the market terminology seems to have been adopted by default, as a way of differentiating these instruments from all other approaches that do not have a pricing element[123]"

In fact, as we will better afford later, the category of MBIs gathers instruments that are far from truly complying with the market rationales, namely a high level of voluntariness, trade dynamics, and a clearly defined product or service embedded in a price system (high degree of commodification). The term has been coined to broadly qualify a set of policy tools that differ from the "command and control conservative regulation", a definition by opposition; however, many scholars have criticized this theoretical dichotomy, rather defined as a flawed category[124]. In practice in fact, MBIs take a variety of institutional forms that often

[120] Keith Hawkins, 'General Editor's Introduction' to Gunningham and Grabosky, *Smart Regulation* (n. 46) vii.

[121] Garrett Hardin, 'The tragedy of the commons' (1968) 162 *Science* 1243.

[122] Romain Pirard e Renaud Lapeyre, «Classifying Market-Based Instruments for Ecosystem Services: A Guide to the Literature Jungle», *Ecosystem Services* 9 (1 September 2014): 106–14, https://doi.org/10.1016/j.ecoser.2014.06.005.

[123] Romain Pirard, 'Market based instruments' (n. 8) 19–20 *Environmental Science and Policy* 59, 66

[124] «The Institutional Dimension of "Market-Based Instruments" for Governing Ecosystem Services: Introduction to the Special Issue: Society & Natural Resources: Vol 26, No 10», consultato 23 June 2023, https://www.tandfonline.com/doi/abs/10.1080/08941920.2013.829380.

overlap with each other and with the role of the state, in particular between voluntary and compulsory tools[125]. Moreover, the term sometimes seems not to define a new range of tools, rather new expectations and representations on tools already existing, or the result of an amalgamation efforts with pre-established governance structures[126]. Many case studies provide evidence of the fact that market-based instruments in environmental policy tend to adopt forms of hybrid governance that result from a combination of hierarchical and market elements[127]. The case of payments for forest services in Costa Rica (Pago por Servicios Ambientales) or the Socio bosque program in Ecuador are good examples of how the two categories interact in the rewarding of ecosystem services. In both cases, the program combines a high degree of voluntariness of landowners' involvement, whether communal or private, with a significant role of the State role, responsible for distributing transfers from the national budget and establishing the terms for payments.
Some argues even that they can be quite placed at the same level, recognizing that "market-based instruments are regulations that encourage behavior through market signals rather than through explicit directives"[128].

Scholars have tried to classify MBIs based on dimensions and scales, but before moving to classifying the type of instruments gathered under this extensive heading, it is considered useful to state the main justifications brought forward by the advocates of MBIs for biodiversity protection.

Correction of market failures: The first justification, anticipated above, is the correction of market failure, basically the fact that current prices on goods and services do not account for both negative or positive externalities of the process, shifting the burden of natural resources degradation far from those who contributed to the harm. This approach in biodiversity conservation emerged in parallel with the development of the notion of ES, and according to its advocates, the correction or even creation of the market is able to provide the incentive to sustainably manage forests and water flows taking into account the environmental costs in business profit logics.

Theory of incentives: The second justification relies on the regulatory failure of the state and its bottom-up legislation to create the right incentives to people to do more of what is enforced by law. In fact, compliance with general provisions aiming to prevent harm to wildlife and ecosystems is not able to well address the indirect and diffused harmful activities that are not subject to regulation. MBIs are assumed to create incentives

[125] David N. Barton, Stefan Blumentrath, e Graciela Rusch, «Policyscape—A Spatially Explicit Evaluation of Voluntary Conservation in a Policy Mix for Biodiversity Conservation in Norway», *Society & Natural Resources* 26, fasc. 10 (1 October 2013): 1185–1201, https://doi.org/10.1080/08941920.2013.799727.
[126] Primmer, Eeva, and Heimo Karppinen. "Professional Judgment in Non-Industrial Private Forestry: Forester Attitudes and Social Norms Influencing Biodiversity Conservation." Forest policy and economics. 12, no. 2 (2010): 136–146.
[127] Roldan Muradian e Laura Rival, «Between markets and hierarchies: The challenge of governing ecosystem services», *Ecosystem Services* 1 (1 July 2012): 93–100, https://doi.org/10.1016/j.ecoser.2012.07.009.
[128] R. Stavins, "Experience with market-based environmental policy instruments", Resources for the Future discussion paper 0009, January 2000, in S. Whitten, M. van Bueren, D. Collins, "An overview of market-based instruments and environmental policy in Australia", in Market based tools for environmental management, Proceedings of the 6th annual Australian Agricultural and Resource Economics Symposium, Canberra, 2003.

that reach every individual, being everyone responsible for the cumulative causes of biodiversity and climate crisis. It is the case of an environmental oil tax, providing incentive to everyone to drive less or buy a more efficient vehicle, unlike an emission cap for site specific industries.

Funding Gap: The third argument of those who argue in favor of MBIs is their potential to attract new sources of income, predominantly from the private sector, that can be devoted to the protection and restoration of habitats as well as monitoring activities. The traditional approach sees the governments as the main actor in managing the high administrative and monitoring costs of biodiversity conservation activities (identify the site, financially assist the management, enhance and enforce compliance checks), that thus tend to be usually underfunded. MBIs can create the right frameworks of incentives to shift the burden of the costs directly to the polluter or the beneficiary.

In international forums, since the 1992 Rio Earth Summit, the problem of lacking resources was the main ground of negotiations around the use of new tools to leverage funds. At the Nairobi meeting, in reaction to the Global South demand for Global North increase in conservation funding, the latter proposed to the option of the "Innovative Financial Mechanisms" (IFMs), rejecting any sort of binding public commitment[129]. On that occasion, North representatives suggested the use of payments for ecosystem services, biodiversity offset mechanisms, environmental fiscal reform, markets for green products and many other different approaches. Again, the term IFMs, even in institutional circles, has been used as an umbrella expression for "asylum seekers" instruments.

Given the variety of typologies, many scholars tried to bring clarity in the field of MBIs and manage the complexity of their governance structures using a deductive reasoning, identifying the general patterns rather than defining the single instruments[130] (Table below).

Category	*Exclusive characteristics*	*Examples of application*
Direct markets	A market where an environmental product can be directly traded between producers and consumers (or processors)	Genetic resources, non-timber forest products (NTFP), ecotourism
Tradable permits	A market where users of an environmental resource need to purchase ''permits'' that can be further exchanged among resource users, thereby creating artificial scarcity	Mitigation banking for biodiversity, emission quotas in the European ETS, Individual Transferable Quotas for fisheries, tradable development rights for land, a voluntary carbon market
Reverse auctions	A mechanism whereby candidates to service provision set the level of payment (if accepted) in response to a call by public authorities to remunerate landholders	Payments for ecosystem services

[129] Draft recommendations for innovative financial mechanisms as first proposed in Nairobi at WGRI 3 (CBD 2010c)

[130] E. Broughton, R. Pirard, "What"s in a name? Market-based instruments for biodiversity" Health and Environment Reports, n° 8, May 2011

Coasean-type agreements	Ideally spontaneous transactions (free of public intervention) for an exchange of rights in response to a common interest of the beneficiary and the provider	Payments for ecosystem services ala Wunder, conservation easements, conservation concessions
Regulatory price signals	Consists in regulatory measures that lead to higher or lower relative prices	Eco-tax, agro-environmental measures
Voluntary price signals	Consists in schemes whereby producers send a signal to consumers that environmental impacts are positive (in relative terms) and consequently gain a premium on the market price	Forest certification, labels for organic agriculture, norms (self produced before certification)

Table 2: MBIs classification
Source: Roman Pirard and Renaud Lapeyre. 'Classifying market-based instruments for ecosystem services: a guide to the literature jungle' (2014) Ecosystem Services 106, 109.

The minimum dimensions to be considered in the matrix in order to be able to catch the most important differences among the elements of this diverse group are:

1) Their degree of voluntariness
2) Degree of commodification
3) Relation with the market
4) Role of the State

This being said, MBIs is an uncertain category whose definition has not yet reached a consensual list and classification of tools. It necessarily underlies predetermined ideas and values on public action and the only feature they seem to have in common is the process of putting a price on nature, disregarding if it happens in a market context.

This fundamental feature gave birth to widely debated technical and ethical challenges[131]. In particular, the moral legitimacy of MBIs had been accused of nature Commodification, namely the fact of give a monetary value to natural resources in order to be traded like other commodities or be subjected to property rights[132]. Basically, to fit the methodologies required by design in a market system. However, the strategy of "selling nature to save it" is a hotly debated one, both in principle and in practice[133]. Some argue that this logic is too much anchored to an old framework that assumes utilitarian reasons as the main drivers of human-nature interaction, disregarding the existence of a spiritual and intimate relation that can shape human behavior, like a sense of environmental and societal justice, feelings to be past of an Earth community as a whole and

[131] Jerneja Penca, 'Marketing the market: the ideology of market mechanisms for biodiversity conservation' (2013) 2 *Transnational Environmental Law* 235.

[132] Nicolás Kosoy and Esteve Corbera, 'Payments for ecosystem services as commodity fetishism' (2010) 69 *Ecological Economics* 1228; Hahn, Thomas, Constance McDermott, Claudia Ituarte-Lima, Maria Schultz, Tom Green, and Magnus Tuvendal. "Purposes and Degrees of Commodification: Economic Instruments for Biodiversity and Ecosystem Services Need Not Rely on Markets or Monetary Valuation." *Ecosystem Services* 16, (2015): 74-82.

[133] Kathleen Mcafee, «The Contradictory Logic of Global Ecosystem Services Markets», *Development and change* 43 (1 January 2012): 105–31, https://doi.org/10.1111/j.1467-7660.2011.01745.x.

concepts of common heritage of humankind[134]. From this perspective, the market-based approach does not acknowledge the fact that costs are perceptions mediated by social values and that tradeoffs exist between economic efficiency and other societal goals. The former Governor of the Bank of England and United Nations Special Envoy for Climate Action and Finance Mark Carney highlighted the dangerous overlap of price and value when talking about nature: "*Amazon is one of the world's most valuable companies, yet the Amazon region appears on no ledger until it is stripped of its foliage and converted to farmland. The price of everything is becoming the value of everything. This crisis (COVID-19) could help reverse that relationship, so that public values help shape private values. More fundamentally, the traditional drivers of value have been shaken, new ones will gain prominence, and there's a possibility that the gulf between what markets value and what people value will close"*[135].

However, even if hard to quantify, others argued that estimating the economic value of a natural species like a whale can help humans to realize their full value and protect them influencing investments. An interesting attempt if the one supported by the IMF when asked "Can you put a price on a whale"[136], shedding light on the monetary value of some of the services provided by the animal globally: fishing industry, whale watching, CO2 sequestration and phytoplankton production.

From a different perspective, it could be argued that the commodification of nature incentivizes a situation in which nature is not considered for the complex dynamics and interconnections between its elements but divided in units that hamper its well-being. In fact, to fit market rationales, property-based legal boundaries are used to set artificial limitations to the land, or treat specific elements of nature (forests, coral reefs, water) or species separately, versus the "ecosystem approach" supported by the CBD that calls for an integrated and holistic view for the goal of reversing biodiversity loss.

In conclusion, the acknowledgement of the fact that, despite multilevel conservation laws and policies, no significant reduction in biodiversity loss has been registered, has led many ecologists and policy makers to turn towards economics to retrieve a sense of connection with nature and turn it into something that citizen and policy makers can care about, create more interest in nature. The process of "Enterprising nature"[137], as argued by Jessica Dempsey in the homonym book, has become the new frontier of biodiversity governance, developing new ecological-economics methodologies, new disciplines, new regulatory conditions to make nature something that can compete by itself (an "entrepreneurial self"), no more a burden of the state.

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[134] Cormac Cullinan, *Wild Law: A Manifesto for Earth Justice* (2nd edn, Green Books, 2011)

[135] «Mark Carney on how the economy must yield to human values», accessed 23 June 2023, https://www.economist.com/by-invitation/2020/04/16/mark-carney-on-how-the-economy-must-yield-to-human-values.

[136] This analysis has estimated the value of a single great whale at more than $2 million—which comes to more than $1 trillion for the current stock of great whales - Ralph Chami et al., «A Strategy to Protect Whales Can Limit Greenhouse Gases and Global Warming», 2019.

[137] *See* Jessica Dempsey, Dempsey. Enterprising Nature: Economics, Markets, and Finance in Global Biodiversity Politics Wiley, 2016. doi:10.1002/9781118640517.

However, despite the approach may seem compatible with the predominantly capitalistic logics of the global economy, the story of enterprising nature comes with not few operational downsides, to the point of being perceived as a paradox.

3.2 Overview of nature markets and market-based instruments (MBIs)

Mobilizing private funds has become the mainstream narrative in environmental policy and sustainable finance circles interested in "30x30" biodiversity conservation goals. Many influential policy reports from the OECD, the UNEP and the WEF advocate for a private-led approach. In order to create a nexus between natural resources and the market, supported by the linking concept of "ecosystem services", many business and financial frameworks have been created and gathered under the heading of "Nature markets".

As per MBIs, nature markets are different in forms and shapes, and there is a broad literature that tries to clarify the emerging phenomenon into categories. To be broadly defined as such, Nature markets need nature to be assigned with a monetary value, nature-specific revenues to be generated, and the presence of a buyer and a seller trading natural services. Building on the more specific definition of the Taskforce on Nature Markets, it is a "a system composed of transactions between separate buyers and sellers, in which the transacted good or service specifically reflects a stock of ecosystem assets or a flow of ecosystem services from terrestrial or aquatic ecosystems."[138]

Nature markets are emerging rapidly, involving several actors among banks, investors, impact funds, civil organizations, corporates and philanthropic foundations and they are intersecting with climate-related markets. According to data, they make up in total up to 9,8$ trillion of GDP annually (11%). However, not every nature market is designed to deliver nature-positive outcomes, indeed they represent a small share, less than 1% of value[139].

Based on the basic precondition set above, nature markets taxonomy has been divided in 4 categories that reflect the different rationales of exchange, each of them operating with established instruments[140]:

- **Asset**: are markets in which the right to use ecosystem assets and their resulting services are traded. They are the system where real assets are exchanged, such as agricultural lands or water rights. These

[138] «Global Nature Markets Landscaping Study | Taskforce on Nature Markets», accessed 28 June 2023, https://www.naturemarkets.net/publications/global-nature-markets-landscaping-study.
[139] «The state of nature markets today and tomorrow», accessed 21 June 2023, https://www.mckinsey.com/capabilities/sustainability/our-insights/sustainability-blog/the-state-of-nature-markets-today-and-tomorrow.
[140] « The Future of Nature Markets | Taskforce on Nature Markets», accessed 28 June 2023, https://www.naturemarkets.net/news-and-events/new-paper-future-of-nature-markets. Pg 20-21

markets require enforceable property rights and reflect demand for stable and long-lived value streams. Asset markets represent a stock of value which may generate revenues over different time periods

- **Intrinsic**: Markets in which provisioning, regulating, or cultural ecosystem services are traded. Biodiversity conservation is the main motivation in the system, both for economic benefit and ethical reasons. Intrinsic markets use specific instruments like Payments for Ecosystem services, overseas development aid, philanthropic grants, sustainability-linked debt
- **Credit**: Markets in which credits that reflect efforts to enhance or conserve ecosystem assets or services are traded. They are born in the climate policies field, with the scope to offset a negative impact of an economic actor somewhere in time and space, but given carbon sequestration capacity of nature, they are now considered jointly. Credits can thus reflect the value of ecosystem services, through biodiversity credits, mitigation banking and water quality credits, or the value of carbon removal, through nature-related carbon credits, AFOLU sector compliance and carbon allowances. Nature and carbon credits specifically distinguish among voluntary and compliance, based on the fact that they are issued by law (i.e., "cap and trade" mechanism under the ETS) or self-governed by companies (like REDD+ programs)
- **Derivative**: are markets that trade more financial than market products which directly reflect the value of ecosystem services or assets. Demand drivers vary substantially among products, but these markets reflect increasing recognition of nature's values and the risks posed by nature loss. Derivative markets represent both stock and flow values, depending on the underlying product or asset. The tools used are Commodity derivatives, nature-related insurance, wildlife NFTs, biodiversity loss insurance, securitization of ecosystem assets, and water futures.

Conservation and credit markets represent the two specifically designed to deliver nature positive outcomes, but still represent less than 1% of the total amount of goods and services traded. However, trends analysis reveals that climate change effects, consumer behavioral shifts and investors preferences may be the key drivers of demand to better align the economy with biodiversity goals. Specifically, qualitative assessments of the Taskforce for Nature Markets and McKinsey show that there is strong evidence to assume that carbon markets, insurance and sustainability linked bonds will soon enter growth at scale[141]. There are many well-structured examples that lead to support this projection, like the well-known Seychelles Blue Bond in 2018, the first sovereign Blue Bond of 15$ launched to catalyze investments in the fishery and sustainable marine management in the country[142]. Bonds can also take the form of payments for performance, like the Wildlife Conservation Bond (WCB) funded by the Global Environment Facility, aiming to channel private funds to

[141] «Global Nature Markets Landscaping Study | Taskforce on Nature Markets». Pg. 9

[142] World Bank Group. 2018a. "Seychelles Achieves World First with Sovereign Blue Bond. Feature story." October 29, 2018. Accessed on May 19, 2020. Washington, D.C.: World Bank. Available from https://www.worldbank.org/en/news/feature/2018/10/29/seychelles-achieves-worldfirst-with-sovereign-blue-bond

increase black rhino populations in target protected areas in South Africa[143]. The WCB provides that institutional investors become direct co-financiers of conservation efforts in the parks, and in return, if the rhino populations meet specified targets at the two parks, they can be compensated with a "*conservation success payment*". Under the growing exposure of corporates to biodiversity risks, innovative insurance tools started to emerge to restore ecosystems after oil spills, fires or other environmental disasters, avoiding the generally slow works of emergency reparation coming from public agencies. The Mesoamerican Coral Reef Insurance Policy in 2018 is a tool for rapid deployment of funds in case of ecological disaster, but also of continuous support to reef restoration in the region[144].

