



# Capturing the Values and Making the Business Case for Nature-Based Solutions

**A STEP-BY-STEP GUIDE**



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## **A STEP-BY-STEP GUIDE**

**August 2024**

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# Document Information

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<b>Citation:</b>	Konijnendijk, C., Di Cagno, F., Borelli, S., Wild, T. (2024). Capturing the Values and Making the Business Case for Nature-Based Solutions – A step-by-step Guide. Deliverable 5.3, H2020 CONEXUS project.
<b>Work package:</b>	5: Valorizing & Investing on NBS
<b>Lead partner:</b>	Food and Agriculture Organization of the United Nations (FAO)

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## About this Guide

### Who is it for?

This Guide can be used by anyone involved in, or advocating for, the planning, proposition, and implementation of Nature-based solutions (NBS) in urban and peri-urban areas, including:

- Citizens and community groups who seek to implement NBS within their block, neighbourhood or beyond
- City councils or municipal departments responsible for urban planning
- NGOs and local organizations focused on sustainable urban development

### What is its purpose?

This guide is designed to facilitate Nature based solutions adoption in urban areas by leveraging the economic value and countless benefits (also referred as “non-monetary values”) NBS have on communities and ecosystems. By providing step-by-step instructions and tools for capturing and communicating the values of NBS, this guide will support you in building a comprehensive business case for NBS, better referred as Valorization case, that is meant to secure necessary support for NBS initiatives, including funding. The resulting valorization case can be used to gain support from:

- **Funders**, including public authorities, private foundations and businesses that can provide financial support for NBS projects
- **Decision-makers** such as mayors, city councils, public officials and planning departments who have the authority to authorize, approve or facilitate the implementation of NBS initiatives
- **Local communities**, including residents and community groups who are directly impacted from NBS projects and whose support is crucial for the relevance and sustainability over time of these initiatives

The method proposed in this Guide been tested in five cities part of the Conexus project, including Barcelona, Lisbon, Turin, Lima, and Buenos Aires. Further details on how these cities have made the valorization case of their NBSs and useful tips on how to use this guide are available in the full reports at [www.Oppla.org](http://www.Oppla.org).





# Capturing the values and making the business case for nature-based solutions

This Guide produced by the Horizon Europe CONEXUS project focuses on urban **nature-based solution(s) (NBS)**. NBS consist of actions to protect, sustainably manage, and restore natural and modified ecosystems that effectively and adaptively address societal challenges, simultaneously benefiting people and nature (IUCN, 2023; see Box I-1). For an introduction to NBS, see also an **introductory video** (CONEXUS, 2024).

## Box I-1. Using nature-based solutions

A city that experiences recurrent flooding due to heavy rains would traditionally address this problem by building concrete flood barriers or expanding stormwater drainage systems, which are typical examples of grey infrastructure. In contrast, a NBS approach may involve creating a network of parks and green spaces to facilitate water infiltration into the soil and reduce the risk of flooding. In addition to mitigating flood risk, these NBS can improve urban air quality, enhance biodiversity, and create recreational opportunities for residents, contributing to their overall well-being.

One of the key differences between NBS (which are often part of green infrastructure) and grey infrastructure is that NBS are designed to work with nature, whereas grey infrastructures are often designed to control it. NBS perform functions that go beyond problem-solving because they deliver a set of **ecosystem services (ESS)** (Box I-2). ESS are the direct and indirect benefits that humans derive from biodiversity and healthy ecosystems (Reid et al., 2005). The concept of ESS, which was widely disseminated following the **Millennium Ecosystem Assessment** (MEA, 2005), provides a framework for assessing the economic, social and environmental advantages of ecosystem services that is also relevant for NBS.

By recognizing how nature can tackle urban challenges while contributing to biodiversity, human health and well-being, it is possible to justify the adoption of NBS in urban areas (as is the focus of this Guide) – or elsewhere. This includes demonstrating the **added value** of investing in NBS approaches. It entails presenting arguments and evidence to decision-makers, investors or local communities to justify an NBS approach over alternatives, the allocation of resources to NBS initiatives, and garner social support, ultimately capturing the values of and making the business case for NBS implementation.



## Box I-2. Ecosystem services

**Supporting services:** processes that are essential for other ecosystem services like nutrient and water cycling, and soil formation

**Provisioning services:** tangible goods from ecosystems like food, timber, water, and fuel

**Regulating services:** benefits from managing ecosystem processes such as water flow regulation, carbon sequestration, and storm protection

**Cultural services:** intangible benefits such as spiritual enrichment, recreation and community building

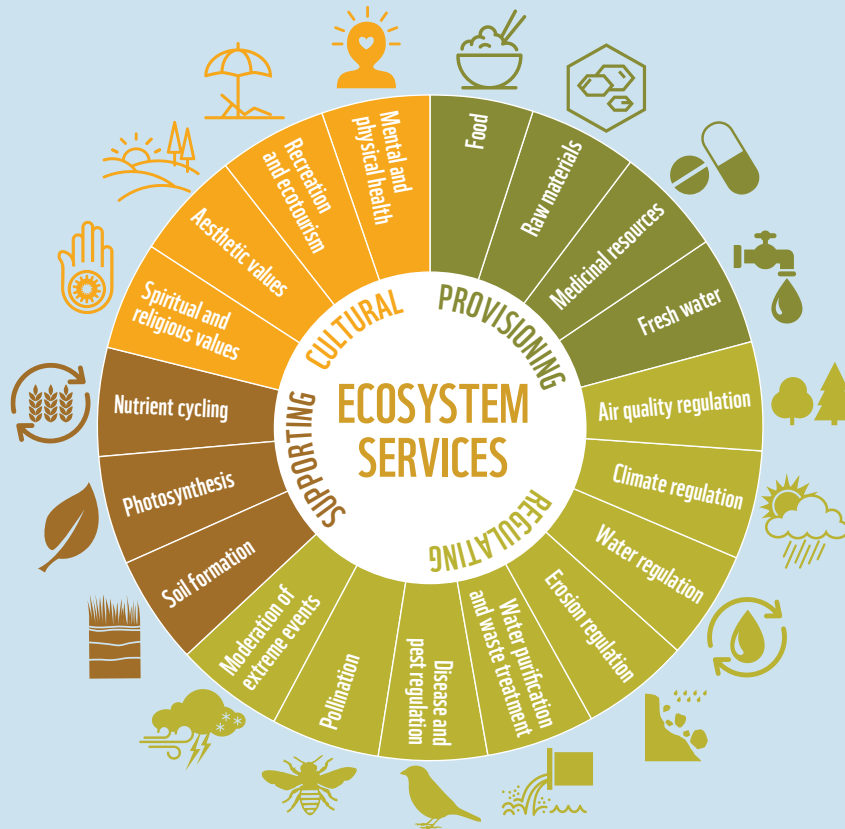


Figure BI-2: Various types of ecosystem services

Source: WWF (2016).

## Linking NBS values to broader policies

The values of NBS are not stand alone: they contribute to a wide range of policies and initiatives from the local to the global level, such as the Sustainable Development Goals (SDGs) of the United Nations' 2030 Agenda for Sustainable Development. Within the CONEXUS project, the contributions of urban NBS, for example in relation to SDG 11 'Sustainable



cities and communities' but also other SDGs such as SDG 13 on climate action and SDG 15 on life on land, as well as the New Urban Agenda (NUA), are discussed (Risi *et al.*, 2023). This report highlights the many important contributions of urban NBS to the SDGs and the NUA, and also current challenges when implementing and maintaining NBS, for example, financing, environmental justice and effective monitoring.

## Leveraging NBS values

Recent years have seen a growing interest in urban NBS across the world. However, their implementation often does not live up to its full potential. One major obstacle is the insufficient funding and investment from both the public and private sectors. This lack of financial support can often be the result of limited understanding of the value of NBS. When a strong values and business case is made, on the other hand, funding can be secured (see Box I-3).

### Box I-3: The business case for urban trees in New York

To illustrate the potential impact of recognizing and communicating the value of NBS effectively, consider the case of New York, a well-known example of a successful business case for urban trees. By calculating the various environmental benefits of urban trees, also in monetary terms, and comparing benefits with cost, the foresters of the US Forest Service built a business case for trees and presented it to Mayor Bloomberg. He then decided to have the city embark on a major tree planting campaign, **1 MillionTreesNYC** (Tree Fund Pottstown PA, 2023).

This key challenge has been addressed by the CONEXUS project on urban NBS in European and Latin American cities. The project developed this report in order to provide **step-by-step guidance** on how to capture and communicate the values of specific NBS, as well as build and convey their business case. For each step presented in this Guide, a range of specific methods, tools and examples are provided.

Making the business case for NBS in both urban and other contexts requires going beyond the merely economic perspective, i.e. this entails recognizing and capturing in monetary and other terms the multiple **values** of NBS and communicating them (Wild *et al.*, 2024) (Box I-4). This also calls for valuation methods that consider and capture environmental, economic, social and health values.

This Guide takes a wider **values** approach, showing the different values of a specific NBS, if effectively implemented and maintained, to municipalities, local communities, investors and businesses, not-for-profits and other entities. Although less in focus in this Guide, nature itself has values of its own as well, which will be reflected in e.g., biodiversity values.



#### Box I-4. Understanding value

The value can be determined in different ways. Specifically for ecosystem services (ESS), Masiero et al. (2019) distinguish between (i) instrumental and intrinsic values; (ii) anthropocentric and biocentric values; and (iii) utilitarian and deontological (or duty-generating) values. The **instrumental value** of an ESS is the value derived from its usefulness in achieving a given goal.

**Intrinsic value**, value, in contrast, is the value that exists independent of its usefulness and reflects the value of something for its own sake. Hence, intrinsic value is unrelated to its instrumental use; it is also referred to as 'non-instrumental' value. **Anthropocentric value** is centred on the idea that only humans can assign value. **Biocentric values** build on a non-anthropocentric view, assuming that certain goods and services have an inherent value, even if no human thinks so. **Utilitarian values** are derived from the ability to provide 'welfare'; i.e. they are viewed as a means toward the end result of increased human welfare, as defined by human preferences, without any judgment about whether these preferences are good or bad. In contrast, **deontological values** imply a set of rights that includes a right to existence.

The ways to assess NBS values, even through the narrow lens of instrumental or utilitarian values, differ widely. For example, we can approach these in monetary market terms, namely, the price of a good in the market. For an NBS, this could relate to paying a specific price for wood from a local woodland or for a ticket to visit a botanical garden. Monetary non-market values, in contrast, relate to placing a price to something that is not directly traded on markets. It reflects how much people would be willing to pay for a certain product or service. For instance, consider the 'cooling' function of trees and other vegetation. There is no direct market for this function at the moment but the value it adds to the urban environment is enormous. Non-monetary approaches are used to determine the value of something based on measurable and quantifiable factors. For example, by quantifying the abundance and diversity of animal species, it is possible to estimate the biodiversity value of a particular location, and also changes in human wellbeing when experiencing trees or use urban parks (see also Andriessen, 2005).

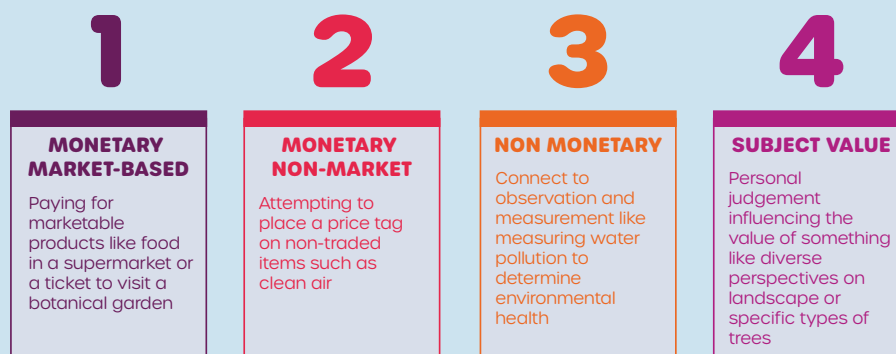


Figure BI-4: Different ways of assessing values.



This process of identifying, capturing and communicating values are referred to as **valorization**. In the context of this Guide, it refers to comparing between different NBS, and between NBS and other non-green solutions (Vrije Universiteit Amsterdam, 2023). **Valuation** is part of valorization because it is a process of attributing an economic or non-economic value to for example, an asset (such as urban trees) or a company. Economic valuation measures, in monetary terms, people's preferences for the benefits obtained from, for example, ESS. Non-economic valuation often examines how the opinions of people are shaped or their preferences articulated, mostly beyond monetary terms (Masiero *et al.*, 2019).

Valorization and making the business case for NBS is strengthened when all **relevant stakeholders and their interests are involved**. The question that needs to be asked is: what economic and other arguments are there for a certain NBS to be implemented and funded? who will benefit from the NBS and who might lose when the NBS is implemented, and what is the extent of these gains and losses? It is essential to have a **strong focus on local urban communities**, because they live in the urban landscapes where NBS are implemented and directly affected by their services and disservices. Municipal councils but also businesses as NBS decision-makers should represent and value the interests of local communities. Appendix 1-1 includes some of the considerations for sound valuation and valorization of NBS according to Chausson *et al.* (2023). Valuation and valorization are often complex in NBS.

Valorization provides an important foundation for communicating about specific NBS, their planning, identifying partners, seeking sources of finance, securing support, and aiding decision-making (Chausson *et al.*, 2023).

The key **target audiences** of this Guide are, therefore, those who propose, decide on and fund (or consider funding) NBS implementation, specifically:

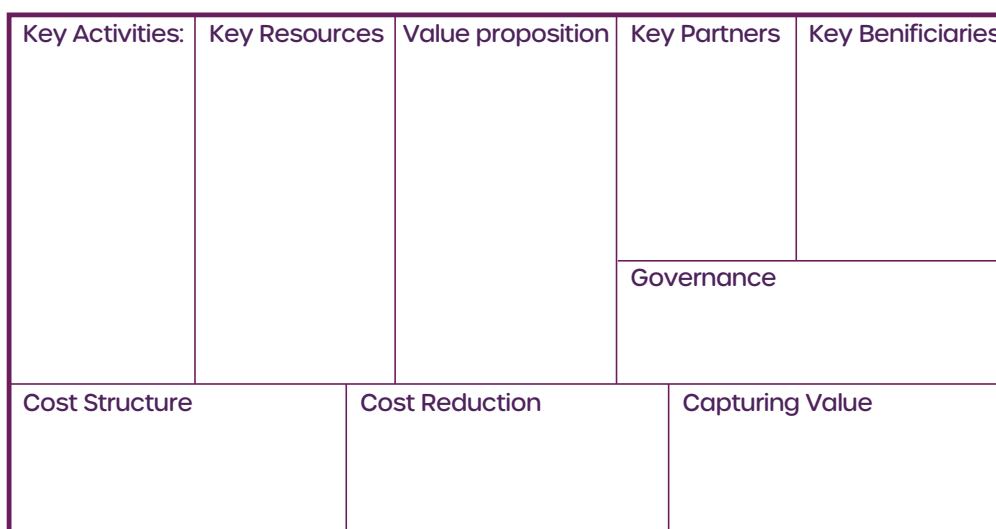
- **decision-makers** in urban areas who determine whether or not a specific NBS will be implemented. They are usually regional or city councils and other public actors but can also be businesses, non-governmental organizations (NGOs), and resident groups.
- **funders** who are interested in supporting and investing in urban NBS. Funders are often the same as decision-makers (e.g. public authorities) and can also be private foundations, businesses (e.g. small and medium-sized enterprises working with NBS) as well as government bodies that provide funding and/or subsidy programmes.



## Scope and structure of this Guide

The lack of understanding of the values provided by NBS can be a real barrier to their implementation. Therefore, it is important to make the business case for NBS, based on an assessment of the values they provide to society, decision-makers, local communities and potential investors. Hence, this Guide provides stepwise guidance for NBS valorization. The Guide has at its core a dedicated version of the Nature-based Solutions Business Model Canvas tailored for NBS (Figure I-1), which was developed by the European Union-funded Connecting Nature project. In addition, a manual detailing its use was also provided (Connecting Nature, 2019). The NBS-tailored canvas has also been successfully tested in a series of urban NBS case studies.

The **Nature-Based Solutions Business Model Canvas** is an easy-to-use tool to help capture in a visual format the business aspects associated with NBS. This model is based on the original Business Model Canvas, a strategic management template for developing new business models and documenting existing ones, developed by Osterwalder, Pigneur and Tucci (2005).



**Figure I-1. The Nature-Based Solutions Business Model Canvas.**  
Source: Connecting Nature (2019).

The **Nature-Based Solutions Business Model Canvas** recognizes that NBS business models are different from conventional business models because providing societal and environmental values is more important than focusing only on business value.

The Canvas consists of various **segments**:

- The **Value Proposition**. This is the core driver of the business model, essentially stating the NBS values available such as environmental, social and economic value.



- **Value Creation & Delivery.** This segment refers to key activities and key resources that make up the project and are supplied by key partners for the key beneficiaries (referred to also as the ‘end-users’). Collaborations and partnerships between these actors operate within specific governance structures.

Value Capture comprises the costs and benefit structure of the NBS. Generally, capturing value will not be just financial; it will also be in the form of jobs, ecosystem improvement, community building, among others. Value can also emerge through cost reduction, such as when reducing the costs of stormwater management or cooling.

In our further adaptation of this approach, this Guide helps you **make the case for NBS valorization in seven interrelated steps**. The steps are iterative, although there will be movement back and forth between them, and it may be necessary to adjust them simultaneously as new information emerges and additional questions are raised. In this Guide, the description of each step starts with a brief summary of the basics, followed by a more in-depth explanation of how to compile information.

The seven steps to be followed for making the NBS valorization case are as follows:

1. Describe the context, site and scale where the NBS is to be implemented. What are the relevant key problems and challenges that will be addressed?
2. Develop your vision and objectives for NBS implementation.
3. Describe one or more NBS that you wish to implement.
4. Develop the NBS value proposition.
5. Determine how to undertake NBS value creation and delivery.
6. Capture NBS values.
7. Make the NBS valorization and overall business case, and include the preparation of a business plan.

