

biofin-project.eu



BIOFIN-EU

PROTECTING AND RESTORING BIODIVERSITY USING MAINSTREAM FINANCE

Nature-based solutions: user's values and requirements

Milestone 3

University of Gothenburg



Funded by
the European Union



Table of Contents

Introduction 3

1. Ecosystem services 4

2. Biodiversity’s value 5

3. Ecosystems services and biodiversity’s values 6

4. Why are ecosystem services not provided at a socially desirable level? 7

5. Financial Institutions: User Needs in Lending and Capital Allocation 8

References 9

List of Tables

Figure 1 Ecosystems, NBS, and values6



Introduction

This report documents important insights from economics that are essential to understanding how Nature-based solutions can contribute ecosystem services, the values that arise from biodiversity and how these values are understood within the economic domain and by ‘users’ of ecosystems. The final section of the report sets out a Requirements Roadmap that outlines the requirements of financial decision-makers in the context of lending and capital allocation.



1. Ecosystem services

Nature-based solutions manage, restore, and protect ecosystems, while at the same time benefiting people. Ecosystems primarily benefit people through so-called ecosystem services. The Common International Classification of Ecosystem Services (CICES) defines three broad categories of ecosystem services:

- **Provisioning services:** examples of provision services are food, timber, water, fuel, but also genetic resources. These services thus provide inputs for products that we use directly or as inputs in production processes.
- **Regulating and maintenance services:** examples are regulating the climate, controlling erosions, controlling pests and diseases, and pollinating plants. These are thus services that regulate and maintain ecosystems.
- **Cultural services:** examples are spiritual and religious experiences, but also aesthetic and cultural aspects.

These are the services that users of NBS enjoy. Note that with users we mean both those benefitting directly and those benefitting indirectly. This means that users include both the local population, in particular regarding provisioning services, but can easily extend to a much larger number of people, and ultimately be of global concern.

2. Biodiversity's value

Biodiversity is the variety of ecosystems. Dasgupta (2021) distinguishes between six sources of biodiversity's value:

1. **Human existence value:** Biodiversity loss can threaten human lives by causing pollution, landslides, or storms.
2. **Human health value:** Biodiversity contributes to human health by providing natural products, green spaces, and protection from pandemics.
3. **Amenity value:** Biodiversity is a source of enjoyment for humans, as evidenced by ecotourism.
4. **Use value:** Biodiversity provides a wide range of goods and services that humans depend on, such as food, water, and climate regulation.
5. **Existence value:** Biodiversity has value because humans care about the existence of other species, even if they never encounter them.
6. **Intrinsic value:** Biodiversity has value independent of how humans value it, because it is sacred or has moral worth that means that it has a value beyond the instrumental value it provides to humans.

These six sources are not mutually exclusive. Furthermore, we can also divide them into direct and indirect use values, and non-use values:

- **Direct use values:** The amenity value and use values are to a large extent direct use values, i.e. it is output from the ecosystem that is consumed directly, like food, and recreation. The use value also includes productive use-values, i.e. goods that are inputs and are transformed in a production process, like paper, wood, and silk.
- **Indirect use values:** There are also values from biodiversity that are so-called indirect use values. These include the services the ecosystems provide to reduce pollution, prevent erosion and floods, and climate regulation.
- **Non-use values:** these are essentially existence values, i.e. that humans care about the existence of the ecosystems. They are thus not dependent on the ecosystem's services. Instead, humans benefit from simply knowing that ecosystems are maintained, protected, and restored. This is sometimes referred to as a feeling of warm glow that is enjoyed.

However, biodiversity might also have a value that today is unknown to us. The option value of biodiversity is the value of maintaining biodiversity because it might provide benefits in the future that are unknown to us today.



3. Ecosystems services and biodiversity's values

In Figure 1, we illustrate the link between these three aspects of the value of ecosystems to humans.

Classification of users

We split the users of ecosystem services into citizens and firms. Citizens benefit directly from improved health and as buyers of goods that rely on ecosystems. Firms use ecosystem services for their production and also benefit from climate regulation (locally and globally). We also consider where the benefits/users are: local, regional, or global. To show how much users depend on the services we use a traffic-light system: green means strong dependence, blue means dependence, and brown means little dependence.