On the other hand, projections estimate that Payments for Ecosystem Services (PES), Biodiversity Credits/Offsets (BO) and related practices of Habitat Banking can potentially scale, but they are still hampered by challenges in gaining effectiveness credibility and building consumer confidence, due to their major reliance on monitoring and verification. Various evaluations have documented disappointing ecological outcomes of biodiversity offsets in achieving their "No Net Loss" objectives, identifying in the literature large gaps of reporting and evidence effectiveness compared to the global deployment of the instrument[145]. Studies assessing the effectiveness of policy options to no-net-loss targets in the European Union, specifically focusing on land use and land management, revealed that none of the considered NNL scenarios overall achieved the target of biodiversity and ecosystems conservation, limiting to a certain share of impact reduction[146]. This has primarily been attributed to the high land demand across the EU-27 and insufficient landscape context analysis that ignored the existing trade-offs among services and triggered displacement effects.

Examples of MBIs for biodiversity conservation exist in both the Global North and the Global South. Despite sharing common goals and employing similar tools, contextual differences arise between the two regions. These distinctions primarily result from variations in biodiversity context, economic development, regulatory frameworks, financial resources, and stakeholder dynamics[147]. The Global South typically faces more acute development and poverty challenges, leading to a stronger focus on poverty alleviation and sustainable development through MBIs. Research indicates that in regions with reliable legal contexts, pre-existing funding schemes, and structured governance frameworks that coordinate actor-specific behaviors and actions, MBIs tend to be more successfully implemented. In the Global North, especially in the EU, where robust

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[143] World Bank, *Mobilizing Private Finance for Nature* (World Bank, 2020), https://doi.org/10.1596/35984. Pg 43 Box 11

[144] Ibid. pg. 46

[145] Sophus O. S. E. zu Ermgassen et al., «The Ecological Outcomes of Biodiversity Offsets under "No Net Loss" Policies: A Global Review», *Conservation Letters* 12, fasc. 6 (2019): e12664, https://doi.org/10.1111/conl.12664.

[146] C. J. E. Schulp et al., «A quantitative assessment of policy options for no net loss of biodiversity and ecosystem services in the European Union», *Land Use Policy* 57 (30 November 2016): 151–63, https://doi.org/10.1016/j.landusepol.2016.05.018.

[147] Sarah Schomers e Bettina Matzdorf, «Payments for Ecosystem Services: A Review and Comparison of Developing and Industrialized Countries», *Ecosystem Services*, Payments for Ecosystem Services and Their Institutional Dimensions: Analyzing the Diversity of Existing PES Approaches in Developing and Industrialized Countries, 6 (1 December 2013): 16–30, https://doi.org/10.1016/j.ecoser.2013.01.002.

regulatory frameworks and enforcement mechanisms are often in place, innovation development has been effectively fostered[148]. Stakeholder engagement and participation may differ due to cultural, social, and political factors in each region. Indigenous and local communities often play a more prominent role in the Global South.

Besides promising potentials to enhance biodiversity governance, the implementation of market-based instruments requires huge design efforts in creating the markets and matching the tools with field objectives. The design challenges derive from the nature itself of biodiversity, that differs from traditional commercial goods in many relevant aspects.

According to McMillan analysis, the basic requirements for a workable market are a "smooth flow of information", "curtailed side effects on third parties", "protected property rights", and "fostered competition"[149]. However, every element presents some barriers when dealing with natural resources in the field.

In fact, information asymmetries are behind the corner, since it is difficult to have full understanding of the significance of the interactions of all the elements present in the ecosystem, beside the poor data availability and monitoring of some species, of which we lack information on the size of the population. In addition to the question of the quantity of available information, there is also the issue of who has control over that information. In fact, environmental protection agencies may hold general scientific evidence, but poor site-specific knowledge, rather detained by landowners. Informational gaps are drivers of possible harm to third parties, being the environment itself or populations. Market may create dangerous incentives towards the production of goods and services whose consequences are not well acknowledged, as it happened with biofuels. Some MBIs impact assessments, specifically PES and BO, have not just revealed ambiguous outcomes on their environmental outcomes, but also that they failed to comply with their assumption of social development and poverty reduction[150].

A key element for a solid and scalable market is property rights. As a common good, it is difficult to assign to nature specific property rights needed to generate market interests. Sometimes, especially in developing countries, rights on nature like forests and lands are based on informal agreements or reputation, but are not supported by specific legal structures. The issue of property has been widely examined by scholars, with often polarized views. It has been long considered an all-or-nothing concept, before Ostrom work illustrated that, especially in common pool resources like natural ecosystems, between private property and a law-free

[148] Lasse Loft et al., «The development of governance innovations for the sustainable provision of forest ecosystem services in Europe: A comparative analysis of four pilot innovation processes», *Ecosystem Services* 58 (1 December 2022): 101481, https://doi.org/10.1016/j.ecoser.2022.101481.

[149] John McMillan, *Reinventing the Bazaar: A Natural History of Markets* (Norton, 2002) ix.

[150] Jessica Dempsey e Daniel Chiu Suarez, «Arrested Development? The Promises and Paradoxes of "Selling Nature to Save It"», *Annals of the American Association of Geographers* 106, fasc. 3 (3 May 2016): 653–71, https://doi.org/10.1080/24694452.2016.1140018.

situation there are plenty of shades and degrees[151]. In particular, the author focused on the category of common and shared property rights as an alternative paradigm to assign ownership and control over resources, in which they are assigned to a community rather than to an individual. However, disregarding which degree, they need to be grounded on solid legal foundations, not only to be traded, but also to set up mechanisms for their protection and enforcement. Biodiversity credits are an example of the artificiality of such rights.
Another noteworthy element is that of transaction costs. Nature conservation notoriously has high transaction costs, generally due to monitoring, enforcement, and management activities, that hamper the potential of MBIs to reach efficiencies of scale. This further influences the level of attractiveness of biodiversity projects in the eyes of investors. Indeed, another fundamental challenge in nature markets design, namely conflict of interests. Biodiversity projects tend in fact to clash with investors requirements and rationales. Small scale local programs and high transaction costs conflict with investors' attraction for large scale and competitive returns projects. Moreover, ecological uncertainties around nature, due to climate change trends and immature measurements methodologies, hardly fit with investors risk-return approach, to which is added a decadal time horizon for acquiring evidence of the project performance and additionality on the environment[152].

Despite private-led conservation potential to address biodiversity loss, if well designed and well-targeted, various evaluations documented disappointing results. Many large-scale PES ended up becoming mere cash transfers to landowners, affected by weak or no monitoring. Carbon and biodiversity offset programs, like land-based offsets in California and Australia's carbon emissions reduction fund, struggled to prove additionality and true impact[153]. This is also due to the tendency to measure biodiversity targets and report them in the form of easy-to-measure proxies, such as 'hectares of area conserved' or 'presence of buffer covers', not as *increase in specie population* or *diversity*, like it has occurred in "blue" ocean conservation bonds[154]. Additionally, according to a recent investigation of the market observatory Bloomberg, among a pool of over 100 Sustainability-linked bonds issued to European investors for a total of 70$ bn, the majority were tied to climate objectives that "were weak or irrelevant or that, in some cases, had already been achieved"[155].

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[151] Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, Political Economy of Institutions and Decisions (Cambridge: Cambridge University Press, 1990), https://doi.org/10.1017/CBO9780511807763.
[152] Katie Kedward et al., «Nature as an Asset Class or Public Good? The Economic Case for Increased Public Investment to Achieve Biodiversity Targets», SSRN Scholarly Paper (Rochester, NY, 19 December 2022), https://doi.org/10.2139/ssrn.4306836.
[153] Macintosh, A., Butler, D., Ansell, D. (2022) Measurement Error in the Emissions Reduction Fund's Human-induced Regeneration (HIR) Method. The Australian National University, Canberra.
[154] Benjamin S. Thompson, «Blue Bonds for Marine Conservation and a Sustainable Ocean Economy: Status, Trends, and Insights from Green Bonds», *Marine Policy* 144 (1 October 2022): 105219, https://doi.org/10.1016/j.marpol.2022.105219. Badgley, Grayson, Jeremy Freeman, Joseph J. Hamman, Barbara Haya, Anna T. Trugman, William R. L. Anderegg, and Danny Cullenward. "Systematic over-crediting in California's Forest Carbon Offsets Program." *Global Change Biology* 28, no. 4 (2022): 1433-1445.
[155] «Greenwashing Enters a $22 Trillion Debt Market, Derailing Climate Goals - Bloomberg», accessed 28 June 2023, https://www.bloomberg.com/news/features/2022-10-04/greenwashing-enters-a-22-trillion-debt-market-derailing-climate-goals#xj4y7vzkg.

To conclude, intrinsic features of nature-related assets struggle to match with investors requirements and market-based biodiversity governance is trying to mitigate tradeoffs between the two competing objectives, nature protection and profits, commercial feasibility and environmental integrity.

3.3 Blended finance and Intermediaries

Another financing mechanism deemed capable of "leveraging private finance" for biodiversity, as claimed by Target 19 of the CBD, is blended finance, through which an estimated US$ 3.1 billion have been channeled to biodiversity conservation from 2000–2018.[156]

According to the definition of Convergence, the major entity operating in the sector, "Blended finance is the use of catalytic capital from public or philanthropic sources to increase private sector investment in sustainable development"[157]. It involves the strategic use of concessional (below-market rate) finance from public sources, such as governments or multilateral development banks, alongside commercial capital from private investors.

Blended finance is not a new concept; it had been recognized as a strategic tool already in the outcome document of the Third International Conference on Financing for Development in 2015, when the Addis Ababa Action Agenda (AAAA) has been endorsed[158]. However, the use of concessionary development funds to catalyze private capital has recently become a hot topic in the financial discourse on innovative financing mechanisms for nature[159]. However, to be precise, it is not considered an investment approach, but rather a structuring model that allows entities with different needs, financial risk-return or social impact, to invest together, widening the pool of resources available to bridge the 'missing middle'. Beside Convergence, many institutional organizations and initiatives work to coordinate blended finance activities, especially the OECD and the DFI Working Group on Blended Concessional Finance for Private Sector projects led by IFC, slightly differing in the scope of blending.

Blended finance can assume different shapes and architectures, but some features remain stable. Some argue that definition given by Convergence missed a fundamental pillar, namely the fact that blended finance has also to "achieve additional, measurable, non-financial development (impact) outcomes"[160]. The final aim is in

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[156] OECD, 2020. A Comprehensive Overview of Global Biodiversity Finance: Initial results.

[157] «Blended Finance | Convergence», consultato 29 giugno 2023, https://www.convergence.finance/blended-finance.

[158] *See* Addis Ababa Action Agenda of the Third International Conference on Financing for Development (Addis Ababa Action Agenda) for the final text of the outcome document adopted at the Third International Conference on Financing for Development (Addis Ababa, Ethiopia, 13–16 July 2015) and endorsed by the General Assembly in its resolution 69/313 of 27 July 2015 https://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf

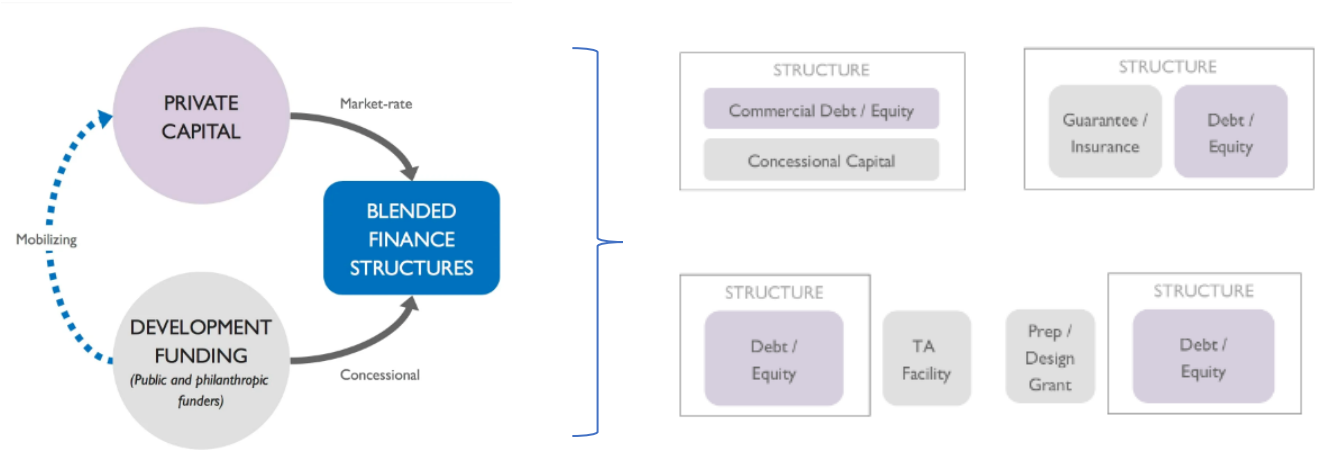
[159] Deutz, A., Heal, G., Niu, R. & Swanson, E. Financing Nature: Closing the global bio- diversity financing gap. tech. rep. (The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability., 2020). OECD. A Comprehensive Overview of Global Biodiversity Finance OECD Environment Directorate Report (Organisation for Economic Cooperation and Development, Apr. 2020). Lankes, H. P. Blended finance for scaling up climate and nature investments tech. rep. (One Planet Lab, Grantham Research Institute on Climate Change, and the Environ- ment, 2021).

[160] «Blended Finance for Agriculture: Exploring the Constraints and Possibilities of Combining Financial Instruments for Sustainable Transitions», *Agriculture and Human Values* 37, fasc. 4 (1 December 2020): 1281–92, https://doi.org/10.1007/s10460-020-10131-8. Pg. 1284

fact to be able to measure additionality of social and environmental impacts, typically related to the achievements of the SDGs.

Models for blending public and private funds can take different forms depending on the projects' needs and the stakeholders involved. It usually happens through grants and concessional loans (the most common archetype), including debt and equity investments; debt- based instruments like guarantees and risk insurances; technical assistance and design-stage grants[161].

Figure 6: Blended finance structures



Source: Convergence

Data show that blended finance activities have witnessed an annual growing trend, reaching an amount of $188 billions of capital mobilized towards sustainable development in developing countries. In fact, not surprisingly, blended finance has a marked regional distribution in Sub Saharan Africa (48%), Latin America (17%) and Asia (15%), linked the fact that it usually aims to tackle societal and environmental issues like food security, water availability, energy efficiency, climate change adaptation and environmental conservation[162]. The engagement of the private sector in these types of investments is relatively significant, representing the 2/3 of the 1710 unique investors in the Convergence database that have participated in one or more blended finance transactions, along with Philanthropic investors[163]. The most active among them are mainly Impact investment funds and ETFs committed to the achievements of Net Zero Goals and with a specific impact mandate, like Ceniarth LLC and Calvert Impact Capital, but also Société Générale and BNP Paribas as European players and pioneers in the preservation of biodiversity.

[161] «Blended Finance | Convergence».
[162] Ibid.
[163] Ibid.

The main idea behind blended finance is to de-risk investments, partly burdening the public sector of potential losses and making them more attractive for private investors. This is particularly true for traditional biodiversity conservation projects, where unpredictable nature-related risks tend to make them unappealing. "De-risking" policies, in the forms listed above, are supported by a large body of literature advocating for the key role of public finance to unlock private capital and develop financial arrangements that meet their risk-return approach and their guarantees rates.

The main approach used to unite the state and the business-entrepreneurial sector is Public-Private Partnerships (PPPs). PPPs are more or less contractual agreements used to deploy blended finance solutions and organize the public and private sector to jointly carry out projects typically run by public authorities. By creating collaborative and multi stakeholders environments, they are considered of high potential to help find innovative ways to tackle global problems in the social and environmental sphere. PPPs have gained traction in the field of modern nature management (forests, water and land) and have been predominantly deployed for the conservation of national parks and protected areas[164]. One example is the World Bank Mozambique Conservation Areas for Biodiversity and Development project, that supported five co-management agreements between the government and nonprofits, as well as private organizations, to manage five conservation areas and to finance anti-poaching activities[165]. The Kruger National Park PPP in South Africa supports the development of eco-tourism in the area and attracts investments for the preservation of biodiversity[166]. However, the activities of PPPs mechanisms may be hindered by a number of problems linked to poor design and planning, financial and legal challenges[167].

Of paramount importance in the design of PPPs and blending structures are *intermediaries.* The issue of intermediation in sustainable finance is of particular interest among social scientists, especially in the climate field[168]. Formally, intermediaries are defined as middle figures that create the fundamental link between global finance institutions and nations, but also between climate finance and project implementation. Scholarship emphasizes the critical role of intermediaries as "system builders", namely their functionality in creating and innovating the market, providing information and standards and supporting project's implementation, building procedures and metrics in unexplored areas. In particular, three fundamental functions of intermediaries stem

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164 Halyna Mishenina e Jaroslav Dvorak, «Public–Private Partnership as a Form of Ensuring Sustainable Development of the Forest Management Sphere», *Administrative Sciences* 12, fasc. 4 (December 2022): 156, https://doi.org/10.3390/admsci12040156.

165 Mozambique Conservation Areas for Biodiversity and Development project page: https://projects.worldbank.org/en/projectsoperations/project-detail/P131965?lang=en

166 «World Bank_Municipal PPP_Project Summaries Part 2 (7Sept) Content.pdf», accessed 5 July 2023, https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2020-02/World%20Bank_Municipal%20PPP_Project%20Summaries%20Part%202%20%287Sept%29_Content.pdf. Pg.18

167 Jomo Ks et al., «Public-Private Partnerships and the 2030 Agenda for Sustainable Development: Fit for Purpose? », s.d.

168 Abrar Chaudhury, «Role of Intermediaries in Shaping Climate Finance in Developing Countries—Lessons from the Green Climate Fund», *Sustainability* 12, fasc. 14 (January 2020): 5507, https://doi.org/10.3390/su12145507.

from the literature: (i) they work as brokers between distributed policy actors[169]; (ii) they bridge between key constituents and stakeholders [170]; (iii) and they diffuse knowledge and information [171], offering structural connections among disparate actors. The group of intermediaries in sustainable finance includes a range of diverse entities among international, public, private and civil society actors, that are gaining growing recognition in global policy.