The **Nature-Based Solutions Business Model Canvas** is at the core of the guidance (see, in particular, steps 4, 5 and 6). However, more efforts are needed to make the case for NBS valorization. Therefore, we also include steps related to analysis of the context in which the NBS is implemented as well as the key problems or challenges that implementation will address (step 1). This is important, because contexts for NBS implementation can differ widely, between neighbourhoods, cities, countries and regions. Before the NBS Canvas Model is to be used, it is also important to develop a clear vision for NBS implementation and to describe the NBS in great detail (steps 2 and 3).

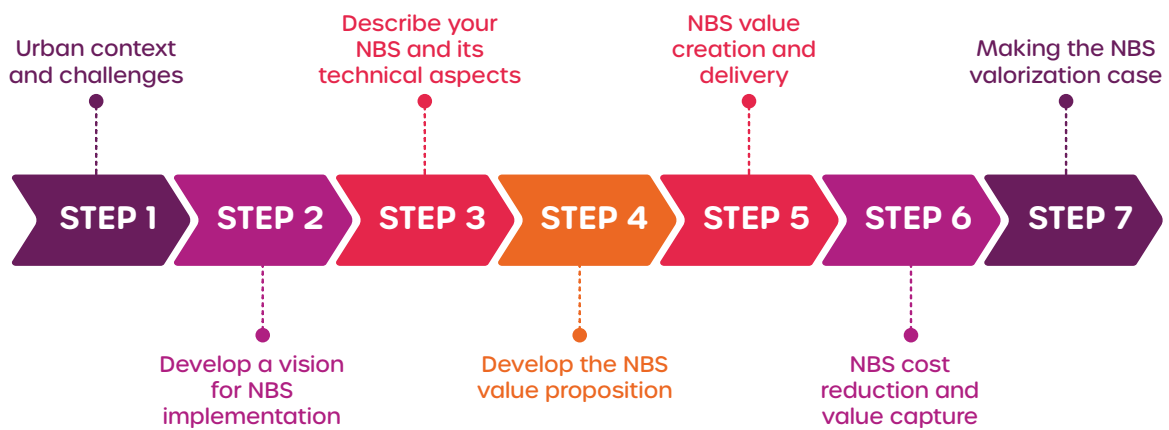
Finally, in step 7, the elements of the analysis need to be collected in order to make a case for NBS valorization to decision-makers and funders. This requires, *inter alia*, developing a business plan for the NBS.



For each step, different tools, templates and examples are provided to help with compiling the required information. It is also important to note that, depending on the local context, conditions, objectives, and time and resources available, information can be compiled at different levels. An in-depth exploration of the values of the NBS will take more time than just rapidly following the steps in order to obtain at least a general understanding of the case for NBS valorization.

A separate Workbook has been developed to accompany this Guide, with checklists, template, and tools for each of the steps.

The Guide was developed in close collaboration with CONEXUS project partners and was tested in five of the project's Life Labs, which validated the applicability of the Guide in real-world scenarios. Focus has been placed on NBS implementation in urban areas, but the Guide's overall approach could also be relevant to other contexts.



**The seven steps to be followed for making the valorization case**





## STEP 1

# Describe the context, challenges and possible solutions



### Basics

The main purpose of nature-based solutions (NBS) is to enhance the resilience and sustainability of urban areas. Therefore, it is crucial to identify the specific challenges in a given context, understand their causes, and recognize how nature can play a general role in solving them. In this initial step, you should firstly understand the challenges to be addressed and the context in which an NBS could be implemented. Factors influencing this context include governance, policies, legislation, local community characteristics, as well as environmental factors and climate, among others.

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

STEP 7



## A step-by-step approach

The two major aspects of the step-by-step approach is to describe the major problems and challenges that will be addressed with one or more NBS, and to describe the specific context in which NBS implementation will occur. These two aspects go hand in hand and will usually require a more parallel than iterative process. Hence, you will move back and forth between describing key problems and challenges, and describing the context in which these will be addressed. You will start by identifying, what types of solutions to the challenges could be considered.

### Identify key problems, challenges and possible solutions - the big picture

Key for any business case to be made for NBS is to clearly describe the **societal and environmental problems and challenges it aims to address**. For example, you could ask yourself, is the focus on climate adaptation and cooling, or perhaps on building stronger social ties and improving local food production? Or possibly, is the focus on increasing biodiversity, with a few specific species in mind? Or could the focus be on a new park in order to create a more attractive living area or to attract tourists? In many cases, an **NBS will provide multiple benefits at the same time**.

These benefits all relate to possible ESS and specific problems and challenges addressed by them, such as climate change and an increasing urban heat islands, leading to an increasing number of very hot days (a health problem), a lack of social ties in the neighbourhood (a social problem), biodiversity loss (a biodiversity problem) and low attractiveness of certain areas, which can result in resident flight and associated lower tax incomes, or lower presence of, or spending by, local visitors and tourists (economic problems).

There are **alternative ways of addressing problems and challenges**. Climate adaptation and cooling can be addressed by using technological means (e.g. air conditioning), while social ties could be strengthened by arranging events and supporting resident associations and clubs. Tourists could be attracted by festivals and events, and by a stimulating and lively restaurant scene. People could be encouraged to move into a neighbourhood due to the presence of good schools and public transport. The problem and challenge description, and ultimately making the business case therefore need to take a broad view and explain how the NBS holds up among alternatives, in terms of the full range of respective values and benefits, both in monetary and non-monetary terms.

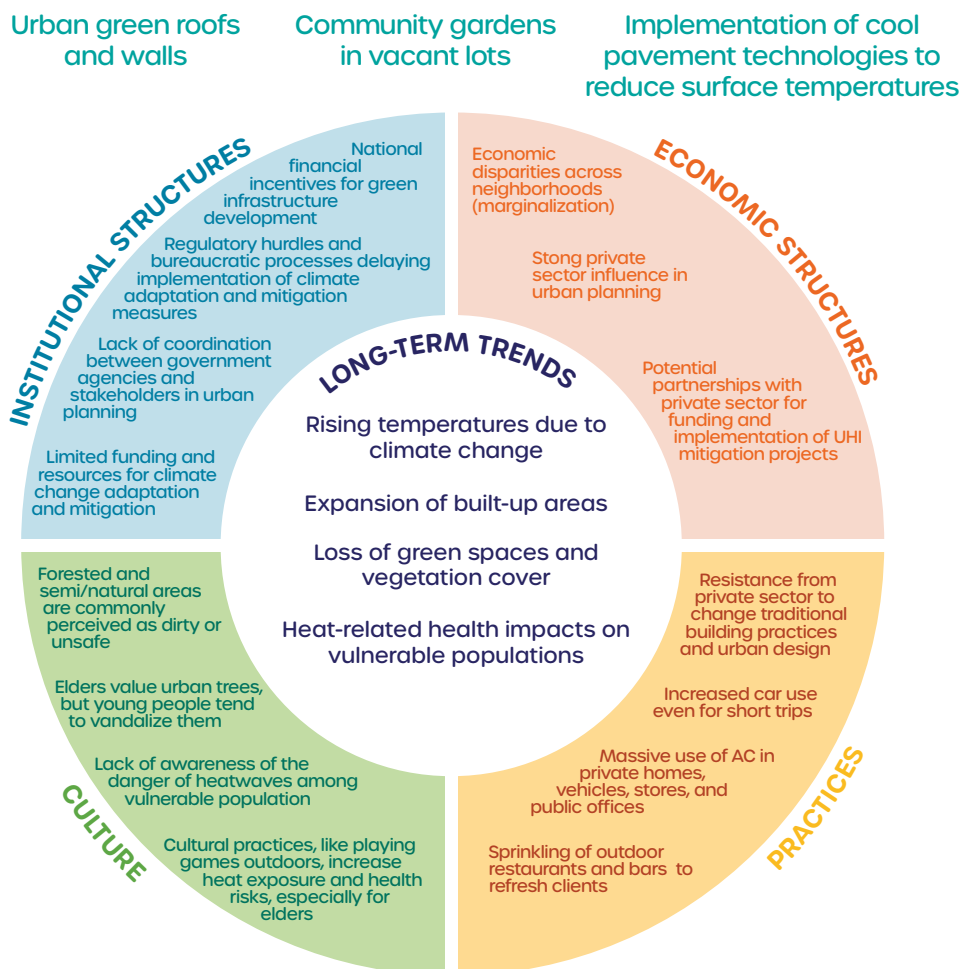


An example of a useful tool to identify urban challenges is the **problem context mapping**, developed by Osmos with a process design approach (Hill, 2022; see Figure S1.1). The context mapping tool can be used to take a cross-cutting view of a problem with its social, economic, and environmental context. The tool is to be used by actor and stakeholder groups of 5–15 people. The context mapping process need not take more than a few hours.

Change can emerge in many ways – through great ideas or minor interventions. The issue of different, interconnecting scales is addressed in greater detail later in this step, but it is good to have a general sense of the different scales relevant to the context.

## TOPIC: URBAN HEAT ISLAND EFFECT

### EMERGING NICHES INITIATIVES



**Figure S1.1. Example of problem context mapping in a process design approach.**  
**Source: Adapted from Hill (2022).**

**Long-term trends** (the inner circle of Figure S1.1) cover topics or issues beyond the control of any single organization or institution. These challenges affect a wide range of urban entities and require



the development of mitigation or adaptation strategies to meet the challenges.

As shown in the outer circle, there are four key segments of the context:

- **Economic structures.** These refer to the formal systems for the exchange of goods and resources, and can include financing, supply and demand, and production and distribution.
- **Institutional structures and frameworks.** These consist of laws, regulations, policies or organizations that manage a certain issue or challenge. For example, these may relate to highly regulated aspects, such as ownership or property, and lesser regulated aspects, such as building densities. They also relate to agencies that manage urban green spaces and trees.
- **Culture.** This refers to the general opinions and values that a community shares.
- **Practices.** These are the general consequences of actions, which are often the outcomes of the previous three segments.

Finally, **emerging niche initiatives** outside of the two circles, are examples of projects, businesses, or organizations that are making a physical impact on e.g., the urban landscape.

In order using this problem context mapping:

1. Define a main **urban topic** (e.g. climate change and potential ways of addressing this) and consider the following guiding questions:
  - What **environmental challenges** are prominent in the project area?
  - How do **social dynamics** and **community values** exacerbate long-term trends, or how will they influence potential NBS?
  - What **economic activities** drive the local economy and how would they interact with NBS implementation?
  - What **health** considerations should be taken into account when proposing NBS initiatives?
2. Start with the major long-term trends, and then move on to the niche initiatives, filling the canvas clockwise from 'institutional structures' to 'culture'. Use sticky notes or draw on the canvas directly.
3. Stop the exercise when the stakeholder group cannot add any more information.

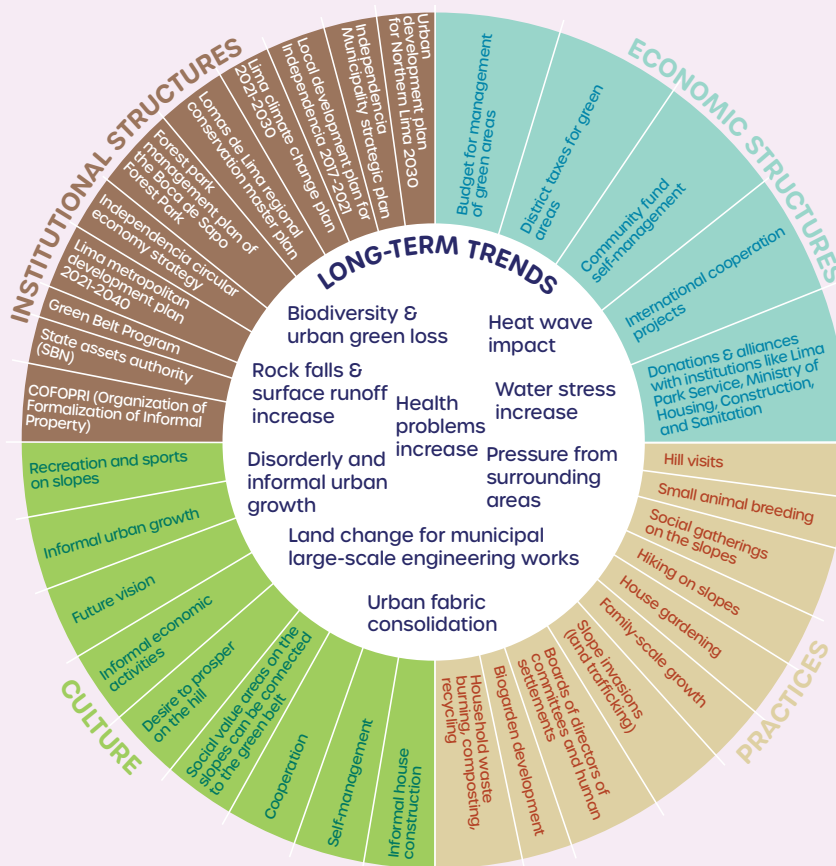
Use this tool to see how an NBS initiative would fit in the big picture and how it could connect to other urban projects and issues. See the example of Independencia Greenbelt (Box S1-1). You can also use the problem context mapping later to check if there are new trends, structures or ideas after the initiative has been developed.



**Box SI-1: Addressing key problems and challenges in the district of Independencia (Lima, Peru)**

In the district of Independencia in Lima, Peru, rapid urbanization has resulted in an undesired and uncontrolled urban sprawl. Approximately 42 percent of the population live in informal settlements along the hills, which puts them at risk of natural hazards like landslides and endangers local ecosystems. Many residents are unaware of the importance of the local loma ('fog oases') ecosystem, especially during the dormant seasons when the hills have a desert look. Access to green areas is very low in the district, especially for people living in the hills. Therefore, the lomas ecosystem provides a major opportunity to access nature and benefit from that in many different ways during almost five months of the year. This situation in Independencia highlights the pressing need to address urban sprawl, biodiversity loss, and the lack of coordination between environmental conservation and housing planning.

The figure below highlights the problem context mapping identified in Independencia.



**Figure BI-1: Problem context mapping of Independencia.**



## Describe the context in greater detail

The implementation of every NBS is unique, because the urban context in which they are implemented will differ from case to case. As shown, the scale will also differ, from a single building and its immediate surroundings for the implementation of an extensive green roof for energy saving and water regulation, to a city-wide effort to increase the tree canopy cover to provide cooling and other benefits. Moreover, contexts will differ in terms of, for example, governance and policies, legislation, local communities, economics, environmental factors and climate, and local biodiversity.

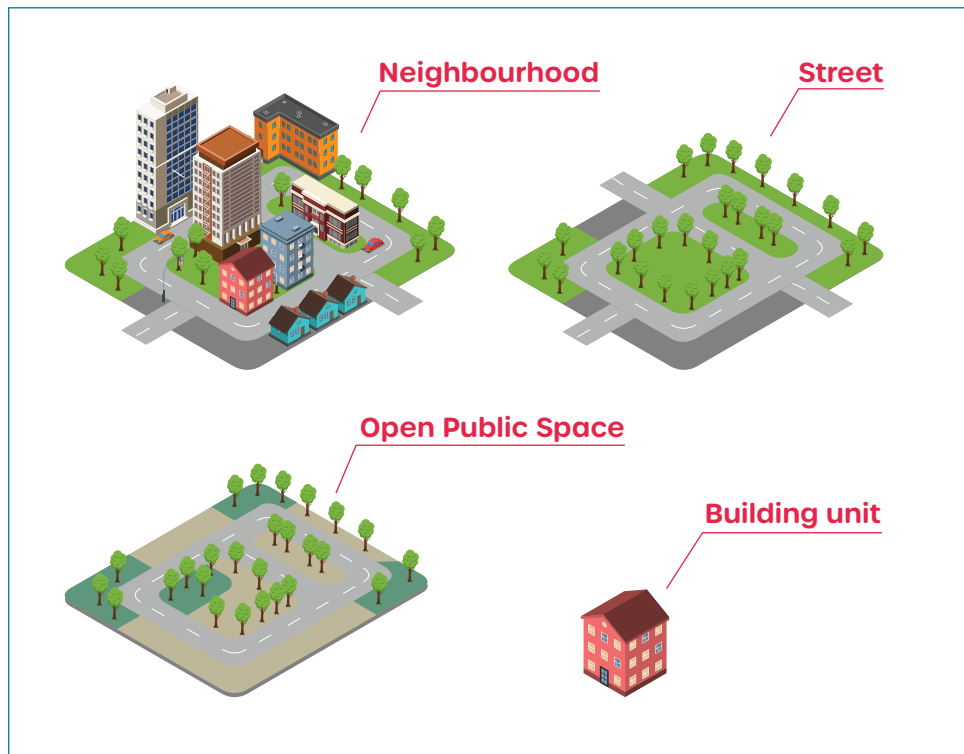
It is also very important to understand that NBS implementation is often part of a larger intervention, of a longer-term effort to improve a site or a neighbourhood. This will often include interventions other than NBS, with the NBS contributing to some specific components of the overall (re) development plan. Therefore, it is important to describe the overall plan for the site or area, and the positioning of the NBS within it.

The scale and specific context will determine what type of information is essential and needs to be collected. For a single rain garden in a specific street, for example, more specific information will be needed about the street and the surrounding conditions. Only a few residents will be directly impacted by the intervention, so they should be the focus of attention. For a city-wide green infrastructure strategy, information about specific sites will be less relevant and the focus will be on, for example, overall urban form and structure. Since all residents of the city will potentially be impacted, social information cannot be as granular as for a single, specific NBS site.

A proper analysis of the local context will also establish a clear **baseline** for NBS implementation. This will then help with **assessing and monitoring changes and performance** of the NBS, i.e. the impacts, costs and benefits over time. Monitoring and assessment should be kept in mind from the start, although they will be addressed in later steps. Similarly, NBS implementation only makes sense if it is followed by proper maintenance, which has implications for resource use and costs over time.

It is also important to determine at what **scale(s)** is going to be addressed. This can be from city-wide, neighbourhood/street, to individual site/building (e.g. a specific green roof). At each of these levels, several types of NBS can be recognized (see Step 3 for more detail). Figure S1.2 shows the different scales and the interactions between them. More information on scale will follow in Step 3.





