



Valorisation of Nature-based Solutions

A step-by-step guide



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Introduction

Making the business and valorisation case for Nature-based solutions

Nature-based solutions (NBS) are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature (IUCN, 2023). These can range from local solutions like a raingarden, street tree planting, or green roof, to a city-wide green infrastructure approach.

One of the key differences between NBS and grey infrastructure is that NBS are designed to work with nature, while grey infrastructures are often designed to control it.

Recent years have seen a growing interest in NBS across Europe and elsewhere. However, their implementation often does not live up to its full potential. One major obstacle is the insufficient funding from both the public and private sectors. This lack of financial support can often be attributed to the difficulty in recognizing the value of NBS and consequently creating strong business cases to justify investments.

A well-known example of a successful business case for urban trees as an NBS is that of New York. By calculating the various environmental benefits of trees, also in monetary terms, and comparing benefits with cost, the case for trees was made 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 within the Horizon Europe CONEXUS project on NBS, in European and Latin-American cities. The project developed this document to provide **step-by-step guidance** on how to build the NBS business case as well as a wider valorisation of specific NBS. It also offers a range of specific methods, tools and examples for each of the steps.

Recognising the **values** of NBS requires going beyond making the business case and overcoming a merely economic perspective. It requires recognition of a plurality of values and more holistic valuation methods not limited to the benefits for end-users but also includes broader environmental, economic, social, and health values.

The value of something can be determined in different ways. In **monetary market terms**, for example, we pay specific prices for products we buy in the supermarket or for services like internet access. From an NBS point of view this could relate to buying wood from a local woodland or paying for a ticket to visit a botanical garden. **Monetary non-market values** relate to our attempts to place a monetary value on something that is not directly traded on markets, such as the pollution reduction by trees and other vegetation. **Non-monetary approaches** are often used to determine values as well, from measuring temperature differences in degrees °C or °F, concentrations of pollution in the air, the number and diversity of certain animal species, but also individual human values ascribed to e.g., the experience of a landscape. (see also Andriessen, 2005)

Therefore this guide takes a wider **valorisation** approach, showing to different target audiences what the different (monetary and non-monetary) values of a specific NBS are and how these can be optimised. Valorisation is also about comparing between different NBS, and between NBS and other (non-green) solutions. In more technical terms, valorisation can be defined as the process of creating value from knowledge, by making knowledge suitable and available for societal and/or economic application and by transforming it into competitive products, services, processes, and new business to benefit society and public health (Vrije Universiteit Amsterdam, 2023).

Valorisation is strengthened when all **relevant actors and their interests are involved**. The question that needs to be asked is: who will benefit from the NBS and who will lose, and what is the extent of these gains and losses? It is essential to have a **strong focus on local urban communities**, as these live in the urban landscapes where the NBS are implemented. They are also usually strongly affected, often positively but potentially also negatively, by NBS decisions. Municipal councils as decision-makers should represent and value the interests of local communities. Appendix A includes some of the considerations for sound valuation and valorisation of NBS according to Chausson et al. (2023). Valuation and valorisation are often complex in the case of NBS.

Valorisation can contribute to the communication about specific NBS, their planning, the identification of partners, the exploration of sources of finance, securing support, and to aid decision making (Chausson et al., 2023).

The key **target audience** of this guide are, therefore, those proposing, deciding on, and (considering) funding NBS implementation. Specifically these are:

- **Decision makers** in urban areas who decide on the implementation of specific NBS. These are usually public actors (such as city councils) but can also be market or civic society organisations, such as businesses, NGOs, and resident groups. The latter are particularly important as well, as they live with the new NBS and in many cases receive the benefits but may potentially experience drawbacks.
- **Funders** who are interested in supporting and investing in these urban NBS. In many cases these are the same as the above (for example, public authorities) but they can also be e.g., private foundations, government bodies with funding/subsidy programs and businesses (including SMEs).

Scope and structure of this document

This stepwise guidance for NBS valorisation has at its core a specific version of the Business Model Canvas tailored for NBS (Fig. 1). This customised canvas was developed by the Connecting Nature project and 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 (NBS) Business Model Canvas (BMC)** is an easy-to-use tool to help you capture in a visual format the business model of your 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 et al. (2005).