In particular, in light of their expertise, their scale and their mission, ODA providers such as Multilateral Development Banks (MDBs) and Development Financial Institutions (DFIs) attracted major attention when dealing with global biodiversity financing and potential to mobilize private funds[172]. The most common approach is to set up a dedicated Fund operating as their formal entity to manage climate finance operations. An important case is represented by the Green Climate Fund (GCF) established in the 1992 Rio Earth Summit, under the UNFCCC, to respond to the CBDR principle (principle 7) and the responsibility of all countries, especially in the Global North, to compensate for the disproportionate effects of climate change and financially assist developing countries[173]. Since then, many environmental Funds have been created by MDBs like the Climate Investments Fund managed by the World Bank, or the Green Environmental Fund (GEF).

MDBs and IFIs are considered to have a pivotal role in creating the opportunities for biodiversity financing, combining the potential of development finance and private capital. To support this argument, beside the de-risking tools that attract private funds, many stress their ability to fill the challenges that usually undermine the credibility of MBIs for biodiversity, compensated with expected safe returns, data and knowledge. During the whole project lifecycle, they are assumed to act as[174]:

- *Information Providers*: provide scientific data, analysis and updates
- *Brokers:* build a shared platform for stakeholders' coordination with different interests and cultures
- *Project designers*: architect, co-creators and enablers of transformative ideas and innovation
- *Implementers*: deliver the projects in the field and overcome the "state capability gap", providing further expertise and technical assistance (TA)

Despite blended finance models having been widely deployed in the last two decades, bilateral and multilateral donors specifically addressing nature and biodiversity are still incipient. An example is represented by the AGRI3 Fund, the first instrument under the partnership between the UN Environment and Rabobank established in 2017[175]. AGRI3 is a fund seeded by Netherlands Development Bank that aims to de-risk loans

169 Winch, G.M.; Courtney, R. The organization of innovation brokers: An international review. *Technol. Anal. Strateg. Manag.* **2007**, *19*, 747–763.

170 Choi, Y. Intermediary Propositions for Green Growth with Sustainable Governance. *Sustainability* **2015**, *7*, 14785–14801

171 De Silva, M.; Howells, J.; Meyer, M. Innovation intermediaries and collaboration: Knowledge–based practices and internal value creation. *Res. Policy* **2018**, *47*, 70–87.

172 World Bank, *Mobilizing Private Finance for Nature* (World Bank, 2020), https://doi.org/10.1596/35984. Pg. 88-94

173 https://www.greenclimate.fund/about/resource-mobilisation/irm

174 Chaudhury, «Role of Intermediaries in Shaping Climate Finance in Developing Countries—Lessons from the Green Climate Fund».

175 Rabobank. 2020. AGRI3 Fund. January 2020

to farmers to help them fund their transition to sustainable and deforestation-free agricultural practices, unlocking $1 billion in capital. This blended finance vehicle creates a market opportunity for companies in partnering with small—and medium farmers, aggregated in cooperatives or through contract farming schemes.

Some objections have been raised against the overestimation of blended finance for biodiversity, whether implemented by development finance institutions, philanthropists, or NGOs. Some analysis of the shortcomings and adverse effects argue for a cautious emphasis on the matter. In fact, while evidence is still emerging, some observation by the OECD and others reveal that the blending of concessionary and commercial capital does not always lead to more efficient development results as assumed[176] and that, despite the "billions to trillions" claim, there is no systematic accounting way for blended finance ability to further mobilize private funds. Moreover, PPPs and other de-risking tools may be more costly on the governments' budgets, since they require them to assume significant liabilities to guarantee safeguards to private investors, thus exposing to the currency fluctuation of the always more uncertain global economy. Some scholars see in the current emphasis on blended finance the symptoms of an accepted public austerity[177]. They argue that attracting private funds has become a necessary precondition for maximizing development finance due to scarce ODA funding, accepting the inability of the state to limit biodiversity loss by introducing effective tax policies on polluters or addressing the direct drivers through stringent regulation and investments. Due to governance and methodological challenges, both in implementation and in assessing additionality[178], some scientists question the deprioritization of public funding sources in favor of private funding and advocate for increasing direct governments investments in nature conservation[179].

[176] «Making Blended Finance Work for the Sustainable Development Goals | en | OECD», accessed 5 July 2023, https://www.oecd.org/development/making-blended-finance-work-for-the-sustainable-development-goals-9789264288768-en.htm.
[177] Biodiversity Capital Research Collective. (2021). Beyond the Gap: Placing Biodiversity Finance in the Global Economy. *Third World Network*. https://twn.my/title2/books/Beyond%20the%20Gap/BeyondTheGap%20complete%20report.pdf.
[178] Ole Winckler Andersen & Irene Basile & Antonie de Kemp & Gunnar Gotz & Erik Lundsgaarde & Magdalena Orth, 2019. "Kedward et al., «Nature as an Asset Class or Public Good?»," OECD Development Co-operation Working Papers 51, OECD Publishing
[179] Katie Kedward et al., «Nature as an Asset Class or Public Good? The Economic Case for Increased Public Investment to Achieve Biodiversity Targets», SSRN Scholarly Paper (Rochester, NY, 19 December 2022), https://doi.org/10.2139/ssrn.4306836.

Ch. IV – Methodology

For the purpose of investigating the challenges of MBIs for biodiversity protection, a qualitative analysis has been chosen as the methodology that best suits this kind of research, since context variables difficult to quantitatively measure, such as governance, economic, social and cultural ones, need to also be taken into account as elements that could influence the outcome. Specifically, the present work will follow a 'two-step empirical approach', even if they are strongly interconnected: (i) the first part will aim to identify key design and implementation elements drawing on selected case studies while (ii) the second part will focus more on identifying the key elements affecting investors attractiveness drawing on semi-structured interviews addressed to field experts working in MDBs and DFIs.

4.1 First part: Design and implementation challenges affecting additionality

The first step of the empirical research will investigate how design and implementation variables can affect the market tool in delivering environmental additionality.

The dependent variable 'additionality' is defined as the direct impacts of the MBI in terms of environmental gains and effectiveness, compared with a baseline of 'no MBI'. Conservation programs, intentionally or not, may also cause indirect effects of environmental, social and economic nature that occur outside the spatial and contractual scope of the market-based scheme. Considered environmental 'Spillovers' mainly include *leakages* and *rebound* effects. Environmental leakages refer to the potential increase of pressure and resources extraction on lands or seas that are excluded by the contract of the scheme, as a work substitution result, while environmental rebound refers to that phenomenon of displacement of pressure on the environment after a change in the demand due to the scheme implementation.

Environmental indirect effects are strictly related to economic and social spillovers. In fact, MBIs implementation, like payments for avoided deforestation, may induce a displacement of workers to land outside the target area, degrading the land beyond the boundaries. However, the leakage may even cross-national boundaries when the scheme influences extractive commodities international prices. Social concerns of MBIs go beyond employment factors. In fact, sometimes environmental effectiveness competes with equality and poverty alleviation objectives, in a constant trade-off.

4.1.1 Conceptual and Analytical framework

Outlining the analytical framework that will guide our research and discussion is considered a necessary step. Based on a review of the available literature and the features shared by the different MBIs considered in the empirical analysis, it was possible to identify the most significant design and implementation variables, as well as the context factors that systematically interact to determine the environmental outcome of the project.

They have been categorized as follows:

Design and Implementation variables:

- Spatial targeting: the scale of the environmental area selected for the intervention. It should be ecologically suitable and consider geographical and functional elements.
- Conditionality: set of terms and agreed rules on which the payment mechanism is based. The service provider is paid only if he secures a certain provision. It may be an *action payment* or a *performance payment*, depending on the fact that the transaction happens depending or not on the ES outcome.
- Monitoring: reliability and frequency of project monitoring and assessment activities
- Transaction costs: each program has contractual terms and implementation costs that cover its management and monitoring.
- Permanence: the continued compliance and maintenance of practices in the long term, after the contract ends.
- Compliance enforcement: sanctioning of misconduct
- Contractual arrangements with ES providers: the form and the timing of the payment. Although cash is the most common form of payment, it can be also supplemented by in-kind transfers and technical assistance (TA).
- Actors involved: each program involves buyers and sellers of ES. They can be *user-financed*, where the service buyers are the actual service users, or *government-financed*, where the service buyers are a third party, typically the State. Theoretically, user-financed programs are fully *voluntary* on both ES provider and buyer side, while the government-financed are voluntary only for the providers. Intermediary actors can mediate the relation between buyers and sellers, such as banks or NGOs.

Context variables:

- Geographical location: the socio-political and the climatic zone where the target site is located
- Property rights regime: whereas the natural resource where the ES are generated is managed under an institutional arrangement that includes or not property and land use rights and their degree of certainty
- Acceptance and motivation of the participants: degree of legitimacy and engagement of the community
- Link with other policy tools: if the program is aligned or compete with other local rules on environmental protection or subsidies

4.1.2 MBIs selection: BO and PES case studies

Since most of the Innovative Financial Mechanism (IFMs) for biodiversity involving the private sector are affected by lack of data availability related to their impact and procedures, the following empirical analysis

will focus on two specific instruments: Biodiversity Offsets, and related voluntary carbon offsets markets and biodiversity-focused Payments for Ecosystem Services (PES).

A number of arguments add up to build a reasonable justification for this methodological selection.

The two MBIs have been chosen because, since their first applications go back to the 1990s, (much earlier than biodiversity bonds and loans and other green market products) they allow to assess and study environmental additionality after a significant time period. Moreover, being highly debated in the literature, the analysis can count on a considerable range of impact assessment data from case studies and secondary variables. Noteworthy is also the fact that they are considered by the Strategy for Resource Mobilization of the CBD[180], and other international economic policy reports, among the "*innovative financial mechanisms*" that have the potential to increase international financial flows in support of protected areas. According to a recent McKinsey study of market growth, payments for ecosystem services and biodiversity credits are among the nature markets with the strongest potential to scale, at the same time facing challenges that make them interesting for the purpose of the research[181].

For each instrument, a specific case study has been identified based on data availability and the presence of significant variables for the analysis. When they were missing, published analysis of other BO and PES cases was the primary source of data for this study. As stated in the literature, the application of financial and market-based instruments for nature is a complex and diverse environment. However, although the peculiarities of each tool are recognized, they have been shown to share the same type of barriers and enabling factors. Thus, the explanatory variables identified for the BO and PES case studies, and the criteria stated in the analytical framework, can be considered *reliable proxies* for other IFMs for nature conservation.

Defining Biodiversity Offsets and Payments for Ecosystem Services

Before moving to introduce the cases, a general definition of BO and PES is deemed necessary. Biodiversity Offsets and Payments for Ecosystem Services are both innovative economic tools to conserve or restore biodiversity and ecosystems. Although they are sometimes used interchangeably, these two market-based instruments follow different founding principles and targets.

The most common definition of BO is derived from IUCN, that qualifies them as "conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure No Net Loss of biodiversity (NNL)"[182]. However, the goal of offsets could even be to improve

[180] CBD, Goal 4: *Explore new and innovative financial mechanisms at all levels with a view to increasing funding to support the three objectives of the Convention*

[181] «The state of nature markets today and tomorrow», accessed 21 June 2023, https://www.mckinsey.com/capabilities/sustainability/our-insights/sustainability-blog/the-state-of-nature-markets-today-and-tomorrow.

[182] «Biodiversity Offsets», Resource, accessed 18 September 2023, https://www.iucn.org/resources/issues-brief/biodiversity-offsets.

the status (Net Gain = NG). Infact, depending on the *mitigation hierarchy,* the offset policy can aim to the avoidance and minimization (reduction), or the rehabilitation/restoration of the impacted area when operations end (decommissioning). Another principle of BO is *ecological equivalence* between the offset and the real impact. Especially in their application in voluntary policies of corporates and private organizations, the goal is to generate ecologically equivalent gains, or 'credits' (BC), in an area geographically dislocated from the impact site ('the offset site') to satisfy their offsetting obligations. The generated biodiversity credits represent the trading unit of the relative nature market, allowing public and private sectors to support conservation and restoration initiatives and to finance nature-positive activities. When BOs are employed in the financial markets, they become structural elements of an emerging phenomenon known as *Mitigation Banking* or *Habitat Banking*, where essentially 'mitigation banks' are established to acquire portions of land for the enhancement and management of habitats for a specific environmental resource or wildlife species[183]. The asset is valued in terms of credits that can be purchased to mitigate impacts if it is not possible in the development site, or simply traded as it happens for carbon trading.

On the other hand, PES are defined by Wunder as "voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services"[184]. They occur when beneficiaries or users of an ecosystem service make payments to the providers of that service through contracts. PES can be framed under a Cosean or Pigouvian conceptualization, depending on the fact that the market theory advocate for an optimal allocation of resources and compensation of externalities made by private markets negotiations or rather by a government intervention[185]. *Conditionality* is the main feature of PES, referring to the condition for which the transaction is made if and only if the ES provider secures ES provision (*quid pro quo* basis). As per BO, conditionality criteria are based on ecological equivalence between biodiversity loss and gains, but unlike them, generally PES do not occur in order to compensate or mitigate a loss of biodiversity and they imply a direct transaction between ES providers and beneficiaries. Moreover, in BO the inherent voluntariness criterion from both sides is hardly ever respected. However, sometimes the distinction between PES and BO structures could be blurred, especially when, to achieve BO results, a developer use contracts with several service providers[186].

Case studies selection:

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[183] A.-C. Vaissière e H. Levrel, «Biodiversity Offset Markets: What Are They Really? An Empirical Approach to Wetland Mitigation Banking», *Ecological Economics* 110 (2015): 81–88, https://doi.org/10.1016/j.ecolecon.2015.01.002.
[184] CIFOR, S. Wunder, «Payments for Environmental Services: Some Nuts and Bolts», 2005, https://vtechworks.lib.vt.edu/handle/10919/66932.
[185] A. Vatn, «An Institutional Analysis of Payments for Environmental Services», *Ecological Economics* 69, fasc. 6 (2010): 1245–52, https://doi.org/10.1016/j.ecolecon.2009.11.018.
[186] Anne-Charlotte Vaissière et al., «Biodiversity Offsets and Payments for Environmental Services: Clarifying the Family Ties», *Ecological Economics* 169 (1° March 2020): 106428, https://doi.org/10.1016/j.ecolecon.2019.106428.

Although PES and BO schemes may also be government-financed, for the scope of this research, the cases need to be coherent with the conditions of being *user-financed* and *voluntary*.

The geographical area in which the two case studies are embedded is the ecological and socio-legal context of Latin America, a selection that relies on multiple reasons. In fact, evidence and scientific data show that the region is responsible for the conservation of a significant share of world biodiversity heritage as well as the management of one of the most valuable tropical forest ecosystems on Earth, the Amazon Forest. Moreover, partly as a consequence of that, Latin American countries have pioneered the implementation of these initiatives in the developing world. The choice is also grounded on the advantage of keeping the forest biome as a baseline for the two cases.

However, case selection was influenced by data limitations: we only considered cases for which formal reports, project websites or published material are available. Following a wide review of the available empirical literature and impact evaluation studies, it has been found that the existing initiatives hardly satisfied all the above-mentioned criteria. Thus, acknowledging that no 'pure' private PES of BO scheme exists, and the predominantly hybrid nature of MBIs is practice, flexibility to some conditions has been granted to be able to retain the most important criteria for the purpose, without compromising the quality of the analysis. In addition, it should be highlighted that, despite a large part of the available literature report on successful or partially successful cases, our analysis does not seek to concentrate on unsuccessful cases, rather to understand the prominent variables influencing the outcome, keeping outside the scope of the paper the assessment of how different combinations could modify it.

In particular, the Biodiversity Offset case is offered by the effectiveness evaluation of a voluntary REDD+ project in a Brazil nut concession in Madre de Dios, Perú, an impact site managed by the VERRA carbon standard certifier (VCS). The primary data have been collected by the independent assessment of the European advocacy group Food Watch, that used the Global Forest Loss Geo Dataset and the analysis tools provided by the Global Forest Watch website, to determine annual deforestation at the supposed 'baseline' years/period, and after project startup. Information have been then supplemented with data from the joint investigations conducted by the Guardian journalistic commission of enquiry on field[187] and the international study team of the Cambridge University on 87 Verra active projects in the region, that passed a peer review process[188]. The second case study on voluntary PES is offered by the payment for watershed services in La Esperanza, Costa Rica, established in 1999. The data for the evaluation are mostly based on interviews with project managers and other actors directly involved.

[187] Patrick Greenfield, «Revealed: More than 90% of Rainforest Carbon Offsets by Biggest Certifier Are Worthless, Analysis Shows», *The Guardian*, 18 gennaio 2023, sez. Environment, https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe.

[188] Alejandro Guizar-Coutiño et al., «A Global Evaluation of the Effectiveness of Voluntary REDD+ Projects at Reducing Deforestation and Degradation in the Moist Tropics», *Conservation Biology* 36, fasc. 6 (2022): e13970, https://doi.org/10.1111/cobi.13970.

4.2 Second part: MDBs and DFIs interviews

The second part of the analysis aims to focus on the institutional and financial barriers that private investors face in approaching IFMs for biodiversity, derived from a qualitative content analysis of interviews to nature financing project managers in the ODA sector, as well as a review of regulatory documents and existing literature. More specifically, experts and representatives from Multilateral Development Banks and Development Funds have been subjected to semi structured interviews in order to understand the type of barriers they face while developing nature financing initiatives that involve the private sector and, on the other hand, which are the benefits and challenges of blending private resources with public and development funds, both from the investors appeal and the implementation support perspectives. Semi-structured qualitative interviews allow the interviewer to cover all questions of interest, while leaving room of maneuver to discuss additional relevant aspects. The interview outline that guided them (Appendix A) was based on concepts analyzed in the literature and on a review of available reports. The interviews lasted between 30-60 minutes and an audio coding activity was performed in order to identify themes and common features.
The respondents organizations, the European Investment Bank (EIB) and Biodiversity Alliance and the International Center for Tropical Agriculture (CIAT), and the International Fund for Agricultural Development (IFAD) are all committed in attracting new capital flows to support nature conservation, restoration and enhancement through innovative channels, therefore experts from Resource Mobilization, Innovative Financing and Private Partnership divisions have been the targeted interviewees.
Despite different internal architectures, their structure shares two components that, as reviewed in the literature, are typical of blended finance solutions providers, (i) a finance facility to guarantee and secure returns through de-risking policies and tools and (ii) a technical assistance facility (TA) to support project design, implementation and monitoring.