**Figure S1.2. The different interacting scales of NBS implementation**

Key elements to consider in the **description of the context** are:

- **Information about the city, neighbourhood, and site for NBS implementation.** Describe the relevant environmental, social, cultural and economic and characteristics. This relates to, *inter alia*, the impacted local community and its composition, economic conditions such as employment and income, and also relevant environmental factors. The latter include climate factors such as temperature, wind and humidity patterns, especially when the NBS aims to impact the local climate. In the context of global warming, local climate perspectives and risks can also be included here. Environmental factors can also include information about local biodiversity.
- **Description of the implementation area in terms of landscape and other physical characteristics.** This includes the description of current land cover (e.g. types of vegetation, built areas, pervious and impervious surfaces, water bodies), current uses of the land (e.g. residential, industrial, commercial), and the presence of specific buildings, infrastructure, among others. An initial assessment of biodiversity, at least in terms of indicator species, is also recommended. There may already be an NBS on site, which is to be modified or replaced. Here, it is also important to describe the current uses that may be lost.

Relevant policies, legislations, plans and land ownership that can affect NBS implementation. Some of the above will potentially have a positive impact, while others can have a negative, neutral, or mixed effect.

Although there is detailed description of the NBS to be implemented in the next step, it would be helpful to have a general idea of what type(s) of NBS is/are in focus, because this can guide the context analysis.

## Undertaking a SWOT analysis

A popular way of analysing a specific problem situation is that of undertaking a strengths, weakness, opportunities and threats (**SWOT analysis**), which schematically identifies strengths, weaknesses, opportunities and threats for a given situation. The SWOT approach uses a matrix with four quadrants, with strengths and weaknesses relating to internal factors, and opportunities and threats to external factors. A SWOT analysis could, for example, be used to describe a current situation and help scope opportunities for different NBS or alternative solutions to problems. Under this step, with its focus on the broader context for NBS implementation, a SWOT analysis can help provide a wider overview of the issue at stake. Table S1.1 provides an example of a SWOT analysis for developing a way to cool a specific neighbourhood that facing more frequent hot days. Box S1-2 provides a real-life example of SWOT analysis applied to NBS development.

A SWOT analysis could be undertaken after the initial, more overall analysis of the context. You can revisit and revise your SWOT after a deeper dive into this context as well (see next section).

**Table S1.1. A SWOT analysis for a fictional case of developing ways to cool a neighbourhood through NBS**

Strengths	Weaknesses
<p>There is local awareness of the need to take cooling actions.</p> <p>The city has several earlier examples of how (NBS) have been used for cooling.</p>	<p>Since funding for interventions is limited, the cooling intervention chosen needs to be cost-efficient.</p> <p>There is little space available for installing new NBS.</p>
Threats	Opportunities
<p>Climate change leads to temperature increases and more frequent heatwaves, which threatens the health of local residents.</p> <p>A local election is imminent and can lead to a different prioritization of climate action, potentially reducing support for NBS interventions.</p>	<p>National and European policies call for higher canopy cover in cities.</p> <p>Funding programmes are available for environmental improvements that also have health benefits.</p>





## Stakeholder mapping

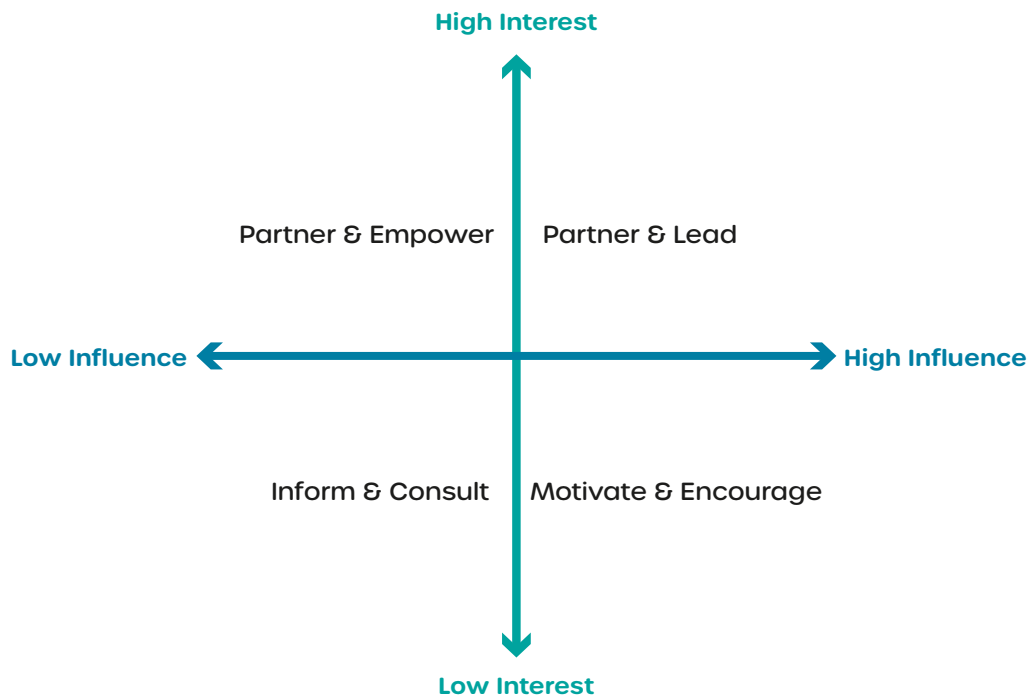
Next, a preliminary and general **stakeholder mapping** should be carried out, which must determine who the key actors are (those directly involved in NBS decision-making) and who will be affected by NBS implementation. The latter are the **key beneficiaries**, but they may also be those who are set to lose when an NBS is implemented. An example of this is the establishment of a closed-off woodland area in a neighbourhood for water protection, where local communities had access to the area previously. Different actors and stakeholders have **various levels of power and interest** in the NBS, which also needs to be described. In this step, the stakeholder mapping will still be more general because you have not yet decided on what specific NBS to implement. This choice (in Step 3) can impact who the key stakeholders are. Stakeholder mapping will occur throughout the Guide, becoming more specific and also shifting focus, as shown in Box SI-2.

It is essential to consider those local communities living in landscapes where NBS are to be implemented in the decision-making. These communities are usually the most affected by NBS implementation – often positively, but not always. With NBS implementation there is always a risk of **green gentrification**, for example, when greening efforts results in higher property and rental prices, potentially pushing out less affluent residents from neighbourhoods (Anguelovski et al., 2022).

Several tools are available to support stakeholder mapping. A specific one is mentioned here, but others are also available. You can also use approaches or tools for stakeholder mapping that you are familiar with. This can include a simple exercise with post-it notes in which you and others first write down the stakeholders that come to mind on individual notes, and then group them together and outline relationships.

Specifically for NBS, Malekpour, Tawfik and Chesterfield (2021) categorize stakeholders according to their influence and interest (Figure SI.3), based on earlier work by Mendelow (1991). Influence is determined by decision-making power and ability or resources that affect the desired NBS. Interest depends on the impact of the NBS (i.e. those most affected are usually also the most interested).





**Figure S1.3. Stakeholder mapping for NBS**

Source: Malekpour, S., Tawfik, S. & Chesterfield, C. (2021)

Some other stakeholder mapping tools that could be considered include the **Miro stakeholder mapping** tool (Miro, 2023). The **Clever Cities** project also developed useful guidance on the co-creation of NBS, including advice on how to carry out stakeholder mapping and foster their engagement (Morello and Mahmoud, 2018).



## Box S1-2: Stakeholder mapping flow

Stakeholder engagement is considered a dynamic process that evolves throughout the entire journey of planning and design, implementation, and valorization of one or multiple NBS. For this reason, stakeholder mapping is present in several steps.

The initial stakeholder mapping (Step 1) allows to obtain an overview of all individuals and entities that could be involved or impacted by a wider NBS approach, based on contextual relevance, the nature of the challenges to be addressed, and stakeholders' influence and interest in the initiative. Note that, often, the specific NBS to be used has not yet been defined, so stakeholder mapping should reflect this broader focus.

Moving on to Step 2, as you are developing your NBS vision, the focus narrows to identifying collaborators based on their willingness and capacity to contribute to the project's implementation, as well as those who will be impacted directly by the NBS, both in terms of potential benefits and costs.

In Step 5, you describe the wider values of your NBS project, and begin to clearly identify synergies between partners and beneficiaries based on the activities and resources required for realizing the NBS's full potential values. Additionally, you identify any adverse effects that certain stakeholders (might face due to the NBS implementation and work to mitigate negative impacts through dialogue and by exploring alternative solutions.

Finally, in Step 7, when crafting the overall business case, you identify specific stakeholders (e.g. local decision-makers, potential funders or local community groups), your communication and engagement strategies will be tailored for and with whom you will engage to garner support and consensus for the NBS project.

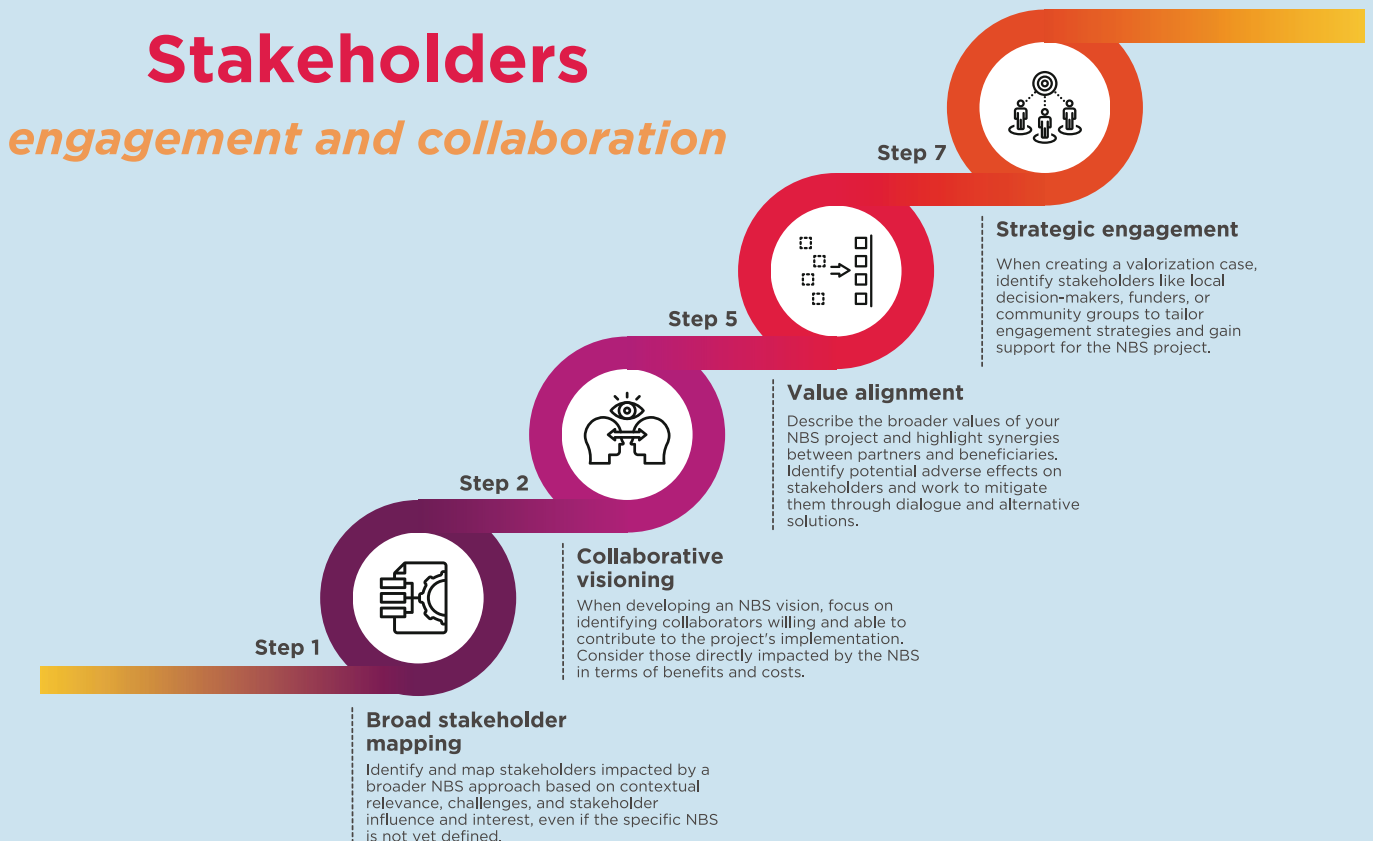


Figure B1-2: Stakeholder mapping flow throughout the NBS valorization process





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## STEP 2

# Develop a Vision for NBS Implementation



### Basics

A well-articulated vision sets a clear direction and ambition for your NBS initiative. A vision Guides stakeholders through the planning, decision-making and execution of the NBS. It ensures that every action taken aligns with the primary objectives of the NBS initiative, fostering stakeholder commitment and giving them a sense of purpose. It requires foresight and a understanding of the challenges and opportunities identified in Step 1. Stakeholder mapping will be essential to determine whom to consider and involve in implementing the vision.

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## A step-by-step approach

A vision paints a vivid picture of a desired outcome for a specific point in the future. It serves as a compass, providing direction to the project without excessive details, which will be outlined in subsequent steps.

It is important to stress here that Step 2 (developing a vision) and Step 3 (selecting one or more specific NBS to be implemented) are closely related. Having a broad idea of what type(s) of NBS you would like to implement can help formulate a clearer vision. However, the vision to be formulated, especially when it is more general, would often still allow for a different combination of NBS to be chosen. Step 1 maybe already provided you with some ideas on the broad type of NBS approach that could be implemented.

Even in a vision that states that future schoolgrounds will be greener and healthy, many choices still remain, which will be explored further in Step 3. How much of this new green will be trees or other vegetation? Or green roofs and walls? What tree species will be used? Where will the trees and other vegetation be placed? Will the focus be on solitary tree plantings or on developing a tiny forest?

In order to develop a vision for your NBS, you must answer the following foundational questions:

1. **Why** are you undertaking this initiative?
2. What **goals** do you aim to achieve?
3. Who will **benefit** from your NBS (and who will bear the potential costs)?
4. Who are your potential **collaborators** in this project?
5. **How** do you intend to bring this vision to life?

Answering these questions requires foresight and an understanding of any **challenges** and **opportunities**. However, the effort invested in this step lays a solid foundation to **inspire** and **align all stakeholders** involved in your initiative, ensuring that every subsequent decision and every action taken resonates with the core **purpose** and drives the NBS initiative towards its ultimate goal.

A **vision statement** reflects a state's ambition for a 'better world' to be created and achieved, looking 10 years or more in the future. A key strength of a good vision lies in its **conciseness**.

One more approach to ensure that your NBS vision is both comprehensive and impactful, is through the Purpose, Engagement, Relate, Strategy, Innovation, Stakeholders and Timeframe (PERSIST) framework. Indeed, you must persist when developing your vision, and document your thoughts and ideas as you progress through this step.



## Purpose

Whether you are looking to improve residents' health, reduce air pollution, or address socio-economic challenges, pinpointing the **purpose** of your NBS based on evidence gained in step 1 is crucial. This is the foundation of your vision, the reason underlying every decision made during the project. Ask yourself: why do I want to use a nature-based approach to solve the challenges identified in Step 1? What do I want to accomplish with this initiative, both in the short and longer term? What motivates the need for using NBS in my context? Answering these questions not only sets a direction but also becomes a guide for all stakeholders, reminding them of the 'why' behind their actions.

Is a specific neighbourhood suffering from low air quality due to excessive pollution from a nearby factory? Your primary purpose for the NBS initiative would then be to improve the air quality in that area, providing the residents with a healthier environment.

## Engagement

After having understood why you are embarking on a nature-based initiative, the next logical step is to understand **for whom** you are implementing it. Drawing from the stakeholder mapping of Step 1 you can now analyze stakeholders from another angle and determine who will benefit and who may be negatively impacted from the implementation of your NBS. Answer these questions: who are the primary beneficiaries of your nature-based initiative? Is it for a particular community or neighbourhood, or the entire city? It is important to delve into broader societal needs, ensuring that your initiative aligns with the larger community objectives. With this in mind, recall that an NBS project developed through the **engagement** of the community has a higher chance of success and acceptance.

Consider a park in the city centre that is underused and neglected. If your aim is to revitalize this park, then you should consult, among other, residents, schools, and businesses surrounding the park to understand their needs and desires for this space. This would ensure that the revamped park meets community needs and becomes a lively hub.

## Relate

As you move forward, regularly **move back to the challenges** identified in Step 1. How will your approach respond to these problems and challenges most generally? How will the success of your initiative be measured against these challenges? Answering these questions would ensure that



the initiative is tailored to tackle the specific problems you identified in Step 1. Your NBS initiative should be a **direct answer** to these problems and challenges.

A community suffering from the urban heat island effect during summers will have different needs from one that is dealing with frequent flooding. NBS options for the former could include increased tree canopy cover for cooling and for the latter, permeable grassy surfaces for water management.

## Strategy

You also need an overall **strategy** to realize your vision but also be ready to adapt as circumstances change. Provide a general overview of the **type(s) of NBS** you want to implement (see Appendix 2-1), in conjunction with Step 3. Make sure your strategy is broad enough. For example, if tackling air pollution, your strategy might involve urban greening. As you gain a clearer understanding of your specific NBS (for example, in Step 3, you decide to design tree-lined boulevards), revisit this step to update and refine the strategy and your overall vision. This iterative approach not only enhances the practicality and effectiveness of your vision but also makes it compelling and impactful for decision-makers and funders whose support you are looking for.

In a coastal town witnessing shoreline erosion, one NBS could involve implementing natural barriers such as mangroves or constructed wetlands. Even though the specific plants and construction details will come later, the solution is to rely on natural barriers to buffer shoreline erosion.

## Innovation

Beyond addressing the problems and challenges you identified, what **innovative** value can your NBS bring to the community? Think about the multidimensional benefits of NBS that should tackle the weaknesses identified. What makes your initiative stand out from other solutions? Innovation is not necessarily tied to technology; innovative approaches could involve reimagining how communities engage with and benefit from their natural environments, or designing new governance models for shared resources.