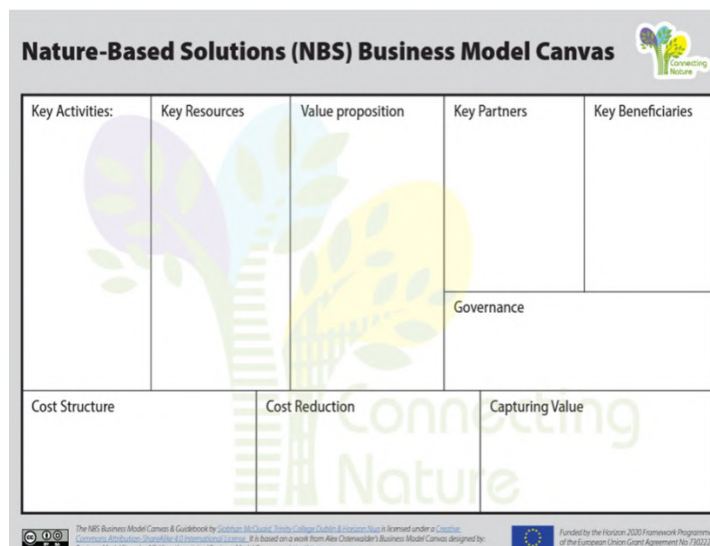


Fig. 1. The Nature-Based Solutions Business Canvas Model. Source: Connecting Nature (2019).

The adapted NBS-BMC recognises that NBS business models are different from conventional business models in terms of the importance of delivering societal and environmental value wider than the value for the business itself.

The canvas consists of various **segments**:

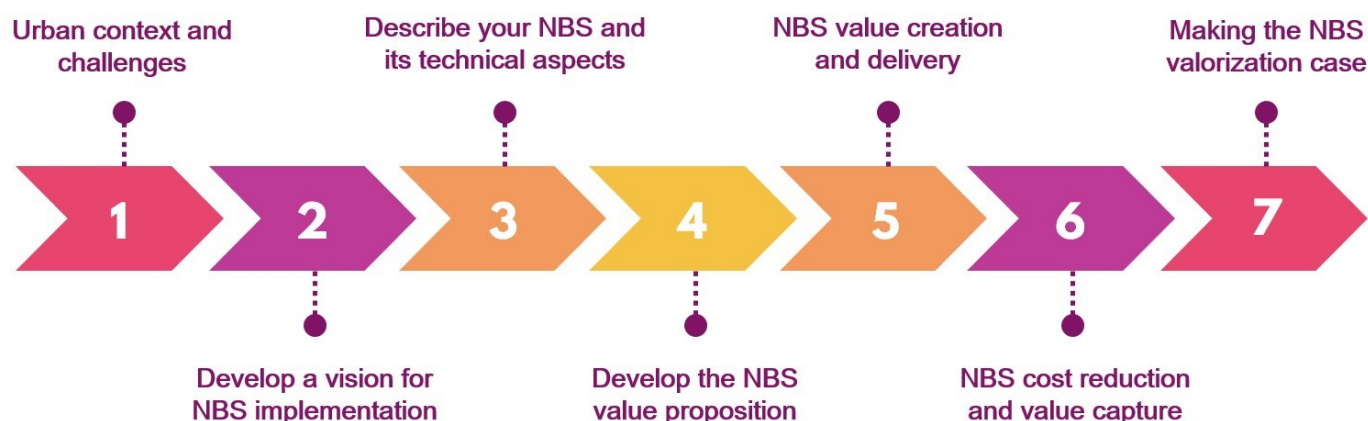
- 1) **The Value Proposition.** This is the core driver of the business model, essentially what is on offer. This could be relating to environmental, social, or economic value.
- 2) **Value Creation & Delivery.** It refers to key activities and key resources that make up the project and are performed/supplied by Key partners for the Key beneficiaries (referred to also as the end-users). Collaborations and partnerships between these actors are set within specific Governance structures.
- 3) **The Value Capture** comprises the Cost structure and relates to the typical costs associated with a business. In the case of NBS, capturing value will mostly not be just financial (contrary to the original Business Model Canvas). Value may have many forms of manifestation in terms of jobs, ecosystem improvement, community building, and so forth. Value can also emerge through cost reduction, as in the case of reducing cost of stormwater management or cooling.

In our further adaptation of this approach, this guide helps you **make the NBS valorisation case in seven steps**. The steps are iterative, although it will be quite common to move back and forth between the steps, and even address them in parallel. The description of each step starts with a brief summary of the 'basics', followed by a more in-depth description of how to compile information. At the end of each step is included a checklist for easy reference.

The seven steps to be followed for making the valorisation case are:

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

Although the NBS Business Canvas Model is at the core of the guidance (see especially steps 4, 5, and 6), we also include steps related to a careful analysis of the context in which the NBS is implemented as well as the key problems or challenges that implementation will address. 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. Finally, in step 7, the analysis needs to be brought together in an NBS valorisation case to decision-makers and funders. This will require, among other things, developing a business plan for the NBS.



Step 1

Describe the context and challenges

Basics

Every Nature-Based Solution (NBS) is as unique as the urban environment it serves. Factors influencing this environment include governance, policies, legislation, local community characteristics, environmental factors, climate, and more. In the initial step of your NBS valorisation process you first have to define the problems and challenges to be addressed with NBS. You also need to understand the context where the NBS will be implemented.