The European Investment Bank (EIB), with the support of the European Commission, set up a financial instrument dedicated to support projects of biodiversity and climate adaptation, labeled as 'Natural Capital Financing Facility (NCFF)'[189]. Through this package, it finances projects for the development of green infrastructures, PES, Biodiversity compensation, pro-biodiversity business and nature-based solutions. The NCFF closed this year and will be replaced by the InvestEU, but since its creation in 2015 provides loans and tailored investments from 2 million to 15 million euros, combining financial resources from the EIB and the LIFE Programme of the EU.

[189] «NCFF - Natural Capital Financing Facility», EIB.org, consultato 22 luglio 2023, https://www.eib.org/en/products/mandates-partnerships/ncff/index.htm.

Established in 2019, the Alliance for Biodiversity International and CIAT has been created to tackle the multiple crisis of climate change, biodiversity loss, environmental degradation, and malnutrition[190]. It is also an integral part of the CGIAR system, a global research partnership for a food secure future, but despite its major focus on agriculture and food systems, the Alliance recognizes the fundamental role of 'multifunctional landscapes' and natural resources management. One of the pillars of its work is to collaborate with private financial institutions and investors to leverage limited public funding and increase investment for sustainable agriculture in developing countries. As per the NCFF, the Alliance resources mobilization mechanism is made up of two pillars, investment vehicles design i.e., the establishment of an Impact Fund in Switzerland for climate smart food systems and a TA facility financed by public funding.

The third development organization is represented by IFAD, the international specialized fund of the UN and the only multilateral development institution to exclusively focus on rural development and food systems. As described in IFAD Sustainable Development Finance Framework, the organization supports projects aiming at restoring and maintaining natural resource capital, promoting an inclusive rural finance, access to market and an enabling institutional environment[191]. To align with the previously adopted environmental and climate change strategy, IFAD just approved a Biodiversity Strategy that covers the period 2022-2025[192] and recently has also introduced a Private Sector Financing Program[193] and the Non-Sovereign Operations Framework[194]. Through the PSFP facility and the NSOs framework, the organization aims to expand its resources and complement its regular sovereign lending program, collaborating and lending directly to Private Institutional Investors, through the proceeds of bilateral loans and private placement bonds.

[190] «Home page | Alliance Bioversity International - CIAT», consultato 22 luglio 2023, https://alliancebioversityciat.org/.

[191] «IFAD Private Sector Engagement Strategy 2019-2024», IFAD, consultato 22 luglio 2023, https://www.ifad.org/en/-/document/private-sector-strategy.

[192] «IFAD Strategy on Biodiversity 2022-2025», IFAD, consultato 10 settembre 2023, https://www.ifad.org/en/-/biodiversity-strategy.

[193] «Private Sector Financing Programme», IFAD, consultato 10 settembre 2023, https://www.ifad.org/en/psfp.

[194] «Framework for Non-Sovereign Private Sector Operations and Establishment of a Private Sector Trust Fund», IFAD, 21 April 2020, EB 2020/129/R.11/Rev.1, https://webapps.ifad.org/members/eb/129/docs/EB-2020-129-R-11-Rev-1.pdf

Ch. V – Emerging Empirical Evidence

5.1 REDD+ project Madre de Dios, Perú - VERRA Rainforest Carbon Credits

The case under investigation is properly known as 'REDD Project in Brazil Nut concessions in Madre de Dios', Peru. It was initiated by a private REDD project development company based in Lima, called Bosques Amazonicos SAC (BAM), that in 2009 signed a partnership with the Federation of Brazil nut producers of Madre de Dios, originating FEPROCAMD[195]. According to the contract, BAM was supposed to give the participating concessionaires technical and financial help, as well as a portion of the carbon credits produced by the project, in exchange for carbon rights to 405 Brazil nut concessions run by some of FEPROCAMD's members. The rationale behind the initiative was that, since Brazil nuts are only produced by trees that grow in native forests with an unbroken forest canopy, Brazil nut production helps forest conservation. Thus, it assumes that Brazil nut harvesters have personal interests in protecting their forest and their livelihoods.

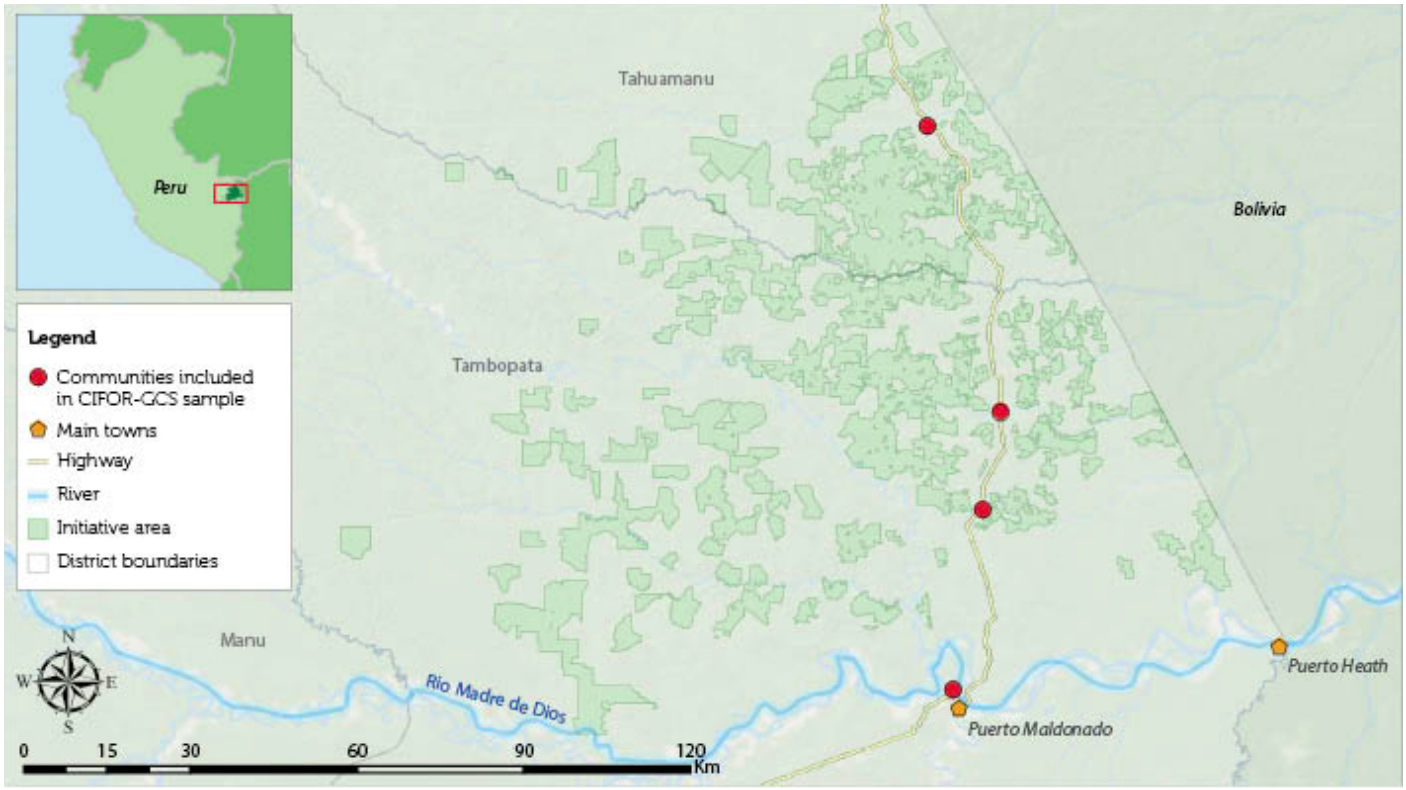
In 2021, the project was then validated under the Voluntary Carbon Standard (VCS), and the VERRA Company was in charge of developing and administrate the VCS certification program, in all its validation, verification, monitoring and carbon credits sale phases, recorded in the online databases and registries[196].

VERRA is a world leading certifier of voluntary carbon offset based in Washington DC, responsible for operating a number of sustainable and environmental standards. Its VCS rainforest program, launched before the Paris Agreement promotion of REDD projects to protect ecosystems, has issued more than 1bn carbon credits, predominantly bought by big industrial corporations like Disney, Shell, Gucci and Easy Jet for CSR purposes[197].

The initiative is geographically located in the South-East of Perú, specifically in the Tahuamanu and Tambopata provinces, where the Inter-Oceanic Highway connects Brazil to the Pacific coast. According to project developers claims, the intervention area of the initiative originally comprised 377 Brazil nut collection concessions covering 291,566 ha, though this was increased to 405 concessions by 2013, covering 308,757 hectares. Moreover, the adjacent agricultural zones included more than 600 non-participants concessions, thus just 40% joined the project.

[195] «foodwatch2021_Tambopata-offset-project_Assessment.pdf», accessed 22 July 2023, https://www.foodwatch.org/fileadmin/-DE/Themen/Windbeutel/Bilder/2021/Dokumente/foodwatch2021_Tambopata-offset-project_Assessment.pdf.
[196] Verra, accessed 22 luglio 2023, https://verra.org/.
[197] Ibid 169

Figure 7 – Location of the REDD project area



(Source: CIFOR Case report)

Despite the REDD project formally started in September 2009, the carbon crediting period actually run from Jan 1st, 2010, to the end of 2040 (31 years). The monitoring and verification period started in the same date, however still in October 2013 CIFOR, the Indonesia-based Centre for International Forestry Research (CIFOR), reported that "BAM had still not sold any carbon credits or built the processing plant, although it had purchased the land on which the plant would be built"[198]. The same authority communicated that in 2016 the project had been suspended for "insufficient remaining funds due to the high transaction costs involved in the project and the delay in the sale of carbon credits"[199]. After the crediting period 2013-14, activities seem to have been stopped. A last verification report was released by BAM in 2019, but, for reasons that are not yet made clear, the verifications due for the crediting periods for 2013-2017 and 2017-2018 were not produced. Despite little financial support from BAM, the main project partner FEDROCAMD continued the activities and in august 2020 it received a boost thanks to the sale of millions of credits to the Gas Company BP and the signing of a partnership. According to the agreement, 222 concessioners received payments of 1500 Peruvian soles.

[198] Kowler et al, 2016. Analyzing multilevel governance in Peru: Lessons from the study of land-use change and benefit sharing in Madre de Dios, Ucayali and San Martin. Working Paper 203. CIFOR, Bogor, Indonesia. https://play.google.com/books/reader?id=Ed4ZDQAAQBAJ&pg=GBS.PP1&hl=en

[199] Ibid.

The ongoing legal status of the REDD project is currently unknown. In 202, a new verification assessment for the period 2017-2020 was announced, but it seems not yet made available. Moreover, the last project authorization from the Ministry of the Environment was only valid until 31 December 2020.

5.2 La Esperanza Hydropower Project PES, Costa Rica

The second case is offered by a national payment for ecosystem services in Costa Rica, named *Pagos por Servicios Ambientales* (PSA). This program, despite predominantly government-financed, had a user-financed component supplementing the costs. Among the environmental services users enrolled, hydroelectric companies were the largest private contributors, since forests are perceived to generate a series of hydrological services, but also breweries, irrigated farms, plastic firms and other organizations that benefit from them joined the program. (93% of all funds, and 78% of funds gathering purely private sources, predominantly targeted hydrological services)[200].

Initiated in 1997, the PSA sought to compensate landowners conserving forest cover for four forest environmental services: biodiversity, carbon sequestration, aesthetic beauty, and hydrological benefits[201]. A legal entity called the National Forest Finance Fund (*Fondo Nacional de Financiamiento Forestal*, FONAFIFO) was created to negotiate and operationalize the contract payments between service customers and suppliers. FONAFIFO engaged the private sector through voluntary agreements with companies that are willing to invest in conservation projects and sustainable land management initiatives and managed the annual payments to landowners in return for specific practices, such as preserving and restoring forest cover. In addition to the voluntary options for contributing to the PSA program, the 2006 Water Law (Canon de Agua) created a mandatory user contribution[202]. It substantially increased water-use charges (beginning from a very low level) and demanded that a quarter of the money from these tariffs was sent to FONAFIFO to help finance PSA contracts. Under this law, individual water users can deduct from their tariff obligations the moneys paid directly to FONAFIFO's PSA program, thus creating incentives for water users to make direct contributions to the program. According to FONAFIFO, as of 2009, around USD8.3 millions of user financing have been raised from more than 40 entities, however these money contributed to 3% of all the program financing[203].

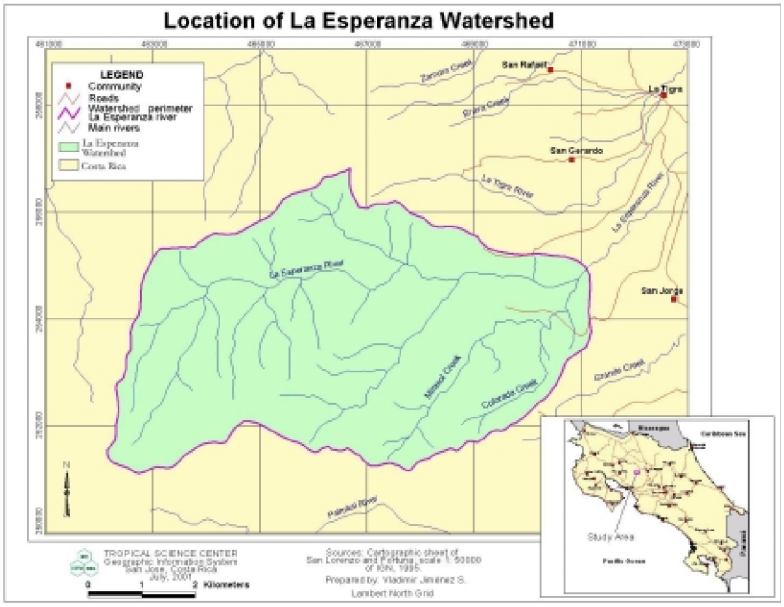
The conceptual framework for environmental service transactions in Costa Rica has been outlined by the FONAFIFO scheme for PES, although it was not the only tool available. One of the private hydroelectric payments developed in Costa Rica was the mechanism set up between La Esperanza Hydropower Project

[200] Allen Blackman e Richard T. Woodward, «User Financing in a National Payments for Environmental Services Program: Costa Rican Hydropower», *Ecological Economics* 69, fasc. 8 (15 June 2010): 1626–38, https://doi.org/10.1016/j.ecolecon.2010.03.004.
[201] https://www.enterprise-development.org/wp-content/uploads/DCED-GGWG-Case-study-PES.pdf
[202] Blackman e Woodward, «User Financing in a National Payments for Environmental Services Program».
[203] Ibid.

(LEHP), the downstream water user, and the Monteverde Conservation League (MCL), a conservation NGO that owns most of the hydropower plant's upper catchment, signed on October 28th, 1998.

La Esperanza watershed is located on Costa Rica's Northern mountains, within the Children's Eternal RainForest, owned by MCL. The development of household communities inside the watershed has been hindered by topographic conditions, thus it is still forested for the 90%.

Figure 8 – Location of La Esperanza Watershed PES project area



(Source: FAO Land-Water Linkages in Rural Watersheds Case Study Series 2002)

The small Hydropower Plant of La Esperanza (LEHP) was created after a government law of 1990 opened access to the electricity market to the private sector. The run-of-the-river plant uses up to 5.5m3/s of water from La Esperanza River and generates, an average of 29 GWh per year, that is then sold to the Costa Rican Electric Power Institute and delivered through the national grid. The power generation is influenced by the hydrometeorological context of Costa Rica Rain Forests, marked by significant seasonal variations.

Despite the voluntary PES scheme between La Esperanza hydroelectric plant and the Monteverde Conservation League does not involve FONAFIFO, the contractual arrangement regulating upstream-downstream cooperation took as reference the FONAFIFO standard payment of US$ 40/ha/yr. for defining the value of the provision of service of watershed protection. Although the contract, meant to last 99 years., overestimated the watershed size at 3 800 ha, it was agreed that LEHP would make payments for environmental services only in an area of 3 000 ha.

Moreover, the scheme does not rely on a formal monitoring process among the parties, but rather a set of assumptions. In fact, the only hydrological variable that is (indirectly) quantified is the volume of water used by the hydropower project, which can be derived from the total amount of electricity produced. The most

significant indicator of change in the watershed used is forest cover, since it is assumed to affect hydrological variables, and its changes are quantified through the Geographic Information System.

An innovative aspect is that the MCL-LEHP contract links the payment to power production and inflation. If the power plant produces more or less power, it will proportionately affect the total amount paid to the MCL.