In an urban area, there may be a desire to establish a network of interconnected green spaces (a general type of NBS) to combat the heat island effect, increase biodiversity, etc. What may set this initiative apart is that each neighbourhood is responsible not only for choosing the plant types and design but also for their maintenance and monitoring. Here, the innovation lies in the integration of urban greening with community-driven design, governance and citizen science.





## Stakeholders

NBS are the result of a collective effort. To ensure that they are supported from multiple angles, identify key **stakeholders**, **partners** and **collaborators** – from city councils and local businesses to community organizations and NGOs – and understand their role in the initiative. This will require an initial stakeholder mapping exercise. In later steps you will elaborate on this initial scoping of key stakeholders.

If a city's central district is facing challenges with stormwater runoff, the stakeholders may include city planners, business owners, residents, and environmental non-governmental organizations (NGOs). Each has a role: city planners design the NBS, businesses maintain the NBS, residents use and support it, and NGOs provide expertise and oversight.

## Timeframe

Implementing an NBS initiative requires time for planning, engagement, implementation and maintenance and that nature to take its course. Therefore setting a clear **timeframe** is essential. The vision for NBS should look at a 5–10 year horizon, if not longer, while also keeping in mind the more immediate future (i.e. asking what will happen and change, and when). When envisioning a new green corridor in a city, for example, you must account for the time it takes to acquire land, set up the planning conditions, design the spaces, plant trees and allow them to grow to create a connected ecosystem. What long-term objectives are you targeting with this initiative? By when do you expect stakeholders to observe the tangible results of your efforts? What milestones should be set to achieve? What steps and impacts will occur in the short term?



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## The core vision statement

By following this simple PERSIST framework, you are now equipped to frame a core vision statement such as, for example:

By...(Timeframe), we aim to...(Purpose). This commitment arises from...(Relate) and is directed towards...(Engagement). Our approach includes...(Strategy). This paves the way for...(Innovation). Our initiative acknowledges and engages...(Stakeholders) to ensure the success of the initiative.

With your vision clearly defined, the next steps of this Guidebook will walk you through the detailed planning, implementation, and valorization of your NBS initiative, ensuring that your urban area reaps the benefits that NBS offer.

### An example of a core vision statement

**By 2028, we aim to** establish school gardens in 50% of our city's high schools. **This commitment arises from** the growing concern about nutritional imbalances and sedentary lifestyles observed in teenagers. The initiative **is directed towards** educating new generations to value wholesome nutrition, locally produced food, environmental stewardship, and the joy of outdoor physical activity while contributing to biodiversity. **Our approach includes** collaborating with local farmers for their expertise, involving students in garden design and maintenance, and incorporating garden produce into school meal programmes. **This paves the way for** an educational transition from passive consumption to active involvement in food production, fostering a sense of responsibility and connection among students. **Our initiative acknowledges and engages** students, educators, parents, farmers and school canteens **to ensure the success of the initiative.**



## STEP 3

# Identify and plan your specific NBS



### Basics

Step 3 is about identifying and planning the specific NBS to be implemented. First, look at the baseline situation and context of your chosen project site or area, also in terms of opportunities and barriers. You should use the overview of challenges and solutions identified in Step 1, and build on the vision and objectives set in Step 2. Your chosen NBS should align with your vision and goals and meet the needs of the local community and environment. Due consideration is given to relevant details and technical aspects, and to the maintenance needs of the NBS.

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## A step-by-step approach

In this third step, one or more specific NBS are identified. There are many possible NBS and several widely used NBS typologies are available that also provide more information on specific NBS (see Appendix 2-1). The NBS you want to implement is defined in a structured way, using information from your previous analysis of context, problems and challenges, as well as the vision and goals you have formulated for your initiative. This will give you a clear idea of what specific NBS is most suitable in the given context and in line with your vision. In this step you will provide a detailed description of the NBS, especially in technical terms. This will help you later, for example, when you need to provide an overview of needed funding and budget constraints, technical expertise and other resources.

## Aligning the NBS with your context and needs

When choosing NBS options, you might have to **decide between solutions that have different outcomes**, some of which perhaps less desirable or those that **serve multiple purposes**. Consider, for example, establishing a wetland park in an urban area: while it can help manage stormwater and become a habitat for birds, it may also become a breeding ground for mosquitoes or might need to be fenced due to security reasons. Are you willing to have to manage a mosquito and aesthetics issue in exchange for stormwater management and bird habitats, and assume the associated cost? Alternatively, if your city struggles with air pollution and lacks appealing public spaces, tree-lined boulevards can address both issues. In situations where one solution can tackle multiple challenges, it becomes crucial to prioritize them, especially when working with limited resources.

It could be tempting in some situations to replicate a solution from another city without due consideration. For example, imagine that you have seen another city in your country successfully implementing rooftop gardens. If your city has a less suitable climate, this may lead to increased maintenance, and consequently much higher costs of rooftop gardens. Some solutions may require complex engineering, while others might need in-depth ecological knowledge or strong community involvement. Does your city have the right conditions and know how, and are local stakeholders willing to support the initiative? If so, there may be situations in which internal dynamics, such as regulations on urban design or specific policies, may also push you towards some solutions over others. For this reason, it is essential to have the right approach towards NBS and select those that are appropriate to your local context, needs and capacity. A site-specific approach is key.

It is also important to consider future maintenance needs of the NBS. Do we have the expertise and resources to ensure proper maintenance, and with that functionality, also in the long term?



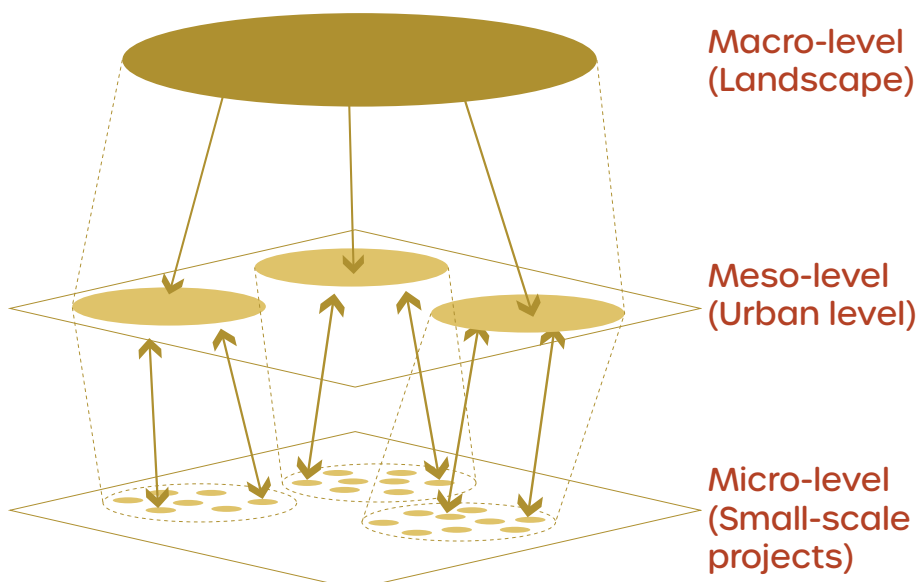
## Considering scales and scale interactions

Understanding the interplay at and between different scales is crucial for NBS planning, effectively identifying the right interventions and for maximizing their values and impacts across different scales (see Figure 3.1).

At the **macro scale**, large-scale NBS interventions, such as urban green belts or the establishment of citywide networks of green corridors can significantly impact the overall ecological and climatic health of a city while providing opportunities for leisure and sustainable transport. Moving to the **meso scale**, in contrast, NBS impact becomes more localized. Many urban parks, for example, provide ecosystem services and resulting benefits primarily to nearby residents. However, by scaling up such NBS (e.g. by establishing a network of parks in a city), it is possible to promote a more equitable distribution of their benefits, even at the macro level. In this way, parks as NBS address broader urban challenges and consequently have a higher value.

At the **micro scale**, individual or small-scale NBS interventions play an important role in providing targeted local solutions. For example, green roofs and rain gardens can mitigate stormwater runoff within specific blocks or reduce air conditioning usage by enhancing building thermal insulation. Despite their more modest scope, these interventions can have cumulative effects when replicated throughout the city, amplifying environmental benefits across meso and macro scales.

Considering the impact of NBS at multiple scales can strengthen the case for valorization and the justification for investment.



**Figure 3.1. Visual representation of the interconnectedness of the macro, meso and micro scales of an NBS.**

Source: Adapted from Loorbach *et al.* (2006).



## Defining a design approach

Eggermont *et al.* (2015), describes a well-established way to categorize NBS approaches by distinguishing between three overall types:

### • **Type 1 - Protection of existing ecosystems**

This approach to NBS focuses on optimizing the use and protection of existing ecosystems, for example, protecting urban wetlands that have evolved over time with minimal human interference. The maintenance of this type of NBS primarily concerns safeguarding them against potential threats.

### • **Type 2 - Enhancement of ecosystems that are already managed or have been restored**

This approach revolves around the management, rehabilitation, and restoration of ecosystems that are already managed or have been restored, such as a peri-urban woodland.

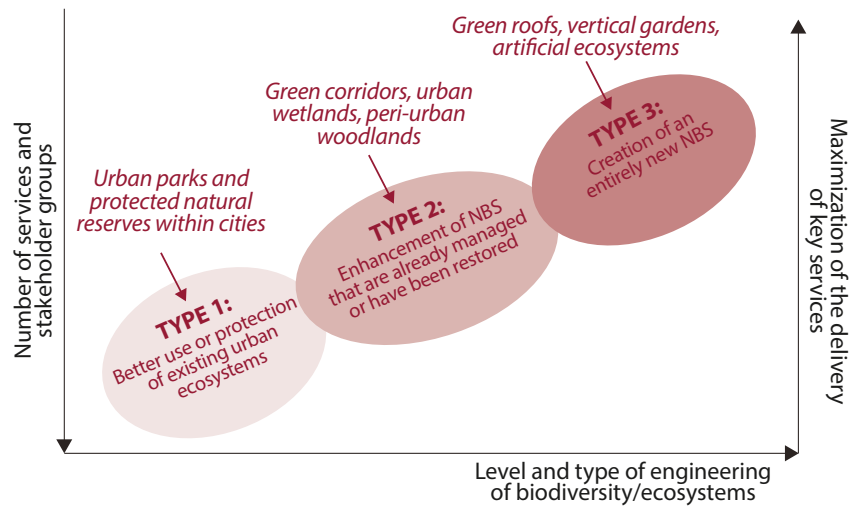
### • **Type 3 - Creation of entirely new NBS**

This NBS approach entails creating new ecosystems or making significant changes to existing ones, by adding new green interventions. Examples include establishing a community garden or a green roof, both of which start a new ecological lifecycle.

The type of approach towards NBS impacts not only its design and establishment but also its implementation costs and the maintenance it will require (also called operational costs). Different approaches require varying levels of engineering, stakeholder involvement, and have different implications for the ecosystem services delivered. For instance, when protecting an existing ecosystem like a wetland (Type 1 approach), expanding its purpose (Type 2 approach), for example with the introduction of recreational areas, could dilute its core functions like flood control or water purification. When creating a completely new NBS (Type 3) that serves multiple purposes, balancing these varied services and fulfilling stakeholders needs at the same time might mean some services may be not fully optimized over time (Eggermont *et al.*, 2015) (Figure S3.2).

For example, consider a solution such as a green roof, designed with the primary objective of building cooling, with the added benefits of providing urban gardening space and supporting local food production. As community needs evolve, the design may shift – from vegetable patches to flower beds or play areas for children. Therefore, while the creation of a Type 3 NBS offers the advantage of tailoring solutions to specific needs and preconditions, it requires a higher level of adaptability and **mitigation strategies** to cope with unforeseen circumstances, including the changing needs and preferences of the beneficiaries targeted by the NBS.

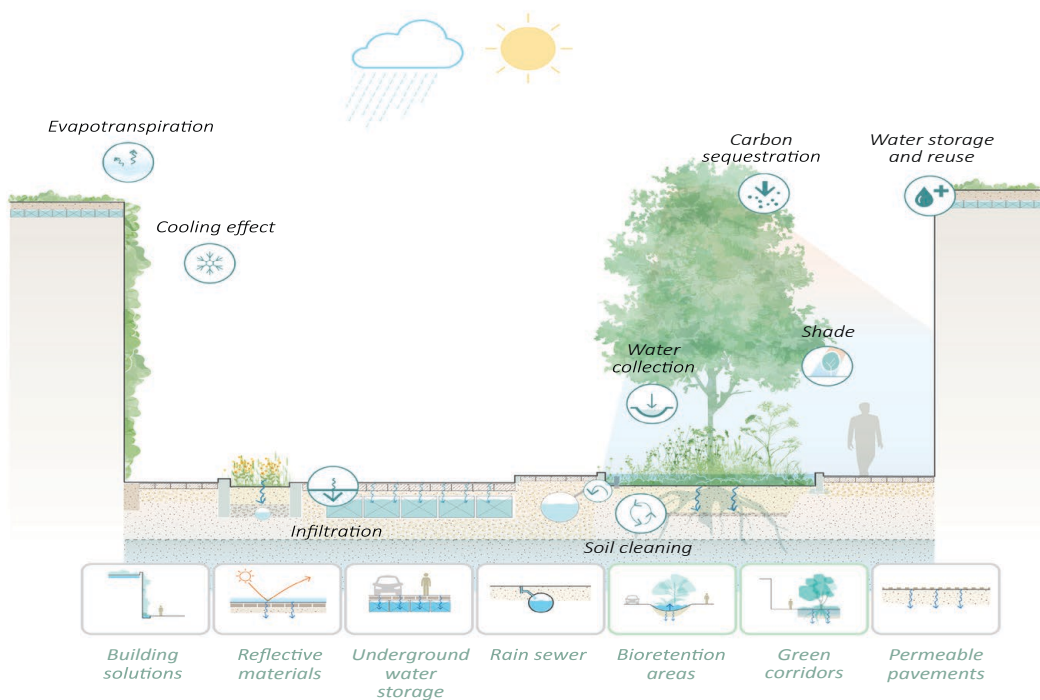




**Figure S3.2. Three overall NBS approaches**  
 Source: Adapted from Eggermont *et al.* (2015).

The three approaches differ in the level of engineering or management applied to biodiversity and ecosystems (see the X-axis in Fig. S3.2), and in the number of services to be delivered, the number of stakeholder groups targeted (left Y axis), and the likely level of maximization of the delivery of targeted services (right Y axis).

It is also important to recognize that different types of NBS can usually coexist within a single project, each addressing specific challenges and offering a diverse set of benefits at different **scales of intervention**. Moreover, while NBS cannot always replace engineering solutions, they can complement pre-existing infrastructures. For instance, a city



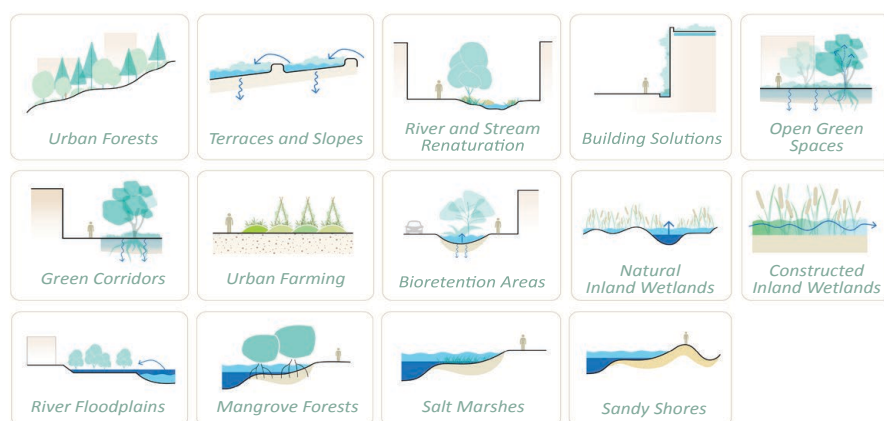
**Figure S3.3. Example of a hybrid solution integrating green and grey infrastructure.**  
 Source: World Bank (2021).

experiencing flooding due to heavy rainfall, rather than only relying on expanding stormwater drainage systems, can also create urban wetlands and parks to absorb excess water (Figure S3.3). Such an **integrated approach** does not view NBS and grey solutions as competing entities but as collaborative forces.

## Understanding technical aspects of the selected NBS

There are many different types of NBS depending on the issues that they aim to solve/mitigate, and understanding the possibilities and restrictions of specific NBS types, as well as their benefits and costs will ensure that solutions are tailored to specific contexts and needs. Key references, such as the World Bank's **Catalogue of Nature-Based Solutions for Urban Resilience** (World Bank, 2021), the **GREEN SURGE** project deliverable 3.1 (Green Surge, 2015), the **NBS Catalogue by the URBAN GreenUP project** (URBAN GreenUP, 2018) and the **Nature Based Solutions Technical Handbook** of the UnaLab project (UNaLab, 2019a, b) provide valuable detailed categorizations of NBS. There are also online courses and videos that can provide information about different types of NBS and how categorization can be done: see, for example, the online course **Urban Nature: Connecting Cities, Nature and Innovation** (Oppla, 2020) and the resources provided by the **Nature-based Solutions Initiative** (2024). Figure S3.4 shows examples of different NBS for urban application.

Drawing from these resources, we have identified 10 primary NBS families to reference (see Appendix 2-1). Each family encompasses specific typologies of NBS focused on a similar intervention set-up.



**Figure S3.4. Examples of NBS for urban application**  
Source: World Bank (2021).





A useful tool to help you choose the NBS that best suits your purpose and context is the **URBAN GreenUP Nature-based solutions selection tool** (<https://www.urbangreenup.eu/resources/nbs-selection-tool/nbs-selection-tool.kl>). This is a decision support tool designed to give suggestions that may help you choose the right NBS, based on both your city's capabilities and the outcomes you want to achieve.

## Plan your intervention in detail

Before diving further into Step 3, revisit the information you gathered in Steps 1 and 2. The context you defined combined with the identification of local challenges and opportunities, as well as your stakeholder mapping and vision should guide your NBS description.