		Ecosystem Services	Example	Value	Biodiversity Value	Citizens	Firms
NBS Nature Based Solutions → Ecosystems	→	Provisioning Services	Food, Fuel	Direct Use	Amenity Value, Direct Use Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	<ul style="list-style-type: none"> ● Local ● Regional ● Global
			Freshwater	Indirect Use	Human Health Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	<ul style="list-style-type: none"> ● Local ● Regional ● Global
	→	Regulating & Maintenance Services	Disease Regulation	Direct Use	Human Health Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	<ul style="list-style-type: none"> ● Local ● Regional ● Global
			Climate Erosion, Flow of Water, Pollination	Indirect Use	Human Existence Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	
	→	Cultural Services	Spiritual Experiences	Direct Use	Amenity Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	
	→		Non-use Values		Existence Value	<ul style="list-style-type: none"> ● Local ● Regional ● Global 	

Figure 1 Ecosystems, NBS, and values

There is often a difference in what services that for example local and global firms would derive benefits from, and the exact service depends on the type of ecosystem. Furthermore, firms would mostly rely on direct use values from ecosystems.



4. Why are ecosystem services not provided at a socially desirable level?

If we focus on the biodiversity values, it is next important to understand why it is far from clear that ecosystem services will be provided at a level that is optimal for society. Economists would typically characterize biodiversity as a public good. The public-good characteristics (non-rival and non-excludable) are causes of market failure where the societal value of biodiversity will not sufficiently be reflected in the market prices. This means that the consumers will not have incentives to pay, and suppliers will not have incentives to supply. To protect biodiversity, policies are needed. The design of policies, and investment choices, could ultimately depend on the societal values that biodiversity creates, and the values associated with biodiversity losses. Policies can set the agenda for what needs to be achieved, for example, the Biodiversity Strategy for 2030 and the Water Framework Directive. Policies can also result in more specific policy tools such as offsetting and putting requirements on investors to compensate for biodiversity loss (McKenney and Kiesecker, 2010; Lambooy and Levashova, 2011; Benabou, 2014), biodiversity-relevant subsidies, taxes, and fees (OECD, 2018).

Many of the direct use values do come from well-functioning markets, such as the food market and the corresponding input markets. Here actors have an interest in protecting ecosystems, and making sure that they provide the services necessary for the production and consumption of various goods and services. If property rights are well-defined or if there are regulations in place that govern the use of these resources, these ecosystem services are likely to be provided. Amenity values are also an example where the services can be provided through the market, actually often through various nature-based solutions, national parks being the primary example. However, without clearly defined property rights or governing regulations, even these services would be underprovided.

For other services and the corresponding values, there are no markets. Economists denote these as non-market values. This is particularly true for most of the Regulating and maintenance services and Culture services. Without appropriate regulations, these services will be underprovided. Take the example of disease prevention. There is no market for disease prevention, which means that the owner of an ecosystem does not receive any payment for the provision of this service and is therefore not likely to consider this service when making decisions about how to manage the ecosystem. This is despite the disease prevention can provide enormous benefits to the population.

For non-use values, market solutions are even less likely to arise, and thus it is likely that they are underprovided. The primary example of how non-use values could be provided is perhaps through donations to various organizations that help to protect nature.



5. Financial Institutions: User Needs in Lending and Capital Allocation

The loss of biodiversity and deterioration in ecosystem services presents risks for financial institutions (FIs). These risks can occur at various scales (micro, meso, macro-) and lead to financial impacts through several transmission channels, including; Changing demand, Raw material price volatility, Asset value, change in profitability/increased litigation and disruption of activities/value chains (Cziesielski et al., 2024). For users within the financial system these financial impacts are likely to be categorized as: credit risk, market risk, liquidity risk, underwriting risk and operational risk. Users require the appropriate tools to mitigate these risks in the first instance, but in the medium term they will need to go beyond risk management and engage with clients and help them to act on these risks. and integrate climate and nature models in their decision processes.



References

1. Benabou, S. (2014). Making up for lost nature?: a critical review of the international development of voluntary biodiversity offsets. *Environment and Society*, 5(1), 103-123.
2. Cziesielski, M., Dekker-Hufler, C., Pal, T., Nicholls, G., Petsinaris, F., Korteweg, L., Obersteiner, M., Nikolay Khabarov, N., (2024) Study for a methodological framework and assessment of potential financial risks associated with biodiversity loss and ecosystem degradation. DG FISMA, EU Commission.
3. Dasgupta, P. (2021). *The economics of biodiversity: the Dasgupta review*. Hm Treasury.
4. Lambooy, T., & Levashova, Y. (2011). Opportunities and challenges for private sector entrepreneurship and investment in biodiversity, ecosystem services and nature conservation. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 7(4), 301-318.
5. McKenney, B. A., & Kiesecker, J. M. (2010). Policy development for biodiversity offsets: a review of offset frameworks. *Environmental management*, 45, 165-176.
6. OECD. (2018). Tracking economic instruments and finance for biodiversity.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.