Table 3 – Context factors affecting MBI effectiveness

GENERAL CONTEXT	**REDD+ Brazilian nut concession**	**La Esperanza Hydroelectric Power company**
Geographical location	Madre de Dios, Perú	Province of Alajuela, Costa Rica
Property rights regime	Insecure land tenure - Temporary State concessions, based on 40 years contracts	Watershed owned by the NGO but overlapping official land entitlements. LEHP granted surface rights for 99 yr.
Acceptance and motivation of the participants	Low stakeholder engagement and communication	NA
Link with other policy tools	Wildlife Law of 2000 (No. 27308), which establishes 40-year concessions for timber and NTFPs	Forestry Law 1996 Water Law 2006

Table 4 - Design and Implementation factors affecting MBI effectiveness

DESIGN AND IMPLEMENTATION	**REDD+ Brazilian nut concession**	**La Esperanza Hydroelectric Power company**
Spatial targeting and scale	Madre de Dios, Amazon Forest (308,757 ha)	La Esperanza watershed, Children's Eternal RainForest (3400 ha)
Monitoring	Every 1-3 years inspections, postponed verification reports From 2012 lacking. from Jan 1st, 2010, to the end of 2012, and then supposedly every two years thereafter	No formal monitoring system Absence of historical hydrometeorological data High costs
Transaction costs	High	Relatively low (one single buyer/limited number of participants)
Permanence (temporal scale)	10 years, not secured beyond contract period	Not secured information on current status
Compliance enforcement and conditionality	Poor enforcement capacities by the Peruvian authorities	Difference is to be resolved through Arbitration of the Chamber of Commerce of Costa Rica. No specification in the contract about measures in case of noncompliance on behalf of the MCL
Conditionality	Action based payments	Outcome based?
Contractual arrangements with ES providers/ Mode of payment	Cash transfers (delayed and untransparent from BAM) + TA	Cash transfer Differential payments From 3 to 10 US$/ha/yr.
Buyers	User-financed Companies like BP Gas	User-financed
Actors involved	FEDROCAMD ES provider/ seller BAM project developer	MCL (service provider) LEHP (buyer)

Intermediary	VERRA credit and verification agency	No

Table 5 – MBI effectiveness

EFFECTIVENESS	Additionality	Baseline	Leakage
REDD+ Brazilian nut concession	No real basis for additionality	High inflation in the calculation	Overexploitation in the leakage belt, not accounted for
La Esperanza Hydroelectric Power company	Unclear due to data limitation	Explicit, static land use	NA

Ch. VI – Results Discussion

6.1 Design and governance barriers to MBIs environmental effectiveness

6.1.1 Additionality

Additionality, in the context of market-based mechanisms for biodiversity, is in theory considered the final goal. It refers to the extent to which conservation projects result in additional benefits for biodiversity beyond what would have occurred in the absence of the funding or the incentive. Market-based mechanisms for biodiversity are designed to create financial incentives to promote conservation and sustainable use of natural resources. In the case of PES, the program is additional if it results in an increase of the ES provision. Emissions reductions in a carbon trading mechanism set up under the 1998 UNFCCC Kyoto Protocol have to be 'additional to any that would have occurred without the project.'[204] As revealed by the results presented in the previous section, in both the empirical case studies there has been no clear proof of additionality, mainly due to poor monitoring, but also influenced by design and implementation variables that will be analyzed forward.

Assessing additionality is not an easy task, because it requires a comparison between a project scenario and a counterfactual scenario of 'business-as-usual'. Basically, additionality of a MBIs is the difference between the two. In BO, if it is equal to 0 the offset credit should not be issued, while in the case of PES the payment relies more explicitly on action-based mechanisms rather than performance-based. Determining the *baseline*, the 'without project scenario', is thus critical for the evaluation of the whole mechanism and for determining its performance. However, anticipating the future is always a difficult attempt. As claimed by Bellassen and Shishlov, "given that these scenarios will never materialize if a project/policy is implemented, additionality can never be established with 100% certainty – even ex-post"[205]. Moreover, since many exogenous factors like demography, climate and land use change may interplay in determining natural ecosystems status, baselines could be subjected to several interpretations. As for the case of the REDD project in Perú, scientific analysis of forest cover based on a pixel matching approach revealed that nothing material to carbon emission changes realistically happened in the site that would have not happened in a business-as-usual scenario, and thus that the carbon credits and VCUs claimed have been not the result of a real additionality, but rather of fraudulent accounting practices and implausible baselines setting[206]. *Perverse incentive*s exist in inflating

[204] UNFCCC, Kyoto Protocol Art 6

[205] Shishlov I and Cochran I, 2016. CLIMATE BRIEF N°41 Six lessons on carbon accounting for Article 6 of the Paris Agreement. Institute for Climate Economics, November 2016. https://www.ieta.org/resources/International_WG/Article6/Portal/I4CE%20-%20Six%20MRV%20lessons%20for%20Article%206.pdf

[206] Food Watch, Offsetting: 'climate neutral' through forest protection? November 2021

baselines, in order to increase the value of emissions reductions and thus the earnings from a higher sale of credits. Food Watch independent calculations, based on Global Forest Watch dataset, revealed a huge discrepancy between the baseline set through the BAM Deforestation Model, built on Verra methodology, and the actual deforestation of the 'intervention area'. In particular, on average, during 2001-2010, over the entire intervention zone the actual tree loss of 0.15%/year was only about one-eighth of the annual deforestation rate used for the baseline[207]. In addition, the years between 2010 and 2020 have seen an acceleration in deforestation in all areas, roughly doubling from 0.15% on average to 0.29%/year, highlighting the general ineffectiveness of the program. This evidence could be partially explained by the proximity of the Interoceanic Highway and by potential unplanned deforestation happening outside the nut concessions by immigrants occupying forests close to it. However, spatial analysis evidence and interviews conducted by the Verra audit team revealed it also occurred inside the concessions, indicating that the same participants were responsible for the additional planned deforestation to grow cassava, corn and other crops. Although the verifiers of the Verra team had serious doubts on the accuracy of the emissions reductions claimed in 2013-2014, it continued issuing credits under the baseline of 2009, which was not renovated.

Additionality assessments in La Esperanza Hydropower PES were also critical. In fact, due to procedural constraints in quantifying the environmental services in the targeted area, there is no data available on how changes in land uses actually influenced hydrological impacts. Several studies have also been undertaken on the overall PSA in Costa Rica, with widely divergent results, ranging from practically no impact of PES on deforestation to a 10% increase in primary forest cover[208]. PES programs in Costa Rica have been widely criticized for a lack of targeting, for not considering opportunity costs in undifferentiated payments and for a lack of additionality, i.e., paying for services that would have been provided anyway[209]. If farmers are paid for practices that would have been implemented anyway or were already implemented, the result is a "windfall effect".

A global review of the ecological outcomes of voluntary REDD+ projects, revealed that in the sample of project, implementation was associated with reductions in deforestation and forest degradation over the first 5 years of operation compared with matched control pixels, but when they had been operating for at least 8 and 10 years no evidence of varying effect sizes through time have been found[210].

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[207] Ibid.

[208] Sven Wunder, Stefanie Engel, e Stefano Pagiola, «Taking Stock: A Comparative Analysis of Payments for Environmental Services Programs in Developed and Developing Countries», *Ecological Economics*, Payments for Environmental Services in Developing and Developed Countries, 65, fasc. 4 (1 May 2008): 834–52, https://doi.org/10.1016/j.ecolecon.2008.03.010.

[209] Sarah Schomers e Bettina Matzdorf, «Payments for Ecosystem Services: A Review and Comparison of Developing and Industrialized Countries», *Ecosystem Services*, Payments for Ecosystem Services and Their Institutional Dimensions: Analyzing the Diversity of Existing PES Approaches in Developing and Industrialized Countries, 6 (1 December 2013): 16–30, https://doi.org/10.1016/j.ecoser.2013.01.002.

[210] Guizar-Coutiño et al., «A Global Evaluation of the Effectiveness of Voluntary REDD+ Projects at Reducing Deforestation and Degradation in the Moist Tropics».

6.1.2 Monitoring and compliance enforcement

Another key element hindering private conservation projects is monitoring, in assessing both biodiversity risks and benefits. Both case studies codification highlights an overreaching challenge with the timing, the transparency and the accuracy of tracking in BO and PES impacts, due to multiple reasons.

One of the most influential is the lack of clear apex targets and global data for biodiversity, similar to the ceiling of 1.5° established by the Paris Agreement and measurable in CO2 emissions. Establishing a single measurable target for biodiversity is difficult, due to its multidimensional nature that includes the interlinkages between populations and diversity of species, landscapes and natural ecosystems and genetic diversity. This makes it difficult to mobilize the private sector towards a goal and develop specific strategies. A review of the available literature shows that often data on the effectiveness of biodiversity conservation projects are based on inaccurate proxies that can be visually measured by project participants, like "forest cover maintained", that are not suitable for capturing the well-being of the environment[211], as it occurred in the REDD offset scheme in Perú. Relying on these indicators rather than on actual outcomes in terms of ES provision (e.g., additional tons of carbon stored) can strongly influence PES effectiveness.

Moreover, defining global measurable targets for biodiversity has more implications than those for climate risks because, despite sharing globally diffused impacts, the formers are much more dependent on local factors that should be accounted for.

The lack of scientific data and measurement tools is probably one of the elements composing the overall challenge. In fact, private entities willing to assess their social and environmental impacts and report them usually face situations where the data on species occurrence or ES simply do not exist, especially in developing and emerging countries. In the case of La Esperanza hydropower plant, hydrological data have not been assessed because, despite monitoring stations downstream and in the surrounding areas, that could have been used via extrapolation, there were not advanced methodologies to isolate the result for land use change and segregate other variables affecting water services like climate change. New technology and continued scientific research have the potential to fill in the gaps and improve data quality. The terrestrial biodiversity database developed by the World Bank, using remote sensing data, can be taken as an inspiring example[212].

The timing dimension is also pivotal. As in the presented case studies, sample site inspections are usually not frequent (1-3 years), lagging or formally absent.

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[211] Jan Börner et al., «The Effectiveness of Payments for Environmental Services», *World Development* 96 (1 August 2017): 359–74, https://doi.org/10.1016/j.worlddev.2017.03.020.

[212] The database is accessible at: https://datacatalog.worldbank.org/dataset/terrestrial-biodiversity-indicators. A brief description of the database is accessible at this blog: https://blogs.worldbank.org/opendata/overlapping-priorities-data-mapping-biodiversityand-development-activities?CID=WBW_AL_BlogNotification_EN_EXT

Depending on funding, monitoring quality might change over time, especially in smaller projects where these fees make up a bigger portion of expenses. However, if program developers choose not to invest money in it, even programs in developed countries may only have minimal monitoring.

Standardized accounting frameworks are also a decisive element contributing to the monitoring challenge. In fact, despite corporate natural capital accounting efforts are expanding, they are still underdeveloped and voluntary. The CBD found that "biodiversity is not often explicitly addressed and reported on in sustainability reports, and, even when it is, there appeared to be a lack of coherence and consistency across reports"[213]. This occurs also as a consequence of not standardized investment taxonomies and regulatory requirements, that leads private entities to not consider biodiversity as a financial material element and, if they do, they can decide how and under which reporting framework. This situation is in the process to be partially tackled thanks to the European efforts to make nature-related disclosures mandatory and provide common reporting standards (ESRS)[214]. Standardized and specific reporting frameworks are a decisive element in the effort of enhancing biodiversity conservation projects, both for the needs of the shareholders and the additionality itself. In fact, if they are missing, companies and project developers are left without the information they need to effectively manage them.

Lack of quality data, standardized accounting and reporting frameworks are direct causes of the perceived "informational silence" when studying the effectiveness of private biodiversity management initiatives. In fact, as mentioned in the methodological references of the research, comprehensive verification reports and documents tracking private finance and biodiversity outcomes are a small percentage compared to the quantity of initiatives implemented and published.

New tools are progressively being incorporated by companies in their decision-making process like the Integrated Biodiversity Assessment Tool (IBAT) for Business, a multi-institutional tool developed by IUCN, that allows businesses to estimate the hazards that constructions or corporate activities would bring to important ecosystems and the opportunities for biodiversity conservation close to producing sites[215].

An appropriate and frequent monitoring is necessary to ensure MBIs recipients to comply with their contracts, however it is not sufficient to ensure compliance. Project conditionality needs to be accompanied by appropriate sanctions and enforcement settings. Conditionality, at least nominally, has proven to be higher in private-financed initiatives, since they typically tend to focus on specific ES (as watershed services of carbon

[213] CBD. 2020. Report of the panel of experts on resource mobilization (First Draft). Secretariat of the Convention on Biological Diversity. Available at https://www.cbd.int/doc/c/ff7b/ decc/6637af8d0a54a1a4dbf397d8/post2020-ws2020-03-02-en.pdf

[214] For further details see «First Set of draft ESRS - EFRAG», accessed 21 august 2023, https://www.efrag.org/lab6?AspxAutoDetectCookieSupport=1.

[215] Integrated Biodiversity Assessment Tool. 2020. Available from: https://ibat-alliance.org/

sequestration), while government-financed projects usually address multiple-objectives at the same time[216]. Los Negros PES case in Bolivia, with its joint payments for water and biodiversity, is an exception among user-financed programs[217].

The most frequent sanction is the stop of the contract or the permanent or temporary exclusion from future payments for PES, or the inability to issue credits for BO. However, sanctions may be difficult to enforce for various reasons[218]. In small-scale user-financed projects, conditionality may be hard to enact due to limited local monitoring capacities, especially in developing countries. Private MBIs conditionality may be also hindered by perceived low opportunity costs or interest collusion with the verification entities, as it happened in the REDD+ project implementation in Madre de Dios, where VERRA continued issuing credits despite questioning the entire baseline and the emissions accounting methodologies of the developer.

Conditionality based on action-based payments rather than on outcomes could strongly influence MBI additionality. When farmers are paid based on visual proxies (like "forest cover") rather than on actual outcomes in terms of ES provision (e.g., additional tons of carbon stored), they may be incentivized not to comply with the ultimate goal of increasing environmental benefits, while paying for outcomes may enable project participants to perform practices that better increase ES provision, thus potentially reducing moral hazards and monitoring.

6.1.3 Poor spatial targeting and small-scale projects

Another key factor affecting the outcome of private biodiversity financing is the spatial scope. MBIs may be of national, regional or local nature. However, user-financed programs tend to be of small scale and localized, which if on the one hand represent a virtuous feature, since solution and strategies can be better tailored on local needs and actors are more easily identified and involved, on the other hand it creates a series of operational constraints.

Poor spatial targeting in biodiversity conservation projects can have significant negative impacts on project outcomes, leading to inefficient resource allocation, inadequate protection and limited conservation impact, and wasted efforts.

User-financed and government-financed instruments typically differ in spatial scope as a consequence of their specific focus and overall budgets[219]. For example, programs financed by individual water users inevitably have a limited spatial scale. Their entire focus is on a single ES and on upstream–downstream watershed management activities, even if this means higher costs of provision and transaction. In the empirical case of

[216] Börner et al., «The Effectiveness of Payments for Environmental Services».
[217] «(PDF) Selling Two Environmental Services: In-Kind Payments for Bird Habitat and Watershed Protection in Los Negros, Bolivia», *ResearchGate*, consultato 23 July 2023, https://doi.org/10.1016/j.ecolecon.2007.12.014.
[218] Wunder, Engel, e Pagiola, «Taking Stock».
[219] Wunder, Engel, e Pagiola.

La Esperanza, the upstream landowner is paid by the downstream organization. Instead, in the Paso de Caballos River Basin in Nicaragua, they are paid by private downstream households for reforestation and conservation efforts that created a Water Committee to negotiate individual contracts with upstream land users.[220] Thanks to their wider project focus, in comparison government-financed programs can choose among a broader selection of potential suppliers.

Poor spatial targeting, often occurring in scenarios of information asymmetry and unqualified data, can strongly affect environmental effectiveness. If the spatial targeting does not accurately identify and prioritize critical habitats for endangered species and payments are not made where they are most needed, those areas may not receive adequate protection[221]. As a result, the populations of targeted species can continue to decline, and the overall effectiveness of the conservation project diminishes.
However, in some cases, the implementation of biodiversity schemes at a local or regional scale has been shown to be more efficient than at national scale. In the Mexico's national PES scheme, for example, an explicit targeting of overexploited natural areas was missing, leading to frequently criticized outcomes[222].

Efficiency losses and misallocation of resources represent further potential implications of small and weak spatial selections. Small-scale biodiversity projects may present drawbacks in their design, since they frequently do not adequately fit the underlying bio geophysical systems, which reduces the program' expected effectiveness. The dynamics in time and space of the ecological processes targeted are not easily matched by the governance and implementation scope of the scheme, leading to the phenomenon known in environmental governance studies as "problems of fit"[223]. Site selection is also affected by acceptance of the neighbors, connectivity with adjacent land uses and availability, administrative boundaries.
Adopting a landscape-scale perspective has been suggested as a particularly valuable strategy to overcome the issue of spatial mismatch, however practice is still significantly affected. The EU Biodiversity Strategy, with specific regard to agroecosystems and European agri-biodiversity policy, provides a unique momentum towards the creation of a multi-functional and more sustainable food system. The notion of Functional Agri-Biodiversity—or FAB represent the acknowledgment of the importance of a sound spatial implementation and the functional groups of species—such as pollinators substantially contributing to agricultural production[224].

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[220] Nelson Grima et al., «Payment for Ecosystem Services (PES) in Latin America: Analyzing the Performance of 40 Case Studies», *Ecosystem Services* 17 (1° February 2016): 24–32, https://doi.org/10.1016/j.ecoser.2015.11.010.
[221] Schomers e Matzdorf, «Payments for Ecosystem Services».
[222] E. Corbera, C.G. Soberanis, e K. Brown, «Institutional Dimensions of Payments for Ecosystem Services: An Analysis of Mexico's Carbon Forestry Programme», *Ecological Economics* 68, fasc. 3 (2009): 743–61, https://doi.org/10.1016/j.ecolecon.2008.06.008.
[223] Francesca L. Falco, Eran Feitelson, e Tamar Dayan, «Spatial Scale Mismatches in the EU Agri-Biodiversity Conservation Policy. The Case for a Shift to Landscape-Scale Design», *Land* 10, fasc. 8 (August 2021): 846, https://doi.org/10.3390/land10080846.
[224] Ibid.

Moreover, specific assessment frameworks, such as the Exploring Natural Capital Opportunities, Risks, and Exposure (ENCORE) platform developed by the Natural Capital Finance Alliance, are emerging as a tool to support corporates and project developers to identify hotspots and better understand and take into account ecological importance, threats, and connectivity, and local community engagement to maximize conservation outcomes and effectively utilize user-financed resources[225].

6.1.4 High transaction costs

Transaction costs can significantly influence the effectiveness of market-based instruments for biodiversity conservation. They refer to all the costs that are not direct payments, but residual and intrinsic to the program implementation and logistics. They are distinguished between start-up costs that are born before the program, such as design, information procurement and negotiation costs, and costs of implementation, monitoring, sanctioning and payment administration.