In order to effectively describe your intervention, first, conduct an **assessment** of the intended NBS project area, documenting local conditions through **measurements, observations, maps** and **photographs**.

Review existing **policies** and **regulations** that could impact your NBS project, including supportive policies like green infrastructure incentives and potential barriers such as zoning laws or land ownership issues. Identify any necessary **permits** or **approvals** for your NBS and engage with local authorities and municipal departments (or promote collaboration between them) early on in the planning process.

Evaluate the **local ecosystem**, encompassing both urban and natural elements such as buildings, streets, plant species and animal habitats, as well as local resident communities. These insights are important when selecting the most appropriate plants, materials and NBS components. See how the NBS will fit in and/or will change local conditions. Here you can build on your overall context analysis from Step 1, but zoom in more specifically on the area where the NBS will be implemented.

Then, **outline** the NBS selected, detailing its **extent** and **characteristics**, such as indicating how many trees are you planting, and of what species and size, and in what configuration.

As you gather all this information, start to visualize your NBS through **preliminary sketches**, showcasing how it integrates with existing built environments. How does the NBS connect with urban elements such as roads, buildings, and other grey infrastructures?

Consider the **features** you would like to incorporate, such as playgrounds, walking paths, benches, the **organization** of different components, the materials used, and the reasons behind their selection.



Give due consideration to the **transformation** of natural elements over time as this also influence the selection and sustainability of your NBS. In particular, with vegetation-based solutions, plant growth will transform the appearance and functionality of the NBS. Trees, for example, will use the space both above and underground differently as they grow their canopies and root systems. So you should ask yourself, how will this impact climate adaptation, biodiversity and health, etc.? How can I make sure that my NBS is resilient to climate change? Again, feed back with your vision and goals.

**Maintenance** should be an important consideration from the very start, not just for the first years after NBS implementation, but also in the longer term. Considerations should include both routine tasks and seasonal or infrequent requirements. You should have an idea of the expertise and resources needed to maintain the NBS in the longer term. Here, you should also start considering how to monitor the development of the NBS (and its performance) over time, so that you can make adjustments through maintenance work, or possibly major adaptations, if needed.

**Engaging** key **stakeholders** and especially the local community is essential, and you should do so throughout the entire life of the project, from planning to maintenance. Often, local stakeholders can also be mobilized for the longer-term success of the NBS, for example, by assisting in some maintenance tasks and by keeping an eye on potential threats such as pests and diseases.

Finally, find **examples** of your desired NBS, ideally from your city or region, or from cities and regions with similar attributes, because they can be a source of valuable insights, for example, to understand the permissions required to implement specific NBS, how to interact efficiently with public authorities and communities, or how to handle long-term maintenance.



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## STEP 4

# Develop the NBS value proposition



### Basics

This step describes what value will be added by implementing the selected NBS. It relates to the previous steps, including the problem context mapping exercise and the SWOT analysis (Step 1). A central component of this work comprises the NBS Business Model Canvas (Connecting Nature, 2019). Four value categories are to be considered for the NBS value proposition: the Environmental, Social, Health, and Economic values of NBS.

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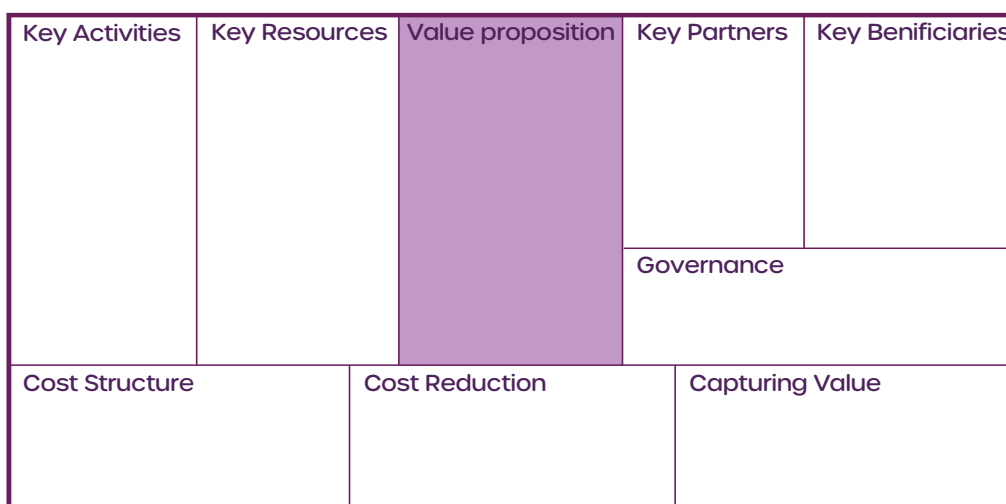


## A step-by-step approach

In this step, the key question to be answered is: What is the value that will be added by implementing the selected NBS? It builds on Step 3, which provided insight into how one or more specific NBS are selected based on an analysis of the current state of the site and context in which the NBS will be implemented and a formulation of a vision and associated objectives.

### Determining the set of values to be delivered

For this step, please refer to the Nature-based Solutions Business Model Canvas developed by the Connecting Nature project (Connecting Nature, 2019). Figure S4.1 shows the central placement of the value proposition within the NBS business canvas.



**Figure S4.1. Nature-based Solutions Business Model Canvas**

Source: Connecting Nature (2019).

In the original Nature-based Solutions Business Model Canvas, focus is on three value categories: **Environmental, Social and Economic**. Given the potential importance of health impacts and the specific ways of assessing them (through health impact assessments), we add **Health values** as a fourth category. Under Environmental values, biodiversity aspects are also covered.

Central questions to be answered to develop the value proposition include (adapted from Connecting Nature, 2019):

- What is the **Environmental Value Proposition**? How will the NBS help address key environmental challenges at site, neighbourhood, city, or metropolitan level? For example, increased tree cover will lead to decreased air pollution, reduced flooding, reduced heat island effect and increased biodiversity.



- What is the **Social Value Proposition**? How will the NBS help address important social challenges at the site, neighbourhood, city or metropolitan level? For example, the creation of a new pocket park can offer opportunities for recreation and play while also serving as a social meeting place.
- What is the **Health Value Proposition**? How will the NBS help address key human health and wellbeing challenges at different scales? The greening of a schoolyard can, for example, contribute to physical health by cooling while enhancing mental health of pupils and staff.
- What is the **Economic Value Proposition**? How will the NBS help address priority economic challenges at the site, neighbourhood, city or metropolitan level? For example, a new community garden can provide marketable products while potentially also contributing to a greener neighbourhood where people are eager to live.

These four value proposition categories are intricately connected, which should be reflected in the value proposition. Environmental values, for example, those related to cooling and air pollution, have clear health implications, and in several cases, there are often indirect economic values associated with Environmental, Social and Health values; the next steps of this Guide will address this.

Although in many cases all value categories will be present and worth considering, **there will be differences in their presence and weight according to local conditions**. For example, a rain garden will primarily have environmental and economic values, but it will also change the look of a street and can thus have social and perhaps even health values. A therapeutic garden is set up as an NBS primarily for generating health values, but will likely have other impacts, for instance, economic ones due to, *inter alia*, reducing sick leave days, and environmental ones such as by creating conditions for biodiversity.

As will be elaborated in Step 5, it is crucial to determine how different values will affect different stakeholders. Key beneficiaries will often be targeted (e.g. who is meant to benefit most?), but often there are impacts on a wider range of stakeholders. Often, when thinking about NBS such as parks or other green spaces, only the direct end-users are considered, i.e. the citizens; other beneficiaries are not considered, for example, businesses that may benefit from their proximity to a park, schools and sports clubs that may benefit from the NBS facilities, and the city as a whole that may benefit from the environmental advantages provided by the NBS. As highlighted in the earlier steps, however, local communities (e.g. local residents) need to be targeted, and co-design, co-creating and local stewardship opportunities should be explored (see the next steps).





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The value proposition needs to be realistic and include a **time dimension**. Thus the following questions should be asked: How likely is it that different values will be generated by the NBS? How long will it take for the full values to be realized? Are the predictions realistic? What are some of the risks and uncertainties that need to be addressed and managed? Will the new trees planted truly reach the expected age when they will provide the full range of ecosystems services? Or will they be weaker or even die early? How about a new green roof – will it survive more frequently occurring heat waves? What will be needed to ensure value delivery also in the longer term? What are the maintenance requirements? When will redesign and replanting be needed? Should there be a loss of a certain percentage of trees planted, the costs of replacement planting will need to be considered.

For trees to start providing local cooling benefits, for example, through shading, they need to be mature and have large canopies. Depending on where you are in the world, this can take some time. Moreover, some trees will grow faster than others, but may not live that long. Good growing conditions, also below-ground, will help allow trees to grow big. Threats, for example, from droughts and pests can affect tree health and growth, as can vandalism by humans.

## Synergies, trade-offs, and negative values

It is important to determine whether synergies and trade-offs between different NBS values can be expected. Often, as mentioned in Step 3, many NBS can provide multiple ecosystem services and values at the same time, enhancing their positive impact. An example of this is the planting of more trees on a schoolyard, which can result in environmental values (e.g. cooling), and more biodiversity and social values (e.g. related to play, learning, and social interactions), as well as health values (e.g. related to physical activity and mental wellbeing), and economic values (e.g. associated with lower air conditioning costs and less staff sick days).

There may also be trade-offs between values, which, however, may be between different value categories, as in the case of an urban woodland being closed off for recreation to ensure drinking water quality. Within the same category, for example, social values, encouraging specific forms of recreation (e.g. festivals or mountain biking) may replace other recreational values (e.g. nature observation and hiking).

Negative impacts can be associated with specific NBS. Think of highly allergenic plants or the possibility of higher amounts of mosquitoes than can come with blue-green solutions. Trees along streets can be perceived as negative when they drop leaves in gutters and in private gardens, or when roots present a trip hazard. In the literature, these negative impacts are sometimes categorized as disservices or **disvalues** (Lliso *et al.*, 2022).



They are generally well outweighed by the values and benefits of the specific NBS, but they may result in local community resistance and come with a cost of their own. It is also important to make these explicit in the value proposition.

In addition, there is the issue of alternatives to NBS implementation and the associated **opportunity costs**. For example, when a local tiny forest is established and replaces a basketball court, this would displace the local user base and force the users of the court to move to other areas. Moreover, the use of urban land for NBS reduces the space available for other uses, such as for housing.

Based on this assessment of different values and their synergies and trade-offs, a stronger value proposition can be developed that shows how prioritized values will be maximized, synergies enhanced, and how trade-offs managed; this also links to maintenance requirements discussed in Step 3. A practical example of an NBS value proposition is provided in Appendix 4-1.

To determine values, possible disvalues, synergies, trade-offs, as well as potential opportunity cost, the key stakeholders identified in Step 2 should ideally engage in a joint value mapping activity. In its simplest form, this could start with a brainstorming session during which the different value categories are written down on post-it notes with distinct colours (see also Connecting Nature, 2019). In Step 5, values can be grouped and prioritized, and expected synergies and trade-offs can be determined.

## Capturing value and other considerations for the value proposition

Developing the value proposition will already raise questions about how to assess and capture value (see the next steps). Monetary and non-monetary economic valuation can both contribute to valorization. Values expressed in monetary terms will help decision-makers and potential funders who usually understand the language of monetary costs and benefits (Box S4-1). However, value capture needs to go beyond this, integrating non-monetary valuation, such as impacts on biodiversity, climate change and health, which are also linked to key Sustainable Development Goals. The questions that should be asked are:

- Biodiversity: Will the project result in gains or losses, in terms of specific species and/or habitats?
- Climate change: Do we see lower temperatures and more shade during heatwaves?
- Health: How will the health of local community members be affected?

It is particularly important to compare the value proposition to the baseline, i.e. the situation prior to NBS implementation; otherwise, it will be







difficult to make a convincing case for valorization. Hence, values need to be assessed and monitored over time, which comes at a cost that needs to be considered.

Most valuation of NBS tends to focus on how people may benefit from nature. Nature also has an intrinsic value (e.g. Rea and Munns, 2017), which can be difficult to include in the NBS valorization process but should not be ignored. The NBS valuation also depends on, for example, local political objectives and priorities, and nature conservation policies. Therefore, it is advisable to include biodiversity values and the values related to exposure to nature in the Environmental Value Proposition.

#### **Box S4-1: Monetary valuation tools for urban nature-based solutions**

As for urban NBS, impact assessment guidance requires further development to address the monetary valuation of urban interventions. Co-productive research and innovation in collaboration with cities provide insights into the role and limits of NBS valuation (Wild *et al.*, 2024). In valuing urban NBS with Latin American and European cities, a systematic review identifies key valuation methods that have been applied to urban NBS. The full set of valuation use-cases can be downloaded as supplementary materials here, covering:

- Cost-benefit analysis
- Benefit transfer
- Contingent valuation
- Discrete choice
- Hedonic pricing
- Travel costs
- Land values
- Net present value
- Cash-flow
- Life-cycle costs
- Incentive analysis
- Replacement costs
- Production function

City government staff and decision-makers indicate that urban NBS valuation can be novel, challenging, and also meaningful in supporting economic decision-making. Monetary valuations of NBS should be accompanied by other forms of impact assessment, especially utilizing the full range of social, cultural, ecological and environmental indicators. In particular, monetary valuation methods can be selected matched with the 12 societal challenge areas included in the European Union's NBS Impact Assessment Handbook (Dumitru and Wendling, 2021). These cover diverse indicators within a wide range of challenge areas such as climate resilience, green space management, biodiversity enhancement, health and wellbeing, and air quality.



## STEP 5

## Value creation and delivery



### Basics

Starting from the initial understanding of context, site and scale (Step 1), then formulating a vision and objectives (Step 2), and then diving into the technicalities of the NBS you want to implement (Step 3), we have laid the foundations for the process of NBS value creation and delivery. As explained in Step 4, the core of an NBS project lies in its value proposition, namely, the 'promise' of delivering environmental, social, economic and health values and benefits. Step 5 delves into the activities, resources, partners and beneficiaries that contribute to creating and delivering the NBS value proposition, which is underpinned by a governance structure that supports the effective creation and delivery of NBS value.

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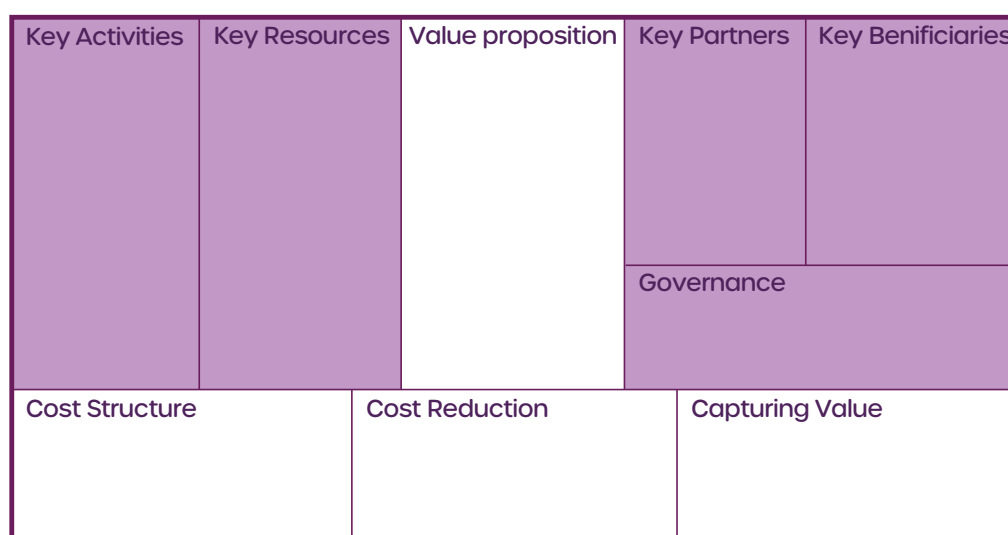
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## Key components of value creation and delivery

NBS value creation and delivery involve designing, developing, and managing solutions that offer environmental, social, health and economic values and benefits. NBS **value creation** is achieved by delivering a wide range of benefits to a diverse range of stakeholders and envisioning NBS not as solutions *for* people but co-created by nature and *with* people (Chausson *et al.*, 2023), thus calling for engagement of local urban residents. This approach requires a shift from the conventional business mindset to create lasting, sustainable benefits for both society and the environment. As seen in Step 4, the value proposition lies at the core of the Nature-based Solutions Business Model Canvas. Now, it is important to go over the previous steps and reflect on the data, choices, stakeholders and resources you have already assembled and on those you still need. In the Nature-based Solutions Business Model Canvas, the quadrants that are specifically associated with value creation and delivery are: key activities, key resources, key partners and key beneficiaries. (Figure S5.1)



**Figure S5.1. Nature-based Solutions Business Model Canvas**  
Source: Connecting Nature (2019)..

### Key activities

Think of these activities as the steps needed to bring NBS value(s) to life. To create and deliver the proposed value, it is essential to pinpoint the activities that drive your NBS value propositions. Each activity should:

- be tailored to the chosen NBS;
- match the context in which the NBS will be implemented; and
- directly support a specific value proposition theme.

Each activity needs to be associated with one or more value domains, namely, the environmental, social, health and economic components of



the NBS value proposition. Ask yourself which actions specifically address each of these proposed values, considering that some actions can impact more than one value category.

For example, let's say you decided to establish a community garden in a neighbourhood. Planning activities will include securing land, deciding on the design and vegetation of the area, involving local residents, and providing infrastructure, and if needed, signage. To match the context, you need to determine what types of plants and crops can be grown, what types of gardening activities local residents may wish to carry out, what the local cultural sensitivities are (e.g. culturally appropriate plants), and whether you need to take measures to manage vandalism. If your value proposition is focused on, for example, social and health values, you need to undertake actions that support them, such as facilitating social interactions and creating meeting places, and providing sufficient shade for gardeners during hot days.