Firstly, market-based instruments require administrative and institutional setup, including monitoring, enforcement, and oversight. High administrative costs can reduce the overall efficiency of the instrument and may limit the funds available for actual conservation efforts.
It is noteworthy also mentioning that implementing market-based instruments involves negotiating agreements and permitting procedures between buyers and sellers of ecosystem services or biodiversity credits. These negotiations, particularly in PES agreements, can be complex and time-consuming, incurring significant transaction costs. If transaction costs are too high, it may discourage participation, resulting in limited conservation outcomes. They also include the expenses needed to collect reliable and accurate information on ecosystem functioning of the impact area, as well as on the market demand. Informational costs of data collection and verification may be high, particularly when dealing with complex and diverse ecosystems. In the private PES case in La Esperanza, the cost of data collection indeed constrained the monitoring of the environmental services throughout the duration of the contract.

The spatial dimension of MBIs is also a relevant element affecting the costs of the program. Especially in BO, where the impact site and the offset site are typically geographically dislocated, coordinating transactions across different areas can escalate transaction costs, making it more difficult to establish comprehensive and connected conservation efforts. The literature on market-based mechanisms differentiates between point-source emissions (identifiable fixed locations) and area/nonpoint sources (diffuse, mobile, or challenging to identify). Monitoring and enforcing point sources is typically cheaper. MBIs schemes commonly target

[225] «ENCORE», ENCORE, accessed 23 July 2023, https://encore.naturalcapital.finance/en.

nonpoint sources or multiple individual landowners whose collective activities impact a specific ecosystem service. Often in the case of long projects pipelines, many stakeholders and intermediaries are involved. This has proven to be an influential variable in the empirical analysis, since the REDD program costs have been probably increased by its complex architecture, the presence of many dislocated actors, intermediaries and multiple landholders in the concessions. On the contrary, PES in Costa Rica registered lower transaction costs, linked to the smaller scale of the watershed area concerned and the existence of a sole upstream provider of watershed services and sole downstream user. This probably lowered the transaction costs of negotiating a contractual arrangement, as well as the costs needed to monitor and enforce compliance.

In this regard, it should be highlighted that low transaction costs may also be the result of under-spending from monitoring. In fact, in the PES analyzed, there was no need to quantify in biophysical or economic terms the land use impacts on hydrology. Conversely, high transaction costs are not necessarily a proof of effectiveness, since funds can be spent inefficiently.

In comparison with government financed programs, user financed MBIs usually have to bear higher start-up costs. In the Pimampiro case in Ecuador, the entire start-up phase cost amounted to US$38,000 (financed by the Inter-American Foundation (IAF)[226]. This equates to relatively high per-hectare expenses of US$69, of which 42% are management costs and 58% are monitoring costs. The Vittel watershed program in France faced startup- costs of over US$4800/ha[227]. Conversely, government-funded PES initiatives typically benefit from their broader region of operation and frequently also from the presence of public institutions with regional reach, which lowers their transaction costs. Some government-funded initiatives may be able to deliver untargeted, undifferentiated, "one-size-fits-all" payments without ensuring that ES are really being produced in order to achieve these low transaction costs[228].

In the long run, the frequently high transaction costs in private environmental conservation may also hinder the financial sustainability of the entire program. High transaction costs in fact might discourage long-term commitments from both buyers and sellers, leading to the discontinuation of conservation efforts once the initial funding or interest dwindles. The *permanence (*or *perpetuity)* of the MBI in the field considerably depends on continued financing. Case report on the Offset program in Madre de Dios explicitly reported a lack of constant financial support and delayed payments to the BNH concessionaires by the project developers. Many have well argued the importance of mid-term or long-term planning for successful outcomes[229]. The

[226] Sven Wunder e Montserrat Albán, «Decentralized Payments for Environmental Services: The Cases of Pimampiro and PROFAFOR in Ecuador», *Ecological Economics*, Payments for Environmental Services in Developing and Developed Countries, 65, fasc. 4 (1° May 2008): 685–98, https://doi.org/10.1016/j.ecolecon.2007.11.004.

[227] Perrot-Maître, D. (2006) The Vittel payments for ecosystem services: a "perfect" PES case? International Institute for Environment and Development, London, UK.

[228] Tobias Wünscher, Stefanie Engel, e Sven Wunder, «Spatial Targeting of Payments for Environmental Services: A Tool for Boosting Conservation Benefits», *Ecological Economics*, Payments for Environmental Services in Developing and Developed Countries, 65, fasc. 4 (1° May 2008): 822–33, https://doi.org/10.1016/j.ecolecon.2007.11.014.

[229] Ibid. 202

UNDP, after an examination of several case studies, made a clear case for a 10–20 years donor commitment for transformational change[230]. This time frame is especially important for implementing sustainable management practices and changing behavioral attitudes toward the use of natural resources. A good example of mid-term planning is the case of Procuencas in Costa Rica, a successful private PES scheme where a private company directly paid upstream landowners preserving water quality and that was used as a model in other regions of the world[231].

Moreover, user-financed, more than government-led programs, are subjected to private satisfactions and humors that may undermine their long-term planning. Limited available evidence suggests that most of the programs have been in operation for a lower period than expected[232]. Long-term management may require higher payments to continue attracting participants or avoid exits and needs to maintain a certain degree of flexibility to exogenous changes, as well as to the heterogeneity of costs among producers.

6.1.5 Leakage, trade-offs and social impact

The overall effectiveness of the program may be undermined by the degree of displacement of environmentally damaging activities that, rather than being reduced, are simply performed in another location. MBIs Implementation plans could lead to unwanted and indirect effects like a decline in other species, environmental resources or ecosystem services (e.g., carbon sequestration, food provision…).

The *leakage* phenomenon is basically the shift of the 'business-as-usual' model to another area outside the project boundaries and may happen both at the local and transnational level. In the first case, it occurs when, for instance, farmlands clear one plot of land to substitute one that is under the contract, while in the latter, deforestation rate may increase in another place due to the higher prices of crops derived by land under conservation management[233]. However, in practice there is little available data to assess MBIs leakage on natural resources, due to considerable barriers in identifying indirect relations. This was a relevant phenomenon in the REDD+ Carbon Offset program in Perú, where the project area and non-project area (the 'Leakage Belt') are such highly heterogeneous and fragmented, that there are lots of small pieces of project area intermingled with non-project area, and especially so where there is lack of clarity of land and usage rights and a mix of different users with different motivations[234]. However, even if from the 2013-2014 verification period the emission from the Leakage Belt have been accounted for and deducted from the VCUs,

[230] UNDP, Supporting Transformational Change. "Case Studies of Sustained and Successful Development Cooperation." *NY: United Nations Development Programme (UNDP)* (2011).
[231] Redondo-Brenes, A., and K. Welsh. "TEEBcase: Procuencas Project, TEEB, Costa Rica." (2010).
[232] Wunder, Engel, e Pagiola, «Taking Stock».
[233] B. Sohngen e S. Brown, «Measuring Leakage from Carbon Projects in Open Economies: A Stop Timber Harvesting Project in Bolivia as a Case Study», *Canadian Journal of Forest Research* 34, fasc. 4 (2004): 829–39, https://doi.org/10.1139/x03-249.
[234] «foodwatch2021_Tambopata-offset-project_Assessment.pdf».

the baseline has been inflated to the extent that real leakage emissions have been simply treated as zero additional emissions. Beyond occupation of adjacent lands and weak carbon density ratios, leakage effects can translate also in higher labor and capital mobility and more competitive land markets[235].

Another likely phenomenon grouped under the category of environmental spillovers is the *rebound effect*, linked to behavioral changes. It occurs when changes in land use are registered as an indirect result of changed incomes in households after PES (or other market tools) programs enrolling.

However, beside environmental spillovers, social spillovers may also occur as indirect outcomes. The design and implementation of projects whose main goal is the maximization of the well-being of natural resources, necessarily also affects the well-being of the people that are more or less directly involved in the program. In fact, when dealing with environmental conservation governance, there is a clear link between environmental outcomes and social impact[236]. Many authors highlight the link between poverty, biodiversity hotspots and environmental degradation[237] and that poor people suffer most from ES loss[238]. Consequently, PES are frequently discussed as a lever for 'pro-poor' rural development[239], with a view to correct the distortion between private and social interest.

Benefits and risks for participants and non-participants, and the entire community safeguarding natural resources, should be well factored and targeted in the effort to reach additionality, looking at them as implementation partners. In fact, keeping social considerations outside the equation of project design elements may undermine *its very legitimacy and acceptance*, therefore negatively affecting the ES provision in the long run.

Some scholars tried to study what drives stakeholders' motivation to join these types of conservation initiatives and their results confirm that their degree of acceptance does not only depend on economic incentives[240], but also on a proper *engagement of the stakeholders* in the design and building of the project itself, collecting their instances, concerns and correcting information asymmetries through proper training and workshops. Other relevant studies reached the same conclusion, highlighting the link between environmental effectiveness and

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[235] S. Wunder, «Payments for Environmental Services and the Poor: Concepts and Preliminary Evidence», *Environment and Development Economics* 13, fasc. 3 (2008): 279–97, https://doi.org/10.1017/S1355770X08004282.

[236] S. Pagiola, A. Arcenas, e G. Platais, «Can Payments for Environmental Services Help Reduce Poverty? An Exploration of the Issues and the Evidence to Date from Latin America», *World Development* 33, fasc. 2 SPEC. ISS. (2005): 237–53, https://doi.org/10.1016/j.worlddev.2004.07.011.; Arild Angelsen e Sven Wunder, *Exploring the forest--poverty link: key concepts, issues and research implications*, 2003, https://doi.org/10.17528/cifor/001211.

[237] B. Fisher e T. Christopher, «Poverty and Biodiversity: Measuring the Overlap of Human Poverty and the Biodiversity Hotspots», *Ecological Economics* 62, fasc. 1 (2007): 93–101, https://doi.org/10.1016/j.ecolecon.2006.05.020.

[238] E.B. Barbier, «Poverty, Development, and Ecological Services», *International Review of Environmental and Resource Economics* 2, fasc. 1 (2008): 1–27, https://doi.org/10.1561/101.00000010.

[239] U. Pascual et al., «Exploring the Links between Equity and Efficiency in Payments for Environmental Services: A Conceptual Approach», *Ecological Economics* 69, fasc. 6 (2010): 1237–44, https://doi.org/10.1016/j.ecolecon.2009.11.004.

[240] Mariel Aguilar-Støen, «Exploring Participation in New Forms of Environmental Governance: A Case Study of Payments for Environmental Services in Nicaragua», *Environment, Development and Sustainability* 17, fasc. 4 (1° agosto 2015): 941–58, https://doi.org/10.1007/s10668-014-9582-1.

non-financial participation variables, such as pro-social, pro-environmental and risk reduction[241]. In particular, increased technical assistance and support to project participants positively affects the PES performance, building operational knowledge capacities within the group enrolled[242]. Empirical evidence from interviews conducted to nut concessioners in Madre de Dios show that only 62% of the participants had a solid knowledge of the REDD initiative and were aware of its purpose and some interviewees criticized the insufficient transparency and communication within the community held by BAM[243].

Trade-offs are therefore needed between environmental effectiveness and social equity objectives, under its three main levels: equity in access, equity in decision-making and equity in outcome[244]. The first trade-off could translate in targeting and differentiating payments to landholders, avoiding a one-size fits all policy. Extensive literature has tried to analyze the impacts of conservation programs tailoring poverty alleviation beside environmental additionality, demonstrating, when data were sufficiently available, significant tradeoffs between the two. The PES program in Mexico registered a 10% of increase in poverty alleviation level. Some even argued that, even if not additional, a program that is perceived as fair and legitimate may increase participants' motivation and trigger a crowd-in dynamic that attracts external farmers and spreads sustainable practices. To conclude, *procedural fairness* in MBIs design is strategic in ensuring program effectiveness, permanence and compliance (thus, lower monitoring and sanctioning).

6.1.6 Unclear property rights and institutional setting

Motivation and thus compliance of participants depends on institutional settings and property rights on the natural resource in scope. Corbera defines institution as "formal and informal rules which regulate what to do and not to do in a given situation"[245] while property rights are the legal and social rights that individuals or groups have over a particular resource, such as land, and determine the extent of control, access, and use they can exercise over that resource.

[241] Kelly W. Jones et al., «Participation in payments for ecosystem services programs in the Global South: A systematic review», *Ecosystem Services* 45 (1 ottobre 2020): 101159, https://doi.org/10.1016/j.ecoser.2020.101159.
[242] Achille Augustin Diendéré e Dominique Kaboré, «Preferences for a payment for ecosystem services program to control forest fires in Burkina Faso: A choice experiment», *Forest Policy and Economics* 151 (1 June 2023): 102973, https://doi.org/10.1016/j.forpol.2023.102973.
[243] cifor.org, «The REDD Project in Brazil Nut Concessions in Madre de Dios, Peru | REDD+ on the ground - CIFOR», *REDD+ on the ground* (blog), accessed: 25 July 2023, https://www2.cifor.org/redd-case-book/case-reports/peru/redd-project-brazil-nut-concessions-madre-de-dios-peru/.
[244] "Addressing Equity and Poverty Concerns in Payments for Environmental Services." (2009). https://core.ac.uk/download/pdf/48022734.pdf.
[245] Corbera, Soberanis, e Brown, «Institutional Dimensions of Payments for Ecosystem Services».

Many articles have emphasized the role of land tenure regimes and institutional structures in determining MBIs performance. In fact, the way in which property rights are distributed highly influences how agents interact and coordinate, therefore affecting social perceptions and embeddedness[246].

With specific reference to the elements of environmental program design, poorly defined land tenure regimes make it hard to efficiently align incentives, increase market participation and enforce compliance.

In fact, secure property rights create a stronger incentive for landowners to participate in market-based conservation instruments. When individuals have exclusive ownership over their land and the resources it contains, they are more likely to invest in sustainable practices and engage in conservation efforts, as they can directly benefit from the environmental services they provide.

This was the underlying rationale held in the development of the Madre de Dios Offset program. Drawing lessons for the previous experience in Brazil concessions, project developers assumed that nut harvesters would have had a personal interest in sustainably managing the lands, however this soon proved to be over simplistic, disregarding the local institutional framework in which the program was embedded. In fact, according to CIFOR reports, in the Peruvian Amazon the collection of timber and non-timber forest products (NTFPs) is regulated under the Wildlife Law of 2000 (No. 27308), which establishes 40-year government concessions. As of 2011, Brazil nut concessions (25–4000 ha units) covered 10.5% of Madre de Dios. Although intended primarily for Brazil nut production, concessionaires can present complementary plans for other forest uses[247]. Moreover, even if nut collectors are allowed to clear up to 2 ha of land, "Concessionaires generally did not deforest more than 0.5 – 1.0 ha in a two-year period, with clearing generally associated with cropping or pasture creation. Nevertheless, when asked whether forest cover within the concessions had changed in the past two years, participants in every community survey indicated that forest cover had decreased."[248] Interviewed participants tended to associate deforestation rates to immigration, climate change, illegal sale of parcels of lands for agricultural uses or for illegal timber or fuelwood and charcoal trade, but also illegal small-scale mining, started in Madre de Dios from the 1930s. As CIFOR noted from its surveys in 2014, "respondents anecdotally remarked that nut concessionaires often illegally invite miners into their concessions for a percentage of their profit."[249]

Another remarkable element that may have determined the failure in compliance of the program was the fact that, according to CIFOR interviews, the majority of the nut concessioners where not born into their communities, but were rather "agricultural colonists" coming from the Andean highlands nearby, encouraged

[246] A. Vatn, «An Institutional Analysis of Payments for Environmental Services», *Ecological Economics* 69, fasc. 6 (2010): 1245–52, https://doi.org/10.1016/j.ecolecon.2009.11.018.

[247] cifor.org, «The REDD Project in Brazil Nut Concessions in Madre de Dios, Peru | REDD+ on the ground - CIFOR».

[248] Garrish, V, et al, 2014. The REDD Project in Brazil Nut Concessions in Madre de Dios, Peru, Chapter 8 in REDD+ on the ground; A case book of subnational initiatives across the globe, CIFOR, 2014. https://www2.cifor.org/redd-case-book/casereports/peru/redd-project-brazil-nut-concessions-madre-de-dios-peru/cifor.org.

[249] Ibid.

to settle after governments reforms at the end of the 1990s, in order to clear the forest and cultivate small landholdings

As it happens in many countries in the Global South, land tenure regimes are usually highly insecure and problematic. Agricultural lands in Madre de Dios were actually owned by the State. Nuts harvesters had not permanent rights on their lands, but rather time bound exploitation agreements (40 yr.) that did not incentivize farmers to sustainably manage the targeted forests and to perceive them as an asset to steward and to pass to future generations.

A further challenge has been that communities' boundaries were found hard to legally identify. Most BNH concessionaires had overlapping land rights due to the fact that registration happened by different actors (NGOs or forests consultants) and the Peruvian Regional Forestry Direction lacked the capacities to verify them. The overlapping resulted in conflict between neighboring concessions, sometimes with violent consequences. While conflicts were not deemed to represent a risk to the forest and the credit system, they undermined confidence in the concession system. In addition, unclaimed gaps between concessions have allowed other actors to request land titles.[250] Land disputed in the project area occurred not only between agricultural landholders, but also with mining concessions that attracted migrants from the highlands.

In situations of weak land tenure regularization, MBIs like REDD and PES are argued to be useful tools to clarify chaotic zoning. Despite land right clarification being one of the promises of the program in Perú, little seemed to have been achieved in this respect. However, private entities like BAM may have a role in collaborating and involving government institutions in project areas that are difficult for them to control and shed light on complex land situations.

Different considerations can be made on La Esperanza Hydroelectric company case, where the implementation of the PES scheme seemed to have solved a land ownership dispute[251]. The conflict arose because both entities, LEHP and MCL, had official land entitlements on a parcel of land, claimed by both parties. After negotiation, MCL granted surface rights to LEHP, meaning that the former retains full ownership, but the latter is allowed to manage and utilize the land autonomously for a period of 99 years. Despite not being the final goal of the project, but a necessary step for the power plant implementation, PES negotiations had the merit to regularize watershed rights between actors, also benefiting from a longer concession period.

6.2 Barriers to nature's attractiveness for private investors

[250] Ibid.

[251] Manrique Rojas e Bruce Aylward, «Land-Water Linkages in Rural Watersheds Case Study Series. Cooperation between a Small Private Hydropower Producer and a Conservation NGO for Forest Protection: The Case of La Esperanza, Costa Rica», s.d.

Significant findings emerged from the content scrutiny of the expert interviews, highlighting the difficulties of biodiversity projects in matching private investors profiles. Despite the varied affiliations of the interviewees across Multilateral Development Banks (MDBs), Development Finance Institutions (DFIs), and Environmental Research and Consulting centers, a consensus was discerned regarding key factors influencing the attraction of the private sector to investments in nature conservation.

To facilitate a more comprehensive discourse, these factors have been systematically classified into six overarching thematic categories.

Table 6 – Interviews themes identification

Outputs	**n/3 Respondents**
Risk-Return profile	3
Too much distributed benefits	3
Some natural ecosystems do not allow to identify direct individual benefits	1
Competition in large grant schemes	1
Dependency of grants and lack of business models	1
Lack of business models and project pipelines	3
Unexplored area and lack of standards and metrics	3
Fragmentation of beneficiaries	3

The overall picture emerging by the analysis of the findings can be preliminarily summarized in a complex *risk-return profile* of biodiversity investments, that collides with traditional and impact investors approaches. The first dimension of risk entails the fact that the project may not be sufficiently profitable and impactful, thus that the cashflow generated by the project may not be enough to compensate for the initial investment and the high interest rates that typically come with nature investments. Possible remedies to this problem identified in the field are technical assistance programs and blended finance instruments, to ideally accompany the projects in their early development stages. De-risking mechanisms, such as concessionary finance, preferred rates of return, financial guarantees or policy insurance may be provided to compensate potential losses at the fund level.

However, the issue generating most concerns is the dimension of return. In fact, if the risk profile may be somehow mitigated with financial arrangements or by the presence of an entity daring enough to go the extra mile and start using innovative approaches with respect to the past, the real challenge lies in the roots of biodiversity investing, namely in how to monetize the benefits that come from a public good like healthy

natural ecosystems and species. The most diffused idea is to find a way to bundle the public good (biodiversity) with a private one and build a relation according to which the value of the latter increases when biodiversity is protected[252]. For instance, farmland investments with pollinators protection (such as bees, beetles, and butterflies). Once the link between the two is formalized, this type of investment can achieve the dual role of protecting biodiversity while providing a financial return, assuming higher crops productivity.

In the following paragraphs, the risk-return issue is discussed, going into the details of its implications and sub-causes, helping to understand what undermines the appeal of nature conservation finance from an investor perspective.

6.2.1 Highly distributed benefits

One of the main barriers emerging from the interviews analysis is intrinsic to the nature of ecosystems conservation itself. *"The difficulty to me was very clear, more or less from the beginning,"* the EIB's expert said from the start. "*It is that you're trying to convince people to invest into projects that create a positive environmental externality with relatively diffused benefits."*[253]

In fact, biodiversity and natural resources conservation is supposed to generate a range of positive externalities, contributing both to the well-being of people and the environment, but they are distributed across diverse stakeholders and not readily attributable to a singular investors' contribution. Many actors, public and private, receive benefits from improved air or water quality. But who pays for it?

The dispersal of benefits inherent in the financing of natural resources conservation engenders a dynamic wherein the appeal for private investors is diminished. The proliferation of distributed benefits, while contributing to the broader societal and environmental welfare, can result in reduced exclusivity of advantages typically sought by private entities. This dissipation of concentrated benefits, in turn, can potentially weaken the distinct appeal that often drives private investors' engagement in conservation initiatives. Moreover, since natural resources, and the ecosystem services they provide, are public goods, the valuation and monetization of the benefits is not easy to calculate. Therefore, it is very difficult to identify and measure a cashflow and to generate a revenue that can pay back the initial investment. Some economists argue for a multi-attribute approach to value biodiversity, under which the diversity of a set of species is the sum of the values of all attributes possessed by some species in the set[254]. The goal is a flexible yet tractable model of diversity that focuses on the aggregate of pairwise dissimilarities between the elements of a set (of species).

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[252] Heal, G. M., 2003, Bundling biodiversity, Journal of the European Economic Association 1(2): 137–175

[253] Interview with an expert from the European Investments Bank (EIB) involved in NCFF projects, conducted on 22/05/2023

[254] A Theory of Diversity | The Econometric Society.
https://www.econometricsociety.org/publications/econometrica/browse/2002/05/01/theory-diversity

However, a significant insight that has emerged from experts' discussions underscores the inherent *heterogeneity among natural ecosystems*. Notably, some allow better than others to identify direct benefits for individual entities. For instance, the scenario of landscape enhancement for the ecotourism sector has been considered. It can be argued that investing in degraded lands and protecting natural parcs and coral reefs may generate a flow of benefits for the tourism sector (ecotourism), however it is not a direct benefit for a single entity or company, but rather for all the different entities benefiting from the landscape improvements, like tour operators or accommodation facilities and real estate. In contrast, there are specific target areas, such as forests, where attracting private investors appears relatively easier. In fact, the act of investing into sustainable forest management, simultaneously entails an allocation of resources towards positive outcomes for biodiversity and the local community, but also towards a tangible and tradable asset, namely timber, that makes it easier for a private investor to discern direct prospective revenues for its project. It is in fact pertinent to note that the majority of the market and financial instruments oriented towards biodiversity conservation and nature management are predominantly implemented within this particular target area.

Consequently, the attenuated attractiveness stemming from the dispersion of benefits necessitates a recalibration of incentive mechanisms to effectively align the interests of private investors within the context of natural resources conservation financing.

6.2.2 Lack of standardized M&E frameworks

A further challenge to private biodiversity financing identified is this time linked to the novelty of the activity. We have discussed in the previous section the lack of effective monitoring, more precisely poor available data, lack of technologies and targets to measure nature-related impacts, as one of the most significant barriers to MBIs performance. Monitoring deficiencies also affects the relationship between biodiversity and businesses. As pointed out by the expert from Biodiversity Alliance and CIAT, specifically involved in agroecology, at present in the food sector we are witnessing emerging regulations, taxonomies and standards. However, they usually come with substantial inconsistencies due to different country jurisdictions, methodologies and approaches, that make them difficult to navigate for private investors. At this stage, where a standardized and clear framework is missing, it is challenging for them to understand how to comply with regulations and how to collect the data to demonstrate it. For example, sustainable finance taxonomies the EU the Sustainable Finance Disclosure Regulation (SFDR) classifies sustainable funds as either Article 6, Article 8 or Article 9. Article 9, or 'dark green funds' are the ones that more strictly constitute environmentally sustainable investments and imply that every economic activity included in the fund is EU Taxonomy aligned[255]. To be

[255] Regulation (EU) 2019/2088

labeled as an impact focused fund, is up to asset managers themselves to assess the taxonomy alignment and therefore the specific impact of the companies in their portfolio. However, providing evidence and collecting robust and scientifically reliable data for every activity might be costly and difficult.

Generalized confusion also characterizes conservation investment definitions. The field of conservation investments is just starting now a discourse that has been lasted for years in the field of climate finance. Therefore, the criteria to determine a conservation investment are not still fully clear, both to regulators and financial institutions. They need to agree on a clear investment taxonomy in order to be able to align private investors interests to biodiversity benefit, building on a common ground.
Some research organizations such as the CGIAR are building robust MRV systems (Measuring, Reporting and Verification) in order to perform Monitoring and Evaluations activities and support impact investors working with nature investments. For them, the monitoring challenge is predominantly a matter of time, and they have a role in supporting investors with specific knowledge and tools when standardized measurement frameworks are still lacking. They acknowledge the novelty of this kind of capital deployment, that does not give enough time to look at the impacts, but they believe by design that bringing their research expertise and ability, better data from different countries, better understanding of the market, impact rates and potential can be maximized.
Interestingly, IFAD competent expert stressed that *"There is a strong interest globally from investors to buy a brand-new biodiversity bond, however there is still work to be done on how to measure and report biodiversity in projects. We do not have enough history. Having a strong and universal M&E framework is key to boost the growth in this segment of the market.*[256]. Based on her experience, she claimed that investors, especially Asian and Japanese investors, are attracted by biodiversity linked investments and always eager for new themes, however, as opposed to climate bonds and social bonds, there are still no harmonized reporting systems. She believes that as soon as one of the big MDBs, such as the World Bank, will massively invest in biodiversity, others issuing organizations will follow and the process will become more efficient.

It may be useful to look at climate-related investments that started being perceived as less risky when accounting and reporting frameworks became more standardized. Without such standardized frameworks, not only the estimation of expected changes and impacts is very limited, but the informed deployment of important financial applications like credit risk assessments or insurance pricing is also affected.

6.2.3 Projects pipelines and beneficiaries' fragmentation

[256] Interview with an expert from the International Fund for Agricultural Development of the UN (IFAD), conducted on 8/09/2023

Discussion with experts strongly emphasized the importance of a well-designed project pipeline for an effective mobilization of capital for the preservation and sustenance of critical natural resources and biodiversity. Private sector engagement in natural resources conservation financing assumes the presence of a robust business model that harmonizes sustainable conservation goals with viable revenue generation mechanisms. In contrast with government-led programs, that are usually based on grant money aimed to have better extension services, such as providing enhanced access to input to small-holder farmers, private investors approach seeks for a return. The most suitable financial tool to consider in these cases is to provide a loan, however, to make the project truly bankable some prerequisites need to be respected. Sound financial structures, risk mitigation strategies, and demonstrable socio-environmental returns, is integral in fostering investor trust and catalyzing financial commitments. To meet this purpose, intermediary banks may provide so-called *design and preparation grants*, used to establish a baseline, a monitoring and verification system, develop a pipeline, and provide the pre-commercial funding needed prior to the investment stage. *Technical assistance grants* are used to build the technical capacity of investors and their key stakeholders such as local communities that may be crucial to the successful implementation and ultimately the commercial viability of the project. They can also be used to build capacity in other areas such as financial management, contracting, business model development, or impact monitoring and evaluation. These grants are often provided by donors through a dedicated fund that runs in parallel to the actual investment[257].

In particular, the element that has been mostly stressed has been the fact that the typically big size of the investment hardly matches with the small scale and fragmentation of the final beneficiaries. Normally, traditional investors lend to a bank large amount of money that the bank has to deploy in sustainable projects, sometimes even towards a specific goal. Then the bank needs to split the initial investment in smaller loans and reach individual landholders. However, especially when looking at the agricultural sector, one of the challenges is that it is very fragmented, even more accentuated in developing countries. Small farmers are usually entitled to manage one hectare of land or less, which raises the question of how to connect those farmers, who may need capital to invest into better agricultural practices, to large scale investors. There is an important issue of *disconnection* between the needs of the farmers on the ground in terms of capital and the amount that investors want to deploy, which lower their attraction.
Moreover, not all the MBIs are replicable. It frequently happens that a market tool fits a small and local project in a specific context, but it cannot be effectively scaled and standardized. The literature on biodiversity financing is in fact rich with successful pilot projects, but in order to mobilize a significant share of investment they need to expand from the pilot stage.

[257] «Earth Security | Connecting global finance with nature's capital», Accessed 20 August 2023, https://www.earthsecurity.org/reports/the-blended-finance-playbook-for-nature-based-solutions.

The majority of the interviewees recognized the essential role of intermediaries, like MDBs and DFIs in the attempt to build sound project pipelines that serve as a conduit for the systematic identification, assessment, and presentation of investment opportunities, thereby offering a tangible trajectory for private investors to engage with. In particular, intermediaries like banks may respond to the need to find a way to *aggregate individual beneficiaries and projects on the ground*, so that large scale investors can invest in a bank that can then lend money to farmers to improve the way they grow crops and manage their land. However, this is a more credible expectation for MDBs than for traditional banks. In fact, at the current development stage, banks are often reluctant to lend to small farmers, seeing it as highly risky. What has been suggested is to support both banks and the final beneficiaries with advisory. In this way banks can be provided with the right tools to understand and assess the potential risk of their investment, and farmers may be provided with knowledge on how to mitigate the risk and enhance the impact they have in terms of biodiversity.

The expert's stake from IFAD has been highly confident in the potential of development banks and multilateral institutions to contribute to bridging the funding gap to achieve the SDSGs and Paris agreement objectives for a number of reasons. First, given their development mandate, balance sheet size and strong credit rating, they are able to provide funding that is additional, meaning funding with terms that are not available from existing market sources. This could comprise, for example longer maturities which are often needed to support investment activities, financial instruments with higher risk appetite like subordinated debt, or financial instruments that de-risk like guarantees. Second, given their rigorous ESG safeguards and rigorous due diligence process, their participation could act as a signal and provide a "reputation reassurance" element to other private sector parties analyzing an investment opportunity . *"If an institution like IFAD invests in a private sector project, for example, in Nigeria, other investors might also decide to join on the understanding that If AA+ rated institution from the UN who is highly specialized in agriculture and rural development is comfortable enough to invest in that project, private investors will be reassured and attracted. Furthermore, IFAD is in a position to de-risk through strong linkages with its 7 billion sovereign portfolio that creates the enabling environment for private sector actors to invest in small scale producers by supporting last mile infrastructure, providing capacity building of farmers and development of value chains."*[258] She reported, adding that in fact the current co-financing ratio, which is the ratio between IFAD funds on the funds from additional sources leveraged, is high for the private sector operations because of their ability to leverage.

One of the interviewees has been more critical of the role of blended finance solutions. The EIB representative claimed that, despite the institution she represented being an MDB aiming at financially supporting natural capital conservation and project implementation, it did not manage to massively mobilize private funds and deliver the expected impact. According to her argumentation, the reason in addition to those above mentioned,

[258] Interview with an expert from the International Fund for Agricultural Development of the UN (IFAD), conducted on 8/09/2023

lies in the sluggish nature of these types of public organizations, which are often very sluggish. Building on her experience, she addressed her hopes more to the role of public intermediaries at the city level, like local municipalities and regional governments. *"The main issue is to find an entity, maybe a public entity, that is willing to go the extra mile and to do something in a different way from what they have been doing in the past,"* she stated[259].

She reported that, despite the original mandate of the financial package she managed was to try to leverage private finance, eventually it ended up working quite a lot with the public sector, on which she recalled specific roles and responsibilities. In fact, a noteworthy consideration concerns the fact that the current emphasis on private financing is actually blurring the specific role of the government in conserving natural resources and mitigating biodiversity loss. Some scholars see it as symptomatic of austerity and inability to address the drivers through specific regulation and financial assistance. "*As soon as there is a strong directive in place, here our institution will follow, and the private will follow to implement, because they don't have a choice, but you need this kind of regulations and regulatory frameworks that the private sector can follow. If there was a good polluter-pay system in place or a 'who-destroys-any-kind-of-ecosystem'-pays system, then you would see a private investment going into the restoration of the ecosystem, but this is not in place and this is in my view the reason why it doesn't work'.*[260]

6.2.4 Grants dependency

An additional challenge emerged through the discourse entails the prospective dependence that a grant dispensed via an intermediary entity such as a MDB may engender for private entities willing to engage in nature-positive investments. Indeed, while blended finance mechanisms commonly integrate grants as a conventional mode of assistance, in the long-term they reveal to be counterproductive. An inherent drawback of grant-based solutions for nature-oriented initiatives, typified by initiatives like the European Commission's LIFE program, is that, following the initial allocation of funds through competitive tenders, recipients find themselves compelled to reapply for subsequent grant tranches to sustain their ongoing projects. This reliance on grant disbursements introduces concerns under the lens of economic viability and sustainability. Private investors may intuitively prefer to find mechanisms to be self-sustaining, such as taking loans that they are able to pay back. Concurrently, institutional investors are tasked to design ways through which projects can generate the revenue streams needed to accommodate loan reimbursement. However, field observations gleaned from the expert testimonies illuminate a predilection among private entities and enterprises to seek grant funding from philanthropic or public sources rather than recourse to loans that potentially outstrip their repayment capacity. This inclination is notably ascribed to the prevalent high interest rates of nature-focused

[259] Interview with an expert from the European Investments Bank (EIB) involved in NCFF projects, conducted on 22/05/2023
[260] Ibid.

investments, reflective of their inherent risk profile. Furthermore, the intricate payment dynamics, encompassing both loan reimbursement and client remuneration, further accentuate the trend.

Despite the inclusion of certain safeguards and de-risking policies by institutional intermediaries, private investors encounter substantive limitations. A pertinent case is the European Commission's infusion of 60 million euros into the portfolio devoted to the Nature Conservation Financial Facility (NCFF) under the purview of the European Investment Bank. This initiative, which has now reached the end of its validity period, sought to mitigate rating risk and assume responsibility for losses, yet, notwithstanding the potential instrumental support offered by such instruments, private investors approaching the tool remained apprehensive of lower expected financial returns, potentially affecting their capacity to generate revenues for loan repayment alongside the prevailing elevated interest rates.
The discussant from Biodiversity Alliance highlighted that the final objective of blended finance solutions should be to unlock additional sources of finance, where MDBs and DFIs ideally play the role of helping private investors with risk taking in the early and less mature stages of biodiversity markets, benefiting from their expertise when the model is not yet mature and lowering transaction costs. They should then decrease and phase out over time, enabling the project to self-sustain without public support.

A recent study using deal-level data from a leading biodiversity finance institution published on the PRI website, found out that, for larger-scale projects with a larger biodiversity impact, blended financing is the more common form of financing[261]. While these deals have lower expected returns, their risk is also lower due to the de-risking from the blending. On the other hand, pure private capital deals, on average, have higher expected financial returns, but they are smaller and so is their expected biodiversity impact. These results, taken together, suggest that there may be a trade-off between financial returns and biodiversity returns, which has consequences for the sort of funding. Even if pure private capital can successfully fund projects with larger projected returns, these projects often provide lower biodiversity benefits. Projects with greater biodiversity returns are often less profitable, but via blending, they can still attract private investors[262].