## Key resources

Key resources are the essential assets you need to achieve the value proposition of your NBS initiative. Resources – funding, information and knowledge, technologies, or human resources and expertise – must be planned, sourced and mobilized. What resources are needed to execute the activities identified above, relating to the environmental, social, economic and health value propositions? Consider both the resources you already have and those you will need. For example, perhaps you already have funding for establishing the NBS but need more money for maintenance. Also, your own staff have the expertise needed to maintain the NBS in the future but you need outside help for the NBS design and construction. As discussed in previous steps, funding and other resources will be needed in the planning and design phase, as well as the implementation phase, but also for the subsequent maintenance of the NBS.

## Key partners

Key partners are those stakeholders (organizations and individuals) that help you deliver the NBS and its values. Partnerships can give you access to specific resources and can reduce costs and minimize errors. Who are the key partners required to deliver the activities and mobilize the resources you identified? What roles will each partner have in realizing the specific value propositions (environmental, social, health, and economic)? How will partners collaborate?

If your NBS project is about creating a city park for both recreation and habitat conservation, your partners might include a local environmental NGO that can provide expertise on which plants to use to attract local wildlife; the city council may be needed to obtain assistance with





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permissions, land allocation and funding; fitness community groups could partner to offer workouts in the park, promoting health; local resident groups may volunteer to help with park clean-ups, cutting maintenance cost; and local businesses might sponsor material resources such as benches, pathways or playgrounds. Each partner should contribute to one or more value propositions, helping you create and deliver the proposed NBS values.

## Key beneficiaries

Key beneficiaries are the stakeholders who derive direct or indirect benefits from NBS implementation. Key partners and key beneficiaries are positioned side-by-side in the Nature-based Solutions Business Model Canvas because this reflects the overlap that sometimes exists between them.

Local communities, for instance, are often both key partners and key beneficiaries. Take the example of trees in private gardens: a city government that wants to expand a neighbourhood's tree canopy cover will need to work with local residents to promote tree planting and protection in private gardens. Residents with trees in their gardens will also reap the cooling and other benefits of these trees.

The Key Beneficiaries box of the Nature-based Solutions Business Model Canvas also includes **co-beneficiaries** who indirectly benefit from the NBS initiatives. As seen in previous steps, local businesses around your NBS might flourish due to their proximity to a park, which also generates a **combined value** for them. Local businesses can therefore benefit from NBS, but also partner in NBS value delivery. When thinking about key beneficiaries, it is important also to consider possible **losers**, i.e. entities and stakeholders that might face challenges or disadvantages due to the implementation of NBS. Planting highly allergenic trees near a school, for example, can provide cooling and mental health benefits, but may also cause health issues for some children and neighbours. It will be necessary to keep these possible negative impacts in mind and find ways to mitigate and minimize them.

In practice, for filling out the Key Beneficiaries quadrant, you should identify all possible beneficiaries, co-beneficiaries and potential 'losers' considering the different Value Propositions and the range of key activities identified.

## Governance

Transforming urban infrastructure with NBS requires strategic collaboration between diverse actors across different urban sectors. How will the NBS be managed and maintained on an ongoing basis? What **governance structure** will best facilitate stakeholder cooperation? How will decisions about the NBS be taken and who will be involved? **Governance models**



**for NBS need to be tailored to specific local conditions.** Just as NBS are very locally specific, so are their governance models. Given the variety of stakeholders involved in NBS, ensuring a transparent and sound governance structure, with clearly defined roles and responsibilities as well as decision-making helps manage relationships between partners and beneficiaries, optimize resource utilization, and execute activities that create long-lasting value, ensuring that the NBS delivers on its value propositions.

There are a range of potential governance approaches that can be applied in the development of NBS, depending on local conditions and circumstances. **Collaborative, multisector, polycentric and adaptive governance models** are deemed to be the more suitable governance models for NBS projects, especially when urban scales are addressed (Egusquiza, Cortese and Perfido, 2019). These governance models involve multiple centres of decision-making, each autonomous but part of a larger governance network, rather than a single, centralized authority. Public agencies, citizens, enterprises, and other relevant actors jointly decide on NBS strategies. Collaborative governance is all about pooling information, capacities, resources and decision-making power so that all the stakeholders involved can accomplish together what they could not individually. For example, while the private sector can fund a project, the public sector can provide policy support, and the civil society can provide local knowledge or/ and get involved in NBS maintenance. As NBS projects evolve and as urban ecosystems and societal needs change, adaptive governance allows for adjustments of NBS strategies.

Governance models of NBS can be: (i) hierarchical and top-down, and typically government-led, closed co-governance, where only a few select stakeholders are involved and government actors still lead; (ii) open co-governance, with many stakeholders engaged by governments; and (iii) self-governance, for example, by local communities (Sheppard *et al.*, 2017).

Clearly, the choice of governance model needs to be sensitive to local conditions and work with, for example, the decision-making bodies and processes in place.

The CONEXUS project provided several papers and other resources on, in particular, collaborative governance of NBS. The European Commission also published **Guidelines for co-creation and co-governance of nature-based solutions: Insights form EU-funded projects**, which provides valuable tips and recommendations.

In the Nature-based Solutions Business Model Canvas, the Governance quadrant comprises a partners and beneficiaries section because cooperation between both types of stakeholders is paramount for gathering all the necessary resources (material or immaterial) and for creating and delivering the NBS proposed values. For more information, see the Nature-based Solutions Business Model Canvas Handbook, in particular, page 19 (Connecting Nature, 2019).





In order to understand which governance model best suits your context, take into consideration:

- The **'why'**: Why collaborate? What are the drivers of collaboration? Think about the resources you need for your activities. What resources can be pooled through collaboration?
- The **'what'**: What are the enablers of collaboration? What are the barriers?
- The **'who'**: Who should participate in the collaboration? What role should they play?
- The **'how'**: What level of collaboration is appropriate for facilitating intended outcomes? What is an appropriate structure? What strategies can be employed to steer the process towards value creation and delivery?

Collaborative governance starts when you intend to deliver values and **impacts** beyond the business-as-usual. The true measure of impact, then, is in the added value you bring to the urban environment and its inhabitants. By evaluating your intervention against the business-as-usual benchmark, you can more clearly see the multidimensional benefits of NBS, from ecological gains to socio-economic enhancements (defined in Step 1).

Independently of the type of governance you chose, consider which type of **policy or legal instruments** is needed to facilitate the NBS governance in your context. Some of these will already exist, but new or adapted ones may have to be developed. It is important to evaluate the governance capacity to overcome barriers and to be adapted to your social, economic, cultural and regulatory context. Three primary policy instruments may play an essential role in realizing the benefits of specific NBS:

1. **Regulatory instruments**: These are the 'sticks' i.e. the penalties or restrictions imposed if there is a deviation from prescribed behaviours. For NBS, there might be city-wide regulations for the inclusion of green roofs in new architectural designs. Local regulations might also enforce the conservation of urban green spaces or mandate green corridors for promoting biodiversity. There could also be regulations concerning access to green spaces and protection of trees over a certain size, even when they are on private land. Failing to adhere to these regulations would result in sanctions.
2. **Economic instruments**: These are the 'carrots', i.e. the positive or negative incentives that encourage specific behaviours. Examples of positive incentives include subsidies for green infrastructure projects or tax relief for developers incorporating NBS into their urban projects. Negative examples are penalties imposed on projects that do not adhere to sustainability criteria or that damage existing natural solutions. For example, payments for urban carbon sequestration could be envisioned for cities with substantial green spaces that help reduce urban heat islands and promote carbon offsetting.



**3. Information and communication instruments:** These are the ‘sermons’ whose aim is to shape a behaviour by providing objective information or appealing to ethical considerations. These consist of voluntary commitments arising from intrinsic motivations or ‘nudging’ approaches to change behaviour. For example, public campaigns informing citizens about the benefits of urban green spaces or certifications for eco-friendly housing projects can motivate developers and residents to prioritize NBS. These instruments will also be key if your aim is, for example, to attract participation for a new community garden in the neighbourhood.

## NBS monitoring and evaluation

In addition to the instruments listed above, **monitoring** is another crucial aspect, that is both an instrument and an activity, which requires resources, that may influence the value delivery of your NBS – and sustainability over time. Monitoring is essential in order to follow the development and performance of your NBS over time, and make adjustments where needed. Moreover, when stakeholders help assess and monitor the performance of the NBS, they can understand its tangible benefits, which also change over time, and identify areas for improvement. For instance, if an urban green space is not functioning as expected, data collection and interpretation can clarify whether this is due to, for example, environmental conditions, a wrong choice of species, issues with the design and management, or perhaps community misuse. Once identified, these challenges can be addressed promptly, provided that a clear governance structure has been established, thus ensuring that the NBS remains effective in delivering its benefits.

Monitoring, assessment, and evaluation, however, come with associated costs that can differ depending on the complexity of your NBS. Yet, they also have the potential to offer returns. One evident benefit is the possibility of saving resources in the long term. When challenges are promptly identified and addressed, they prevent more extensive, costlier interventions later. Moreover, consistent and thorough monitoring and evaluation helps showcase the actual tangible benefits of your NBS. This strengthens the case for NBS among decision-makers, funders and the broader community. Proper monitoring and evaluation can also provide lessons for improving future NBS implementation.

Perhaps you can find ways of engaging local residents or other volunteers in monitoring through citizen science or similar approaches. This not only mobilizes additional resources, but also creates stronger local stewardship. Monitoring by residents and other volunteers could include, for example, bird and other wildlife surveys, monitoring pests and diseases, or assisting with tree inventories.

The need to integrate the costs of monitoring will be further discussed in Step 6.



## STEP 6

## Capturing value



### Basics

To capture the values of your NBS project, you will need to provide a clear and realistic overview of all of its financial aspects. Hence, you must be clear about the different costs of NBS planning, design, implementation and maintenance, as well as identifying ways of working in a cost-efficient manner. Costs can be expressed in financial terms, but you should also consider the costs that are not easily monetized (e.g. health impacts, biodiversity loss). You must capture the different values and benefits of the NBS, in monetary as well as non-monetary terms. This will help in presenting a compelling business case for its adoption. Once again the NBS Business Model Canvas is used.

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## Capturing NBS value and cost

After the preparation of the value proposition (Step 4) and determining how value creation and delivery will be achieved (Step 5), this next step looks at how to 'capture' the different values associated with the NBS project. **Capturing value** refers to making money from a value proposition, but it is not limited to this. As discussed in previous steps, for NBS, capturing value in direct monetary terms will often be limited, so other ways must be used, from indirect monetary valuation to non-monetary value capture to capitalize on a wider range of values. Think of the revenues associated with hosting events and charging fees in new green spaces, charging concession fees, and selling timber, biomass, vegetables, etc. produced by woodland and community gardens, among others. But also consider reduced air conditioning and air filtration needs that can result from increasing urban tree canopy, which results in cost reductions that could incentivize local utility companies to co-fund the NBS. Or the fact that residents start feeling happier and even healthier when there are more trees and green spaces in their street and neighbourhood.

Hence, again, you must refer to the NBS Business Model Canvas (Connecting Nature, 2019) for this step in the valorization process, which as shown in Figure S6.1, has three key components: Cost Structure, Cost Reduction and Capturing Value.

Key Activities	Key Resources	Value proposition	Key Partners	Key Beneficiaries
			Governance	
Cost Structure		Cost Reduction		Capturing Value

**Figure S6.1. The value capturing components of the Nature-based Solutions Business Model Canvas**

Source: Connecting Nature (2019).

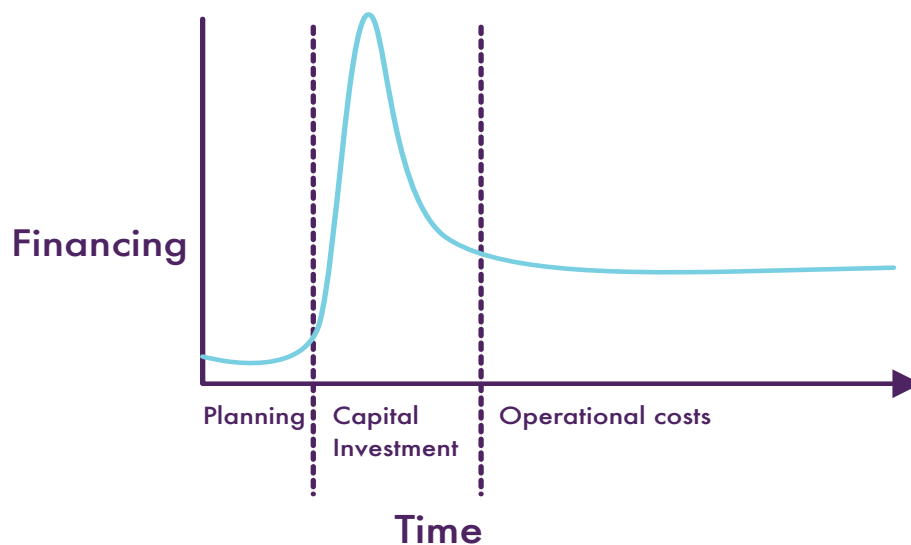
In earlier steps, the different values to be produced by the NBS project have been determined, and ways of creating and delivering values have been specified. A business case for NBS implementation will often not be convincing to decision-makers, potential funders, and local communities if there are no specific and realistic ways of capturing the value to be delivered by the NBS over time, both in monetary and non-monetary terms.



## Cost structure of NBS implementation

In Step 5, under Key Resources, you were asked to provide an overview of the funding, staff time, knowledge and other resources needed for designing, implementing, and maintaining your NBS. Here, you should also provide further detail regarding these requirements, especially in terms of funding needs.

To make a convincing business case for implementing an NBS or a set of these solutions, it is important to provide a **realistic overview of associated cost**. As shown in Figure S6.2, several types of costs are associated with NBS implementation.



**Figure S6.2. Financing and types of cost of NBS over time (Connecting Nature, 2019).**

**Capital investment costs**, i.e. the costs incurred when installing or establishing an NBS, are an essential component of the overall costs of the solution. Costs included here relate to, for example, preparing soil or building, maybe even land acquisition, growing vegetation, purchases of plants and other material, and establishment costs (e.g. tree planting), as well as the installation of infrastructure and facilities (e.g. irrigation systems), as well as the costs of communications regarding the new NBS. It is important, however, not to exclusively focus on these capital costs when you want to provide a realistic overview of the entire NBS intervention cost structure.

The **planning of NBS implementation and design** also come at a **cost**, for instance, for a wide range of planning and preparatory activities, from site analysis to public engagement costs. You, your staff and others will have to spend time in carrying out these activities, which comes at a cost (salaries, overheads, social cost, etc.). Even the costs associated with making the business case, such as assessing baseline conditions prior to

NBS implementation, should be included here. Further, there will be costs associated with, for example, tendering and bids, and external contracting of designers and other experts.

Often overlooked but essential are the **operation costs** of NBS implementation. These costs relate to the various maintenance costs (e.g. watering, tree pruning and other forms of vegetation management, replacement of dead vegetation) over the lifetime of the NBS, and the costs of community engagement and communications during the life of the NBS, as well as of proper monitoring of the impacts of the NBS. Some costs will be fixed (e.g. the costs of dedicated maintenance staff), while other costs will be variable (e.g. watering of vegetation depending on the weather, costs of trees and plants to be replanted). An important consideration regarding these operation costs and of NBS project sustainability is whether they are covered and how. Operational budgets also need to include the costs of monitoring the NBS and its performance over time.

Costs in all these categories include personnel costs (in-house, externally contracted, or a combination). As highlighted in the Connecting Nature (2019) guidance, research has shown that, very often, the importance of ongoing community engagement activities is underestimated as are the associated costs (for example related to staff time or hiring outside consultants).

Clearly, it can be difficult to obtain a full, detailed overview of all planning and design, capital and maintenance costs. You may not have all information needed. Moreover, some cost assessments will require more in-depth economic knowledge and expertise, something which is not always readily available. It is important, however, to give reasonable estimates based on the information you have and earlier experiences. The ReGreen project published a **guide on cost-effectiveness of NBS**, which looks into the cost-effectiveness of NBS, with a focus on a range of different cost categories (Panduro *et al.*, 2021). The World Bank (2021) also offers **guidance on assessing the costs and benefits of NBS** (with a focus on climate benefits).

## Cost reduction and efficiency

It is also important to consider how to efficiently implement the NBS in order to keep costs to a minimum. Are there ways in which NBS costs can be reduced? Questions to be asked here are, among others:

- What is the current state-of-the-art for implementing the specific NBS, also in terms of working in a cost-efficient way?
- How can changes in planting techniques and the use of locally appropriate plants reduce the costs of maintenance? How about vegetation systems that require less maintenance?





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- Are there opportunities to collaborate with social service providers to deliver services that may help to reduce the costs of park maintenance?
- Are the opportunities for volunteering and local stewardship to support future maintenance (or monitoring, as discussed in Step 5)?
- Is there scope for economies of scale? In our example, economies of scale may arise if trees or materials are bought in bulk and therefore a discount is applied.
- How does this specific NBS fit in with other activities by the organization, including NBS implementation and maintenance? Can the same staff, materials and expertise be used, or is there a need for training and new recruitment, as well as purchasing new equipment?

Cost reduction here relates to the different costs associated with NBS implementation. The costs of the NBS can be compared with the costs of alternatives, both NBS (e.g. establishing green roofs) and non-NBS (e.g. technological solutions such as changes in building structures, insulation). An example is the cooling effect of trees and other vegetation that can lower air conditioning expenses.

## Ways of capturing value

To capture value, the following questions must be asked: **Will the potential values of the NBS also materialize? How can we assess the different environmental, social, health and economic values in both monetary and non-monetary terms?** Capturing value often refers to monetary gains made by enterprises from their value proposition. For NBS, we need to look further and use possibilities for capitalizing on both market and non-market, monetary and non-monetary values.

For most types of NBS, however, generating direct revenue is still challenging, particularly where the output is considered a shared public good, such as improved air quality and cooling by trees or parks. Funding for such public goods usually comes from public sources, i.e. international, national or local funding incentives related to environmental or social benefits. In order to access this funding, it is important to be able to capture the value created through relevant indicators, such as those that measure air and water quality, biodiversity or impact on improved social interactions and health; some of the economic indicators are summarized in Table S6.1.





**Table S6.1. Examples of economic indicators, contributions and market values associated with NBS (Connecting Nature, 2019).**

**Economic indicators:**

- Increase in value of land (commercial/residential) close to parks
- Increase in house prices (property related tax)
- Increase in commercial property value (property tax & rates charges)

**Contribution to local economy:**

- On-site businesses benefit most from increased footfall to NBS
- Technology transfer (NBS/UGI technologies/energy generation), upskilling of existing firms
- New job and enterprise creation (eco-tourism), emerging clusters, new market creation (incentives & subsidies)
- Increase in attractiveness of area for new business (inward investment & start-up environment)

**Market prices:**

- How much individuals generate in income or save in costs by producing their own food (urban agriculture) or reducing their energy costs (green roofs)
- Use of parks as CO2 sinks

*Note:* Increases in property values will impact some people positively (e.g. owners) and others negatively (e.g. the poorest inhabitants).

Capturing value requires revisiting the value proposition, the activities, the partners and the beneficiaries while considering the following questions:

- What are the **direct revenue generation possibilities** from the Activities planned?
- Are there other ways to use monetary valuation, for example, of non-market benefits?
- What **indicators can be used to capture 'non-monetary' value**, for example, environmental indicators, social indicators, health and wellbeing indicators, and economic indicators to assess the value of various ecosystem services? There can be many non-monetary indicators, for example, self-reported wellbeing and neighbourhood satisfaction by residents, number of sick days, local temperature and thermal comfort, amount of water runoff, and animal and plant species diversity. Good guidance is offered in FAO's **Valuing forest ecosystem services: a training manual for planners and project developers** (FAO, 2019, chapter 4 in particular).



- Consider **which partners' interests are aligned with achieving these non-monetary indicators**. Are there opportunities to co-create joint programmes with these partners to reduce or share the costs of delivery? Are there funding opportunities?
- Consider **alternative funding sources** such as: funding programmes for climate action, health improvement or biodiversity enhancement; business funding as part of corporate social or environmental responsibility programmes; and donations and crowd-funding, among others. Table 27 in the FAO report, **Developing bankable business plans - A learning Guide for forest producers and their organizations** (FAO, 2021) also provides insights into possibly funding sources. Another FAO report, **Local financing mechanisms for forest and landscape restoration** (Besacier *et al.*, 2021), discusses different for-profit and not-for-profit financial mechanisms. The Connecting Nature project also developed a **number of reports on NBS financing** (Connecting Nature, 2024).

Capturing value goes well beyond economic valuation approaches. In many cases, and for a range of environmental, socio-cultural and health values, however, some form of economic valuation will be possible. Guerry *et al.* (2023) provide some good examples of this, focusing on climate mitigation, cooling and health impacts of specific NBS in the cities of Guangzhou, China and Minneapolis, United States of America. The authors use a range of methods to assess value, also in monetary terms, including the **INVEST model** (Natural Capital Project, 2023). Another interesting example is the comprehensive assessment of the economic values of **New York's Central Park**, which looks at indicators such as employment, impact on property prices, and contributions of the park to the tourism industry (Appleseed, 2015). See also FAO's guidance on valuation of forest ecosystem services for further inspiration (Masiero *et al.*, 2019).

However, valuation can be challenging, depending on the availability of data. It will often be based on more indirect economic valuation than on market-based valuation. Examples of economic valuation are comparing with the costs of alternative solutions, for example, technological solutions such air conditioning versus the cooling effect of trees. In order to provide an economic value estimate for recreational and social benefits, methods such as identifying travel costs, placing an economic value of people's time spent in parks and green spaces, and stated preference approaches such as willingness to pay for recreational or touristic experiences can be used. For health benefits, the avoided costs by keeping people physically, mentally and socially healthy can be calculated. For specific products and some services, direct market values can be used. Consider timber and biomass produced, or fruit and vegetable production in community gardens.



# Assessing different value categories and types - zooming in

## Environmental and biodiversity values

Several tools and methods are available for assessing the environmental values of NBS, such as values related to biodiversity, cooling, stormwater regulations, air pollution reduction and carbon sequestration, energy saving, and wind and noise reduction. The following may be useful for NBS value capturing:

- **i-Tree Suite of software tools** (i-Tree, 2023; see also Step 5). For trees and shrubs, this is likely the most promising set of assessment tools. Focus is placed on a suite of environmental services, such as cooling and energy savings, air pollution reduction, stormwater regulation and carbon capture. The full range of tools (e.g. i-Tree Eco) is not yet available to all countries, because this requires including country-specific meteorological, species and other data; however, some basic assessments can be made with some of the simpler tools (e.g. i-Tree Canopy).
- **InVEST** (Natural Capital Project, 2023a). This Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) is a set of models used to map and value the goods and services from nature that sustain and fulfil human life. A range of models is available for many different values, including environmental ones. More recently, an urban version of the set was developed (Urban InVEST, 2023b). Although the urban part of InVEST is still under development, the first of several new Urban InVEST models, namely Urban Cooling and Urban Flood Risk Mitigation, were released. Moreover, some models in the original InVEST software suite are applicable to urban systems, and ecosystem services such as pollination, climate change mitigation (e.g. carbon storage and sequestration), scenic quality, coastal hazard protection, habitat quality, habitat risk assessment, and recreation. For an application of the InVEST model to urban NBS, see Guerry *et al.* (2023).
- The **CIRIA's Benefits Estimation Tool** (CIRIA, 2023) provides a structured approach to evaluating a wide range of benefits from blue-green infrastructure (particularly sustainable drainage systems and natural flood management), often based on the overall performance of the chosen intervention. It follows a simple structure, beginning with screening and qualitative assessment to identify the benefits to evaluate further. Where feasible, it provides support to help quantify and monetize the potential benefits and can help underpin collaborative working. The downside is that this is a licensed tool that comes at a cost, whereas tools such as i-Tree are free of charge.



While the above tools allow to place a monetary value of selected environmental services, value could also be captured by showing impacts in terms of changes, for example, in air and water quality and pollution levels, amount of carbon captured, changes in wind and noise levels, and temperature reductions.

For biodiversity assessment, a wide range of tools can be used, many of which have become well-established, such as for species and habitat inventories, the use of indicator species, and landscape assessments:

- the **Biodiversity Metric**, developed by the UK Department for Environment, Food and Rural Affairs, and Natural England (2021) as part of the Biodiversity Net Gain principle. Although this metric is developed for a UK context, it could inspire similar points systems for use elsewhere;
- the **Green Space Factor**, initially developed for the city of Malmö, Sweden. Although this has a less specific focus on biodiversity, it nevertheless has a scoring system for different types of vegetation, green spaces and other biodiversity components (Kruuse, 2011);
- widely used tools such as the **Simpson's Diversity Index** (e.g. Statology, 2021); and
- **'bioblitzes'**, which a communal citizen-science effort to record as many species within a designated location and time period as possible (iNaturalist, 2024).

While less suitable at the site or smaller scale, several tools are suitable for assessing biodiversity larger scales (e.g. city scale). Some examples are the **European Urban Biodiversity Index** (Ruf *et al.*, 2018), a composite indicator for biodiversity in cities developed by the European Environment Agency, and the **Singapore Index on Cities' Biodiversity** (Chan *et al.*, 2021).

Detailed guidance manuals are available for all of the above. Often, cities also have their own biodiversity assessment frameworks and tools that should be considered.

## Socio-cultural values

Under this value category, benefits to be considered for value capture can include, *inter alia*, recreation and tourism, the building of social cohesion, learning, reduced crime rates, aesthetics and higher appreciation of the local environment; many well-established tools and methods are available for several of these, such as assessing visitation and use of parks and other green spaces.

Although the impacts of social cohesion in a neighbourhood can be very important, they are also difficult to assess. There are specific tools that can assess levels of neighbourhood satisfaction and social cohesion and



connectedness; for instance, the Foundation for Social Connection (F4SC) has an **inventory of social connection measurement tools**, and Jensen (2010) provides examples of how this could be achieved through a set of indicators.

Some methods and tools that can assist with capturing social-cultural values in monetary terms are:

- **INVEST**, as discussed above, for scenic value and recreation;
- **measuring the impact of the NBS on tourism**, as in the example of Central Park in New York by Appleseed (2015). Tourism impacts can relate to, for instance, the number of nights at hotels etc. near the park and money spent by tourists at concessions and other businesses in and near the park;
- **capturing recreational values** using, for example, travel cost methods and willingness to pay, and placing a value on the time spent in parks and other green spaces;
- **reducing the crime rate** and saving costs, for example, by reducing incarceration; and
- **hedonic pricing** to evaluate the impact of the NBS on property values and rents.

In non-monetary terms, socio-cultural values can be assessed in various ways. For recreational use, for example, changes in visitor numbers, types of activities, types of users and visitor satisfaction can be monitored. What impact does the NBS have, and how does this change over time? Is the new park, for example, living up to its expectations? Measures and metrics such as the average distance to a public green space, local canopy cover, and area of green space within an area or per person can all be useful to track the value and impacts of NBS. A useful metric for enhancing access to trees and green space for all is the **3+30+300 rule for greener and healthier cities**. This rule or Guideline calls for every resident in a city, town, or even village should be able to see at least three large trees from their home, school, or place of work. It also requires at least 30 percent canopy cover in each neighbourhood and no more than 300 metres to the nearest high-quality public green space.

Through surveys and interviews, other socio-cultural values can be measured and monitored, for example, those related to residents' satisfaction with their neighbourhood before and after an NBS is implemented, connections to neighbours, among others.

## Health values

The NBS implemented can change the physical, mental and social health of local residents and visitors. Various measures and indicators can be used to monitor health impacts in the shorter and longer term. Some of these are more epidemiological and use existing health data, for example,



data-related changes in specific health indicators to NBS implementation (e.g. greening of a neighbourhood), while others use self-reported health surveys. The latter are easier to use, since residents can respond to a series of questions on their well-being, health and overall happiness. See, for example, the study by Wolfe *et al.* (2014) on green spaces and changes in self-rated health among people with chronic illness.

**Health impact assessments** (HIAs) are tools to make more comprehensive assessments of the expected or actual health impacts of projects and interventions. Similar to environmental impact assessments, HIAs estimate the potential positive and negative effects of a policy, programme or intervention on the population's health. HIAs also assess how these effects are distributed across different socio-economic groups. World Health Organization (WHO, 2023) provides an overview of the HIA process, with the steps of screening, scoping, appraisal, reporting and monitoring. Organizations such as the Barcelona Institute for Global Health have undertaken HIAs specifically for NBS and urban greening programmes (see, for example, Vidal Yañez *et al.*, 2023), relating increases in green cover and in the score of the Normalized Difference Vegetation Index (NDVI) to changes in self-reported mental health, medical visits and medicine sales. HIAs can generally be used to relate green interventions to changes in morbidity and mortality, depending on the availability of data and plausible understanding of how green impacts different health indicators.

Health impacts of NBS implementation can also be expressed in monetary terms, for instance, by assessing changes in medication and the use of the medical system. Examples include the impact of increasing canopy cover on reduced morbidity during heat waves and lower occurrence of mental health problems.

Both health and environmental impact are considered in the **CO-IMPACT tool** developed by Connecting Nature (2022). CO-IMPACT is a decision-support tool whose main objective is to streamline the process of building a baseline and impact assessment plan, accompanied by a final report that provides advice on suitable methodologies based on scale and project characteristics. CO-IMPACT Guides users step by step through an intuitive process, where they select the targets, they intend to reach with their NBS/project, and the tool provides a set of indicators adapted to these benefits.

## Economic values

Some of the economic values of NBS can be more direct, for example, when marketable goods such as food or timber are produced. Thus, it is possible to conduct an assessment of the approximate market value of the production from community gardens or from timber harvesting and salvaging. Also related to environmental values are the values of carbon credits that could be connected to NBS implementation.



Parks and other green spaces can also have an economic impact on recreation and tourism, as discussed above. Some of these values can be captured more directly, for instance, through park event or entrance fees and concession fees for restaurants, cafés and hotels. More indirectly, for example the travel cost method can be used.

The impact of NBS and green space in general on property prices can be estimated by using hedonic pricing and other economic assessment methods. It is also possible to obtain sales and rental information from estate agents or publicly available information and relate them to factors such as neighbourhood greenness. When an NBS is implemented it could have an impact on sales and rental prices extending beyond changes that would have occurred due to general market development. Focus is often placed on costs avoided by the NBS intervention; this is also the principle used by models such as i-Tree and InVEST. What would have been the alternative costs of technologies and energy, etc. to be used for cooling, air pollution reduction and stormwater regulation? Table S6.2 provides an example of capturing value of a specific NBS.



**Table S6.2. Example of NBS value capturing**

<b>NBS value</b>	The cooling effect of tree planting and canopy cover increase (compared to the baseline), for example, from a 8 percent canopy cover in a specific neighbourhood to 15 percent in 15 years.
<b>Value impact</b>	Cooling the environment of a certain amount of degrees, providing shade and more comfort during the hottest days (environmental and health value).
<b>Value capturing in monetary and non-monetary terms</b>	<p>Costs related to planning and design, growing of trees in nursery, establishment and aftercare of trees (e.g. watering), longer-term maintenance (e.g. pruning) and replacement costs when trees fail.</p> <p>Compare with the costs of other cooling tools to achieve similar effects (e.g. canopies for shade, air conditioning). Saved energy cost.</p> <p>Also, less morbidity and mortality, especially during heat waves, expressed in, for example, premature deaths avoided, and fewer sick days and doctor visits.</p>
<b>Assessment tools and methods</b>	Assessment tools used for temperature measurements and thermal comfort surveys, for example, i-Tree and InVEST (also for calculating monetary value), and health impact assessments.
<b>Likelihood of impact/risk</b>	<p>Likely to very likely.</p> <p>However, this depends on the survival and vitality of trees, and the growth of canopy to the expected level, which is associated with proper maintenance, including watering.</p>
<b>Who wins or loses?</b>	<p>Winners: Most local people (less problems during heat-waves).</p> <p>Losers: Some nearby residents may experience other people using their property too frequently.</p>
<b>Synergies and trade-offs</b>	<p>More trees also can result in social benefits, biodiversity gains and stormwater management benefits, which can be captured in monetary and non-monetary terms.</p> <p>More trees can generate disservices such as too much shading/darkness, allergies, fallen limbs, damage of overhead electricity lines and other infrastructure (e.g. sidewalks). Also there is a risk of green gentrification: i.e. too much shading could result in lower property prices.</p>
<b>Potential negative impacts and mitigation measures</b>	<p>Potential negative impacts: allergies to pollen, too much darkness and the feeling of unsafety, fallen branches, damage to infrastructure, etc.</p> <p>Potential mitigation measures: risk assessment and contingency planning, community collaboration, adaptive management and maintenance.</p>





## Further considerations

**The values of NBS are not static but rather, change over time.** A simple example is that of a tree that will only provide a full range of ecosystem services when it reaches maturity, or a park or green roof that will take some time to achieve full functionality. In contrast, vegetation ages and trees and other plants will decline and no longer be as functional after a certain time. Parks can also decline, for example, due to changing recreational preferences and ageing facilities. Rain gardens and sustainable drainage systems can lose their functionality, for instance, when not maintained properly.

It is important to provide a realistic idea of how revenue streams (as well as costs for maintenance and possible replacement) will change over time. Moreover, as mentioned at the beginning of this step, costs will also change with planning and establishment often being in focus and maintenance costs on the longer term being ignored. A **life-cycle approach** of the NBS will be needed, as mentioned under Step 3. When will replacement or a renovation be needed? When do trees and other plants require replacement, based on the best available information?

## Combining the different values, benefits, and costs captured

Many but not all values can be expressed in monetary terms. Therefore, ways must be sought to compile and weigh the different values for making the business case. In addition to **cost-benefit analysis**, which combines both the benefits and costs of the proposed NBS intervention, this can include methods such as **multi-criteria analysis** and **risk-opportunity analysis** (e.g. Chausson et al., 2023). At a minimum, a clear overview and estimate must be provided of the full range of values and all costs over the lifetime of the NBS project.

Earlier mentioned reports such as by Panduro *et al.* (2021) and the World Bank (2021) can help with your cost-benefit analysis and the wider compilation of all values, benefits and costs and/or resources needed. There are many studies that can provide further inspiration, such as the cost-benefit analysis of nature-based solutions in Turin using InVEST by Biasin *et al.* (2023).

One way to present all values, benefits, costs and resources needed is to prepare a matrix with all values and benefits on the left, and costs and resources needed on the right. A further distinction could be made between monetary and non-monetary benefits and costs.



Depending on the specific NBS and the local context, etc., the primary values and business case to be made may be economic. An example of this is the establishment of extensive green roofs to save energy cost. Alternatively, values may be related to, for example, biodiversity or health as the primary argument, such as in establishing wildflower meadows or planting trees along streets.



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## STEP 7

# Making the NBS valorization case



### Basics

In this final step, all information from the previous steps is compiled. On this basis, a strong values and business case is prepared for decision-makers and potential funders. A business plan can help make the case for valorization, but the case also needs to be presented to the local communities that are impacted by the NBS. Making the right 'pitch' for different audiences is important and will require sound communication planning.

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

STEP 7



## Bringing it all together

In the previous six steps of this Guide, you developed a business and value case for one or more NBS. This began by describing the specific context and scale of NBS implementation and the key problems and challenges to be addressed (Step 1), followed by developing your overall vision and objectives for NBS implementation (Step 2). Based on these two initial steps, one or more specific NBS were chosen and described in detail (Step 3). Next, using the Nature-based Solutions Business Model Canvas, a value proposition was developed (Step 4) and key information was provided on how to undertake NBS value creation and delivery (Step 5). Finally, specific ideas for capturing value were presented in Step 6.

In this last step, all previous steps are brought together, and on this basis, **a strong valorization and business case is made**. It is important here to make the case with the specific target audiences in mind, be it decision-makers who will potentially give the go ahead for NBS implementation, local communities whose support you would need, or potential funders.

It is important to not only present the key information compiled during the valorization process, but also to ‘package’ it in a strong narrative aimed at the specific target audience(s). Often, more than one audience is targeted and will require a different **narrative and ‘pitch’**.