It is important to acknowledge that development finance institutions which employ commercial capital to amalgamate public and private funds often confront the challenge of competing with substantial-scale grant initiatives. These comprehensive public funding schemes are geared towards fostering regional and rural development, underwriting up to 80% of the capital outlay requisite for project realization. Consequently, the residual 20% funding allocation necessitates alternative sources of funding. This intricate landscape may

[261] Caroline Flammer, Thomas Giroux, e Geoffrey M. Heal, «Biodiversity Finance», SSRN Scholarly Paper (Rochester, NY, 6 March 2023), https://doi.org/10.2139/ssrn.4379451.
[262] Flammer, Giroux, e Heal.

occasionally overshadow the role of Multilateral Development Banks (MDBs) issuing loans and equity instruments. The prominence of big size grant programs, such as the European Regional Development Fund (ERDF) within the European Union context, trigger a distinct competitive dynamic. Notably, these substantial grant mechanisms, characterized by their non-repayable nature, may eclipse the visibility and appeal of MDB-driven loan and equity offerings.

Ch VII – Conclusions and Recommendations

7.1 Conclusive remarks

The biodiversity and climate crisis are posing a major threat to the well-being of society and the world economy. The effects of nature's degradation are becoming more visible, with severe consequences on food security, and wider security outcomes. Moreover, a growing understanding of nature's role in achieving climate goals is developing. According to a report of the World Bank Group, the collapse in the provision of vital ecosystem services such as food production from marine and land resources, the provision of timber from forests, wild pollination and climate regulation may result in a global decline in annual GDP of $2.7 trillion by 2030[263].

Addressing nature's destruction has thus become critical. In light of this urgency, ambitious goals have been set by the international community, such as the '30x30' initiative, and financial reforms are shaping a new operating environment. However, despite cyclical policy and market innovations, they proved to be disappointingly inadequate, and the financial flows mobilized were not sufficient to protect nature. Acknowledging that a massive amount of money is needed, biodiversity finance could represent a strategic allay in attracting new funding sources to bridge the so-called 'biodiversity funding gap'.

The present research focused on the increasing role of the private sector in mobilizing financial resources through innovative financial and market tools for reversing the galloping biodiversity loss. However, despite the growing emphasis and responsibilities/expectations placed on private actors, private financing for biodiversity remains insufficient. The considered analysis represents an attempt to assess the impact of design and implementation variables on market-based instruments performance and appeal, helping to improve the literature on nature conservation finance.

The two-step approach followed in the paper was useful to identify barriers both in the demand and the supply, namely in investors attraction and project implementation. Findings based on case studies and interviews suggest that, despite MBIs may represent economically viable incentives to reconcile nature and investors benefits, a range of governance and implementation challenges exist when dealing with private commitments to nature regeneration and that the conflict of interest between a public good and private profit cannot be easily resolved without a strong regulatory and governance framework.

The study reveals also that policy outcomes like environmental effectiveness, cost-opportunity and equity are not only based on economic incentives, but are strictly dependent on the context dynamics, considered in its

[263] «The Economic Case for Nature: A Global Earth-Economy Model to Assess Development Policy Pathways», accessed 20 August 2023, https://openknowledge.worldbank.org/entities/publication/fcc11682-c752-51c4-a59f-0ab5cd40dc6f.

multi dimensions of environmental, political and socioeconomic context. The empirical analysis showed that unaddressed barriers are still present to presumably assume to scale up biodiversity finance in an effective manner.

The two cases in the Latin America tropical forests have been emblematic examples, instrumental to bring such barriers to the surface of the investigation. Firstly, despite progress has been made in measuring and monitoring, data and standards for nature-related risks and benefits are still too scarce, characterized by overlapping and uncertain tools that make them incomparable between jurisdictions. The enforcement capacity and the sociopolitical environment in which the project is embedded is extremely influential in ensuring frequent and reliable compliance checks, and therefore the credibility of the MBIs itself. But compliance does not only depend on the enforceability rate, but also on the level of acceptance and engagement of the local participants, as well as on all the relevant stakeholders. Notably, indigenous peoples and local communities in nature abundant countries, and particularly in the Global South, are the main actors affected by nature degradation and conservation programs. Social equity and justice considerations should be a sensible variable besides environmental additionality when aiming to deliver positive outcomes. However, as shown by the analysis, landholders' willingness to collaborate and sustainably manage natural resources is also proportional to the personal interest they have on the land itself, shaped by clear property rights and local institutional arrangements.

From an investor point of view, experts' interviews confirmed that approaching biodiversity finance is still perceived as a risky move, accomplice the immaturity of the field and inherent features of nature management. In fact, in contrast with carbon trading functioning, defining a tradable value and a monetizable cashflow for such a complex resource, whose positive externalities are quite always invisible and only function in a network of interactions and relativity, is not easy. Moreover, the long time it takes for conservation projects to produce noticeable results and changes often collides with short-term investable windows, undermining return perspectives.

The most interesting findings emerging from the discussion, significant both in theory and practice, focused on the project pipeline element. What primarily undermines unlocking substantial private funds is the lack of a smooth and structured business model that makes nature a secure and bankable product. This predominantly depends on the small-scale and localized nature of ecosystems conservation programs and the fragmented organization of the final beneficiaries at the local level.

Blended financing structures consequently emerged as an alternative - or at least introductory - practice to pure private financing. However, despite the practice of blending could play a major contribution in improving the risk-return tradeoff and aggregate smaller scale projects to deliver a more ambitious biodiversity impact, and it would be unwise to reject it *tout court*, it should not be defended as a final 'gold' solution. As per pure private investments, multilateral intermediaries supporting biodiversity positive projects, like development

banks or funds, are facing considerable challenges in structuring bankable pipelines, comparably monitoring improvements, and measuring compliance. Harmonized frameworks are pivotal to make biodiversity finance scalable and secure, and this cannot happen without a proper institutional enabling environment.

The paper starts acknowledging the extended role of the private sector and market dynamics in environmental governance. However, despite the specific focus on privatization and market led mechanisms, the review of the literature on MBIs applications illustrates how the role of the public is still very pronounced. Especially in the case of PES, public authorities act as dominant traders between private users[264]. More broadly, state bodies play a key role in setting up the whole market and regulating it, but also in defining the commodity to be traded, who holds the property rights on the resources and how they can be transferred. As per carbon markets, in biodiversity credits and other nature markets the publicly defined right to trade and the norms to be respected forms the basis. Consequently, it is possible to conclude that the public sector should not be perceived purely as a regulator that superimposes development, but rather as the designer of the intervention that plays a key role in organizing and supervising all the parties involved.

Despite the shift that appeared over time towards a more private regulations in environmental management, they face considerable constraints in such a sphere[265]. Hybrid, polycentric and participatory governance models, where multi-level regulation and multiple actors coordinate among each other, are suggested as a prerequisite for starting ecosystem conservation programs and sustaining them over time while delivering market benefits. While higher environmental regulation and governance is needed to implement schemes in a defined legal and institutional framework, in practice they are managed at the territorial level, where strong local authorities are crucial to facilitate collaborative management, local participation and compliance. Especially in the Global South, marketization and privatization of nature thrives on situations of weak institutions, lack of capacities, lower prices and poverty[266]. In conclusion, although a market approach is now seen as the best governance structure, after decades of inadequate command-and-control conservation, the role of the state has not eclipsed, rather it has become more engaged in building the basis of the markets and setting an enabling environment to sustainably perform them. In practice, the opposition between public and private appeared not as simple as depicted, and where performed, pure private governance revealed not to be as promising as expected. The reasons lie predominantly in the complexity of environmental services, but also in the disappointing efficiency implications of privatization. In fact, in some cases, costs have not been consequently reduced, due to frequently high transactions.

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[264] Benjamin S. Thompson, Jurgenne H. Primavera, e Daniel A. Friess, «Governance and Implementation Challenges for Mangrove Forest Payments for Ecosystem Services (PES): Empirical Evidence from the Philippines», *Ecosystem Services* 23 (1 February 2017): 146–55, https://doi.org/10.1016/j.ecoser.2016.12.007.

[265] «Environmental Governance – From Public to Private? », *Ecological Economics* 148 (1 June 2018): 170–77, https://doi.org/10.1016/j.ecolecon.2018.01.010.

[266] *See* note 226

However, this study is not free from limitations. As stated in the premises, a methodological choice was to focus the empirical analysis of MBIs on PES and Biodiversity Offsets. Despite these tools providing helpful insights for answering the research question, they are not to be considered fully representative of the range of innovative biodiversity financing deals. In fact, even if mentioned in the literature, blue bonds, rhino bonds, debt-for-nature swaps and other tools have their own peculiarities, shape and functioning. In second place, despite the accuracy in identifying the most complete case studies in the relevant area, data limitation represented a barrier in conveying a comprehensive image of their environmental and financial performance. Thirdly, the paper interviews aimed to analyze the role of MDBs and development institutions in mobilizing and sustaining private action, however multiple actors, such as local participants and individual investors, should have been involved in the discussion. In line with the call launched by Karolyi and Tobin-de la Puente's (2023)[267], the inquiry at hand aims to contribute to the final hope that biodiversity conservation will soon gain the prominence it deserves in the sustainable finance hierarchy of priorities, besides, if not above, climate change risks mitigation policies. As biodiversity finance continues to grow and develop, the academic and financial research will follow, and basic research questions will be addressed for the field to effectively progress.

7.2 The role of governance and regulation in building high performance biodiversity markets

Interviews' findings emphasized the increasing role of states and regulatory arrangements in the fight against biodiversity loss, which instead seems to have retreated, delegating to market logic. Data shown that the funding gap, more than an actual situation, is a political choice. Considering the fact that governments spend about $500 billion per year (5-6 times more than the total spending on biodiversity) in economic support potentially harmful to natural ecosystems[268], the lack of finance seems not to be the main barrier. The paper's findings show that the real barrier appears rather to be institutional. Indeed, one of the theoretical contributions is a call to shift the focus of future research in development finance more on the design stage of the interventions, where multiple variables interact and where the solution must be sought. Governance frameworks, understood as a multistakeholder group of economic, political and civil actors, and the institutional structures defining their interactions, are a key element in determining environmental conservation projects performance.

[267] G. Andrew Karolyi e John Tobin-de la Puente, «Biodiversity Finance: A Call for Research into Financing Nature», *Financial Management* 52, fasc. 2 (2023): 231–51, https://doi.org/10.1111/fima.12417.
[268] OECD (2020), *Towards Sustainable Land Use: Aligning Biodiversity, Climate and Food Policies*, OECD Publishing, Paris, https://doi.org/10.1787/3809b6a1-en.

In the field of biodiversity markets, the regulatory frameworks have not been defined as expressively as it has been done for climate change mitigation and carbon markets by the Paris Agreement. However, as stemmed from the analysis, further developments in governance and regulation need to be pursued in order to design and administrate biodiversity schemes and enable the market to support the private sector to more confidently take up them.

A mature, efficient and mainstreamed biodiversity market essentially depends on the active responsibility of all the stakeholders' groups. Public policy and financial regulation must play the protagonist role on the scene. In fact, they are responsible for mainstreaming biodiversity consideration at every organization's strategic level in a way that is standardized, replicable and truly enforceable. Regulatory interventions are needed to repurpose harmful incentives and unsustainable subsidies that still massively flow from public budgetary resources, resetting the efforts towards nature conservation. The use of Environmental Fiscal Reform (EFR), predominantly focused on climate change, can also be a useful arrangement to apply to ecosystem services. Moreover, public actors should act as 'ice breakers' and level the playing field, bearing the early risks, channeling resources and developing certain legal operational frameworks. In the financial decision-making area of intervention, governments and financial regulatory agencies play a major role in supporting the private sector to better incorporate nature in their investing decisions, providing specific knowledge and data, i.e., implementing natural capital accounting (NCA). They should promote a better management of biodiversity risks, providing supervision, assessments, and global standardized disclosure and reporting frameworks.

However political reform periods typically take time, therefore in the meanwhile the private sector's responsibility is to develop transitional frameworks, without jeopardizing them. International networks, also in the form of private coalitions and initiatives, can definitely help in standardizing these tools and coordinating actions. A growing trend has been already witnessed in climate finance, like the Network for Greening the Financial System (NGFS)[269] or the Sustainable Banking Network, while for biodiversity matters the Finance for Biodiversity Pledge coalition is the most prominent example. Further developments are essential in building innovative business models and biodiversity financing tools, to expand them from their pilot level. Financial innovation is evidently taking place in nature conservation sector, with many tools being deployed. However, it is due discerning, based on previous experience, which of them prove to represent a real long-term opportunity and have a true potential to be scaled, as it occurred for renewable energy investments in the case of climate change. Standardization is crucial, therefore further experiences such as the Coalition for Private Investment in Conservation (CPIC) are supported. The sectoral blueprints published by the coalition provide assistance to develop project pipelines and aggregate suitable financial assets in the sustainable cocoa production, forestry, coastal resilience, and marine protected areas[270].

[269] NGFS. 2019. First comprehensive report: A call for action. April 17, 2019.

[270] *CPIC* (blog), accessed on 20 August 2023, https://cpicfinance.com/about/.

In this regard, Multilateral Development Banks and Development Financial Institutions have a pivotal role to play in mobilizing solutions for public and private cooperation. Blending concessional finance with private capital must not be seen as an innovative model itself, but rather as one of the elements of the transition to a natural smart economy. There is still not sufficient evidence to necessarily consider blended finance models an efficient solution, also given the fact that it comes at a public cost, nevertheless its importance is recognized in providing the right incentives to help standardizing the whole process and providing the needed proof of concept, hoping it will run more smoothly in the future. Donors and multilateral institutions are in the strategic position to encourage private actors to engage in new business models, and to build risk assessment capacities for financial sector firms (banks, insurance companies, institutional investors) to use in their investment processes. In addition, MDBs may support the planning and implementation stage of the schemes, increasing in-country skills and aggregating projects, but also helping to design National Biodiversity Strategies and Action Plans (NBSAPs), developing national policy scenarios.
In conclusion, MDBs and DFIs, if supported by enforceable policies and regulations, can trigger *supply side and demand side innovation*, at scale and over extended time periods. The actions of market actors are not sufficiently reliable for enacting a rapid and systemic change. Tailored regulatory interventions can timely boost demand, retaining it pretty stable in time. At the same time integrity and quality of the supply, at an agreed price floor, requires collective actions, envisioning some sort of 'Sellers Club', maybe at a sovereign level or directly involving nature's stewards[271].

Overall, this research is a call to rethink the design of future governance innovation development processes for biodiversity conservation. Most likely, as it is already occurring in practice, this transformative shift will be initially shaped by an ecosystem of voluntary or partially regulated markets. However, supply and demand innovation must not be allowed to emerge unrestrainedly, but needs to be overseen by a collaborative governance platform. Setting up protected spaces where all state and non-state actors are effectively involved in the design, including local and indigenous communities, and allowed to openly deliberate on interests about the ES provision will be preconditions for governance co-design of nature conservation schemes. Framing it almost exclusively as a private investment opportunity risks distracting from the need to rapidly reorient public investment portfolios away from harmful economic activities. The challenge is to implement the right governance and oversight to enable private funding to reliably deliver nature positive outcomes. When supply-side benefits are combined with demand-side benefits, a particularly valuable tool is created.

Acknowledging from the analysis the limitations of private environmental action and the implementation barriers of large-scale environmental projects, this paper serves as a foundation for future policy investigations and to explore the role of *public utilities* for biodiversity conservation. Public utilities companies, as providers

[271] «TheFutureOfBiodiversityCreditMarkets.pdf», accessed 20 August 2023, https://www.naturefinance.net/wp-content/uploads/2023/02/TheFutureOfBiodiversityCreditMarkets.pdf.

of services that inherently involve negative and positive externalities in their business models, possess the capacity to contribute, either directly or indirectly, to sustainable development[272]. While it is true that these companies can have adverse environmental impacts, such as pollution, biodiversity loss and deforestation, they also have the potential to create public value. Water utilities, in particular, are deeply intertwined with natural ecosystems and are therefore strongly committed to the pursuit of sustainable practices[273]. The call for research is connected to the hybrid nature of these institutions. Functioning both as government representatives and core service providers, this duality positions them as strategic players in reconciling public and private interests[274]. On one hand, public utilities face pressure from the state to align with national development strategies and priorities. On the other hand, as entities with corporate elements, they must be responsive to multiple stakeholders and adhere to sustainability reporting and transparency requirements.

Furthermore, core societal services like water and electricity are capable of establishing secure markets, thereby reducing financial risks and attracting private investments. Crucially, the localized nature of public utility operations makes them particularly attuned to local environmental and societal needs, aligning with the objectives of their business activities and fostering closer relationships with the local communities and biodiversity directly impacted.

[272] Francesca Imperiale, Simone Pizzi, e Stella Lippolis, «Sustainability reporting and ESG performance in the utilities sector», *Utilities Policy* 80 (1 February 2023): 101468, https://doi.org/10.1016/j.jup.2022.101468.

[273] Andrea Venturelli, Lorenzo Ligorio, e Elbano de Nuccio, «Biodiversity accountability in water utilities: A case study», *Utilities Policy* 81 (1 aprile 2023): 101495, https://doi.org/10.1016/j.jup.2023.101495.

[274] D. Argento, F. Culasso, e E. Truant, «Competing Logics in the Expansion of Public Service Corporations», *Utilities Policy* 40 (2016): 125–33, https://doi.org/10.1016/j.jup.2016.02.007.

APPENDIX

A. Semi-structured Interviews Outline

Introduction

1. What is the work of your Division?

Blended finance solutions:

2. What does your organization specifically offer private investors that attracts them?
3. What do you think are the main obstacles in attracting private funds in biodiversity and natural ecosystem conservation?
4. What do blended finance models offer to nature financing that pure private investments cannot do?
5. What do you think are the main obstacles to blended finance for nature?
6. Could you please tell me about a project you helped to develop that was well managed and succeeded in delivering positive outcomes for nature?

MBIs Implementation:

7. Did the project you helped to finance and implement with private funds bring additionality on the environment or positive outcomes?
8. Which are the main limits in the implementation of nature financing projects that underpin their effectiveness and additionality on the environment?

Forward questions:

9. Do you think MDBs and organizations like yours can have a role in bridging the gap?
10. Which are in your opinion the next steps private investors, public policy and regulation should take in order to really mainstream nature into the financial equation?

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