## Targeting funders: Bankable business plans

Although you now have most building blocks for making the case for NBS valorization, you will often have to present it in the form of a comprehensive, well-structured and convincing **business plan**, for example, when you approach funders. Here, a first step is to identify who could fund (part of) the NBS intervention. Each potential funder may require a somewhat different approach and the case for NBS values and the business plan need to be tweaked.

A lot of guidance is available on how to develop a business plan. See, for example, the **guidance by C40 Cities on financing and implementing NBS** (C40 Cities, 2023), as well as the more generic **template for business plans** by Forbes (2023). Much of the information to be included can be derived from your use of the Nature-based Solutions Business Model Canvas and the valorization steps you have followed. But a business plan goes beyond this and presents the business case in a format recognizable for investors and decision-makers. Important components of a business plan are, for example, according to FAO’s **Developing bankable business plans - A learning guide for forest producers and their organizations** (Boscolo, Lehtonen and Pra, 2021):

- **The NBS business idea:** This is your proposed use of NBS as an efficient, effective and equitable way to address specific problems and challenges, and make a positive impact. This also includes your value proposition.



- **Assessment of the NBS business environment** and the relevant regulatory, legal and policy environment for the NBS.
- **A market outlook:** This relates to the way the specific NBS compares from a business and value perspective to alternative solutions.
- **The organization, governance and resources needed** for value delivery, including logistics, technologies, knowledge, etc.
- **Financial analysis:** What will be the costs and benefits on the short and longer term? What does the cost-benefit analysis tell you? How can value be captured? What are the funding and investment needs?
- **Risk analysis:** What are the risks associated with NBS implementation? Do you think that the predicted revenues and costs over time are credible? How can risk be mitigated?

Several of these aspects are also covered in the **RISE4NBS** framework developed by the **ThinkNature project** (e.g. Coles *et al.*, 2019); investment options and funding streams are specifically mentioned.

The different business plan components were all addressed in the different steps of this valorization Guide, so you can base your plan on the information you have compiled.

For potential funders and investors, it will be important to show that the invested money will be well spent. Often, they will expect revenue and profit from their investment, but when investing in NBS, they may have other concerns, such as environmental and social corporate responsibility.

## Targeting decision-makers: Pitching the case for NBS and alternatives

Decisions on whether or not to implement specific NBS are often taken by municipal authorities and other public actors. Sometimes they are made within the administrative structure, and sometimes, for example, for larger-scale NBS projects, city councils, and other political structures are involved. Decision-makers can also come from the business/private sector (e.g. companies that want to implement NBS on their property) or civic society (for not-for-profits).

The decision-makers to whom the NBS is pitched are often also potential full or partial funders, as in the case of local government. Thus, the pitch to be made will include the business plan, although perhaps in a somewhat different form.

**The pitch to be made to decision-makers goes beyond the case for valorization.** What are the environmental, social, health and economic values of the proposed NBS? What will be required in order deliver them (e.g. in terms of funding and other resources), and how can value be captured? How likely will these values delivered? How does the proposed



NBS compare with other NBS and non-NBS alternatives to solve the same problems? How will local communities and residents be impacted? What will be expected from the different partners in delivering the NBS?

For formal decision-making processes, for example, within local government, the information compiled in the different steps of this valorization Guide can be presented in a report. In addition, more detailed, comprehensive information should be included, such as an executive or policy summary that describes the valorization case in one or two pages. A completed Nature-based Solutions Business Model Canvas will be an important component of this. The use of **visuals and visualizations** (e.g. 'poster style') can also help pitch the valorization case. It can also be useful to use examples and reference cases of similar NBS implementations, ideally in comparable contexts.

## Targeting communities: Enhancing support and engagement

As stressed throughout this Guide, it is essential to engage the local communities (e.g. local residents) that will be impacted by NBS implementation in the valorization and decision-making process. The 'pitch' and narrative will be different for this target group, also depending on the extent to which these local communities have been involved throughout the valorization and NBS development process.

A clear and balanced insight should be provided of **how the NBS will impact local communities**. This is not only about the positive environmental, social, health and economic values that people can obtain when NBS delivery is successful, but also potential drawbacks and disvalues. Some drawbacks may be only short-term or will only affect some people. It should be made clear that the awareness of these negative impacts will inform mitigation efforts that reduce negative impacts while optimizing the positive ones.

Also, when communicating the case for NBS value with local communities, it can be very helpful to use **visuals** and to provide examples of similar NBS implementation. Possibly, residents can even be shown real-life examples of the NBS already implemented elsewhere in the city. This will make the proposed implementation more 'real' for local residents.

The ultimate goal of making the case for valorization to local communities is not to just have their acceptance, but also to obtain their support and even engagement in NBS delivery and longer-term stewardship. In some situations, local residents can play a vital role in supporting the maintenance of the NBS in different ways. Local stewardship can also reduce vandalism and other negative impacts.



## Communicating a strong values and business case

The above components and activities should be brought together in a **comprehensive valorization plan**, which can be built on the information compiled by using this Guide. In addition, it should include a **communication plan** component that specifies what the key messages are for the different target groups and what means and narratives will be used to communicate these messages. In brief, the key elements of a communication plan answer the following questions:

- With whom are you communicating and what are the different audiences you are interacting with?
- What message do you want to convey to the different audiences? Why?
- What communication tools and platforms will you use for the different audiences?
- When will the message be communicated?
- Who will communicate it?
- What resources will be needed?

Further inspiration for developing your plan can be obtained from specialized websites, such as Creately (2023) with its **communication plan template**, or Community ToolBox (2024), with its **step-by-step guidance on developing a communications plan**.

Once again, it is important to stress that a longer-term perspective needs to be adopted for costs and revenue streams, such as a realistic overview of longer-term maintenance costs that will secure value delivery. It is also important to define ways of monitoring the NBS project to determine whether value delivery works as planned or requires adjustments and transformations.





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# APPENDIX 1-1 – Considerations for the NBS valuation

As discussed by Chausson *et al.* (2023), it is essential that, regarding NBS and their financing, it is essential to go beyond market-based mechanisms. According to the authors, a narrow focus has the following various pitfalls:

**Limits to scalability** – It is difficult to quantify and map flows of the ecosystem services delivered by NBS, even at the landscape scale. Moreover, there is a bias towards some types of ecosystem services, primarily those that are instrumental, tangible or easily measured with numerical metrics. The costs of NBS should include transaction costs, costs of implementation, as well as costs of management and monitoring. There is still a lack of market maturity for NBS. Alternative funding mechanisms remain essential.

**Reinforcing the separation of nature and people.** The NBS market-based approach promotes an extraction framework (i.e. humans primarily treating nature as a resource for extracting products and services) and is rooted in the ‘nature for people’ perspective.

**A limited view of barriers to scaling NBS.** There is often a narrow focus on economic rationality and thus there is a need to prioritise rights-based approaches as well as local decision-making. Adaptation activities (e.g. climate-related) need to be locally driven.

**Changes in governance and achieving equity for indigenous peoples and local communities IPLCs).** There are issues with distributional and procedural equity. There is a need to involve, co-design, and reduce biases. Notions of ‘capital’ and ‘assets’ can be problematic, e.g. in conflict with alternative worldviews.

**Reinforcement of Global North Global South power imbalances.**

The authors also provide recommendations for addressing these pitfalls:

- **Recognize NBS as place-based partnerships between people and nature that harness diverse values.** NBS need to have local relevance and meaning; delivering benefits to local communities should come first. Also, a greater range of values needs to be represented in decision-making.
- **Recognize the role of IPLCs as leaders of NBS.** Develop robust governance mechanisms that ensure that NBS are responsive to local communities’ priorities and preferences, are attentive to diverse and marginalized actors within broader communities, and have appropriate accountability mechanisms in place.
- **Recognize alternative modes of finance.** Harmful government subsidies need to be repurposed, and environmentally harmful activities need to be taxed while incentivizing environmentally beneficial activities. Direct funding of nature is also needed.
- **Shift away from the imperative for economic growth.** Embrace alternative metrics accounting undervalued public goods and services, including through ecosystems and biodiversity, and their socioeconomic distribution.



# Appendix 2-1 – Overview of ‘families’ in and specific typologies of NBS

**Table S3.1. Overview of ‘families’ in and specific typologies of NBS**

<p><b>NBS family: Urban forests</b></p> <ul style="list-style-type: none"> <li>- Forests (e.g. remnant woodland, managed forests, mixed forms, phytoremediation forests, ecological forest corridors)</li> <li>- Tree alleys and street trees, hedges</li> <li>- Tree meadows</li> <li>- Orchards</li> <li>- Tree-lined streets</li> <li>- Boulevards</li> </ul>	<p><b>NBS family: Urban blue spaces and wetland solutions</b></p> <ul style="list-style-type: none"> <li>- Lakes and ponds</li> <li>- Rivers and streams</li> <li>- Dry riverbeds (or ramblas)</li> <li>- Canals</li> <li>- Estuaries</li> <li>- Deltas</li> <li>- Sea coasts</li> <li>- Constructed wetlands (e.g. surface constructed wetlands, subsurface gravel wetland, floating wetlands)</li> <li>- River floodplains (e.g. river bypass or oxbow, re-activating the floodplain)</li> <li>- Coastal littoral/mangrove forests</li> <li>- Salt marshes</li> </ul>
<p><b>NBS family: Urban Agriculture</b></p> <ul style="list-style-type: none"> <li>- Allotment garden</li> <li>- Community garden</li> <li>- Arable land</li> <li>- Grassland</li> <li>- Horticulture</li> <li>- Biofuel production/agroforestry</li> <li>- Raised beds</li> <li>- Amphibious farming</li> <li>- Floating farming</li> </ul>	<p><b>NBS family: Bioretention and water management solutions</b></p> <ul style="list-style-type: none"> <li>- Bioswales</li> <li>- Rain gardens</li> <li>- Detention ponds</li> <li>- Retention ponds</li> <li>- Water-sensitive urban design measures (e.g. infiltration basin, underground storage, biofilters).</li> </ul>
<p><b>NBS family: Urban green spaces</b></p> <ul style="list-style-type: none"> <li>- Large urban parks</li> <li>- Historical parks /gardens</li> <li>- Green playgrounds, school grounds</li> <li>- Neighbourhood green spaces</li> <li>- Institutional green spaces</li> <li>- Green sport facilities</li> <li>- Cemeteries and churchyards</li> <li>- Camping areas</li> <li>- Pocket park</li> <li>- Botanical garden/arboretum</li> <li>- Residential park.</li> </ul>	<p><b>NBS family: restoration and bioengineering</b></p> <ul style="list-style-type: none"> <li>- Daylighting of rivers and streams</li> <li>- Reprofiling, extending flood plain areas</li> <li>- Channel widening and length extensions</li> <li>- Reprofiling the channel cross-section</li> <li>- Diverting and deflecting elements</li> <li>- Living revetment</li> <li>- Measures of bioengineering (e.g. living fascines, revetment with cuttings, planted embankment mats).</li> </ul>



<b>NBS family: Building integrated green solutions</b>	<b>NBS family: Natural and semi-natural areas</b>
<ul style="list-style-type: none"> <li>- Balcony greens</li> <li>- Ground-based green walls</li> <li>- Facade-bound green walls</li> <li>- Extensive green roofs</li> <li>- Intensive green roofs</li> <li>- Atriums</li> <li>- Vertical greening (e.g. noise barriers as ground-based greening, free-standing living walls, mobile vertical greening, moss walls, living plant construction)</li> <li>- Green roofs (e.g. smart roof, constructed wet roof).</li> </ul>	<ul style="list-style-type: none"> <li>- Shrublands</li> <li>- Wetlands (e.g. bog, fen, marsh, natural inland wetlands)</li> <li>- Sandy shores.</li> </ul>
<b>NBS family: Green infrastructures and corridors</b>	<b>NBS family: Other NBS and innovative solutions</b>
<ul style="list-style-type: none"> <li>- Street greening and green verges</li> <li>- House gardens</li> <li>- Railroad banks</li> <li>- Green avenues</li> <li>- Urban green corridors</li> <li>- River and stream renaturation.</li> </ul>	<ul style="list-style-type: none"> <li>- Biofilters (air quality)</li> <li>- Mounds</li> <li>- Terraces and slopes (e.g. living smiles, wattle fences, vegetated gabions)</li> <li>- Private, commercial, industrial, institutional urban green spaces (UGS) and UGS connected to grey infrastructure.</li> </ul>



# APPENDIX 3-1 – Example of using the NBS description checklist

## Case study: The transformation of an abandoned tramway into a green urban corridor in Turin, Italy

Turin, Italy provides an exemplary case of nature-based solution (NBS) application for rejuvenating unused or obsolete infrastructure. In June 2020, the Municipality of Turin established its inaugural linear park, Precollinear Park, established on a 700-m stretch of an abandoned tramway. What makes the Park stand out is not just that it was created on an abandoned space, but also that it is rooted in the community's needs; i.e. the linear park gave back to the community a public space that had lost its function and gave new life to a green strip that connects four neighbourhoods. With minimal investment and a community-centred approach, Turin has showcased a replicable model, highlighting that urban rejuvenation can be achieved through innovative yet straightforward transformations.

### NBS Description Checklist

<b>Type of NBS and purpose</b>	<b>NBS approach and type</b>	NBS approach: enhancement  NBS type: temporary green corridor
	<b>Targeted challenges</b>	Rehabilitating unused tramway, combating urban heat, promoting biodiversity
	<b>Ecosystem services</b>	Climate regulation, habitat creation, recreational space, pedestrian pathway (mobility)
	<b>Interaction with local biodiversity</b>	Integration of mature trees and local plant species, and providing a habitat corridor
<b>Design basics and location</b>	<b>Components</b>	Walking paths, benches, shaded areas, art exhibition spaces
	<b>Implementation scale</b>	Stretches along the entire length of the abandoned tramway
	<b>Location/region of applicability</b>	The Precollina neighborhood in Turin, crossing the River Po
	<b>Site analysis</b>	Presence of mature trees, existing metal tracks and wild grasses between tracks
	<b>Dimensional details</b>	700 metres along a linear tramway stretch



<b>Conditions for implementation</b>	<b>Land requirements</b>	The abandoned tramway and some space on either side for vegetation
	<b>Land ownership</b>	Municipal
	<b>Urban land classification</b>	Public domain
	<b>Current usage</b>	Abandoned
	<b>Expert consultations</b>	Collaboration with urban planners and Torino Stratosferica organization
	<b>Soil and water conditions</b>	Use of existing soil and trees and minimal interventions for plant growth
	<b>Local regulations</b>	Conversions compliant with city regulations while preserving the tramway's historical aesthetics
<b>Design Details</b>	<b>Sketching or image of the current state of the site (to be compared to after implementation of the NBS)</b>	<p>Conversion of tramway into a temporary green corridor with separate sections for varied uses</p> <p>Far and close view</p> 
	<b>Spatial arrangement</b>	Walking paths intertwined with green spaces, exhibition areas and seating spots
<b>Materials and components</b>	<b>Material inventory</b>	Native plants, recycled wood for benches, and exhibition materials
	<b>Selection criteria</b>	Native plants chosen for sustainability over time
<b>Infrastructure interaction</b>	<b>Urban integration</b>	Integration with Turin's urban matrix while maintaining distinct identity as a green corridor
	<b>Replicability</b>	Replicable in other areas of the city and in other mountain cities with abandoned tramways
<b>Growth and evolution</b>	<b>Life cycle assessment</b>	Evolution of vegetation over X years, with provisions for maintenance
<b>Maintenance</b>	<b>Task list</b>	Regular weeding, cleaning, and ensuring safety along the path
<b>Stakeholder involvement</b>	<b>Key stakeholders</b>	Turin Municipal Council, local businesses, residents, volunteers, and Torino Stratosferica, non-profit association
	<b>Community engagement</b>	Cultural events focusing on urban and social themes, book presentations, sports and yoga lessons, live music, neighbourhood events, school and resident workshops, cultural initiative presentations

## APPENDIX 4-1 – Example of a detailed NBS value proposition

<b>NBS to be implemented: The greening of the schoolyard of a secondary school in a dense urban area, by increasing tree canopy cover by 10 percent and establishing a small school garden of 250 m2 for growing vegetables.</b>	
<b>Environmental Value Proposition</b>	<p>Cooling through shading and evapotranspiration; based on research experienced temperature (thermal comfort) under the trees can be 10 °C lower.</p> <p>Biodiversity will be enhanced by creating more habitat for birds and insects.</p> <p>Air pollution can be reduced in particular by capturing particles when trees are placed close to a busy adjoining road.</p>
<b>Social Value Proposition</b>	<p>Pleasant areas are created for play during school breaks.</p> <p>Cooler temperatures will make learning easier.</p> <p>The community garden can be used in teaching and educate children on growing vegetables.</p>
<b>Health Value Proposition</b>	<p>Better physical health due to cooler outdoor space, which stimulates more games and play.</p> <p>Greener schoolyards with, for example, more visible green areas enhance learning and reduce stress (also of staff).</p>
<b>Economic Value Proposition</b>	<p>Cooling through trees can help reduce air conditioning costs in summer.</p> <p>Lowering of stress can result in few sick days among staff.</p> <p>The vegetable garden can produce vegetables and fruits, hence less vegetables need to be purchased.</p>
<b>Possible value synergies to be enhanced</b>	<p>Many of the values described above can go hand in hand, for example, cooling, mental health promotion, and enhanced biodiversity by planting trees. The vegetable garden stimulates learning and social interactions while also producing fruit and vegetables.</p>
<b>Possible value trade-offs to be managed/minimized</b>	<p>Too much shading of the vegetable garden by trees can have a negative impact on some crops.</p> <p>Trees can have different properties (e.g. leaf size) that impact contributions in terms of aesthetics, cooling and air pollution reduction.</p>
<b>Possible disvalues to be managed</b>	<p>Some trees and other plants produce a lot of pollen and can cause allergic reactions.</p> <p>Trees and plants attract insects such as bees and wasps, which can create nuisances such as stings and allergic reactions.</p>
<b>Potential values lost by implementing the NBS</b>	<p>Using part of the schoolyard for a community garden takes away paved surface that promote some sports activities.</p> <p>Perhaps there is less space for movement of larger groups of pupils and visitors.</p>





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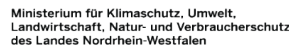








# Project Partners



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 867564