A step-by-step approach

Key aspects of this step are to describe the key problems and challenges that will be addressed with one or more NBS and describing 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, i.e. problem and context description occur at the same time and inform each other. Thus you will go back and forth between describing key problems and challenges and assessing the context in which these will be addressed.

Identify key problems and challenges

Key for any business case to be made for NBS is to clearly describe the **societal and environmental problems and challenges it will address**. Is the focus on climate adaptation and cooling, for example, or perhaps on social cohesion and local food production? Maybe biodiversity increase, with focus on a few specific, desired species, drives the project. Or perhaps a new park is meant to create a more attractive living area or perhaps a draw for tourists? In many cases, an **NBS will provide multiple benefits, or bundles of ecosystem services**.

These benefits all relate to specific problems and challenges, such as climate change and an increasing urban heat island (health problem), lack of social ties in the

neighbourhood (social problem), biodiversity loss (biodiversity problem), and low attractiveness of certain areas that can result in resident flight and associated lower tax incomes, or little visitation and spending by tourists (economic problems).

There are **alternative ways of addressing problems and challenges**. Climate adaptation and cooling could be done with technological means (such as air conditioning) while social ties could be strengthened by arranging events and supporting resident associations and clubs. Tourists could perhaps be enticed by setting up attractions and stimulating a lively restaurant scene. People could be encouraged to move into a neighbourhood through the presence of good schools and public transport. The problem and challenge description, and ultimately making the business case, therefore needs to take a broad view and explain how the NBS solution holds up among alternatives, in terms of the respective benefits and costs but also the wider value case.

A useful tool to identify urban challenges is the **problem context mapping**, developed by Osmos for NBS and the problems they address (Hill, 2022). The context mapping tool can be used to take a transversal view of a problem with its social, economic, and physical context. The tool is to be used by actor and stakeholder groups of 5-15 people. The context mapping process does not have to take more than a few hours.

Change can emerge in many ways - through big ideas or small interventions. Analysing emergent trends can be critical to build on a movement or getting one started. A simple way to understand it is that there are three scales. Firstly, at the macro-level there are topics such as climate change or food security. At this scale, the idea helps bring people together, yet it is so broad and general that it can be interpreted as various things. Then there is the meso-level where laws, culture and practices are present. Finally at the micro-level there it is possible to see tangible action. As shown in Fig. S1.1, context mapping is structured into several core elements.

Describing the context

As mentioned earlier, the implementation of every NBS is unique, as the urban context in which they are implemented will differ from case to case. The context can 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, climate, and so forth.

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, meaning the impacts, costs, and benefits over time?

It is also important to determine at what **scale(s)** the NBS is to be implemented (see Fig. S1.2). 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 recognised. Fig. S1.2 shows the different scales and the interactions between them.

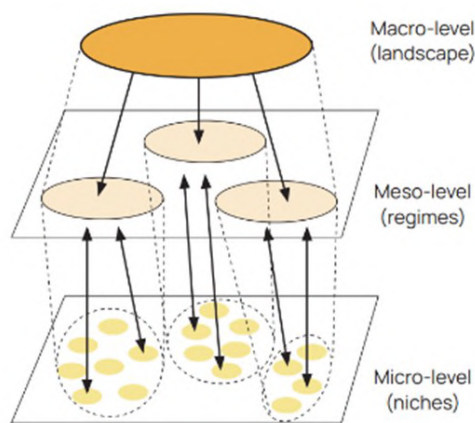


Fig. S1.2 . The different, interacting scale levels of NBS implementation (Loorbach et al., 2006).

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

- *Information about the city, neighbourhood, and site for NBS implementation.* Describe the relevant social, cultural, economic, and environmental characteristics. This relates to e.g., the human population and its composition, economic conditions such as employment and income, but also relevant environmental factors.

The latter can include climate factors such as temperature, wind, and humidity patterns, especially when the NBS is meant to impact the local climate.

- *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, and the like. An initial assessment of biodiversity, at least in terms of indicator species, is also recommended. Maybe there is already an NBS on site which is to be modified or replaced. In this case it is also important to describe the current uses that potentially will be lost.
- *Relevant policies, legislations, plans* in place that can affect NBS implementation. Some of these will potentially have a positive impact, while others can have a negative, neutral, or mixed effect.

Although a detailed description of the NBS to be implemented follows in the next step, it will be helpful to have a general idea of what (alternative) NBS are in focus, as this can guide the context analysis.

Stakeholder mapping

Next, a careful **stakeholder mapping** needs to be carried out. This mapping needs to determine who are the key actors (who is directly involved in the NBS decision making) as well as those affected by NBS implementation. The latter are the **key beneficiaries**, but in some cases also 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** on the NBS, something which also needs to be described.

It is essential, therefore, to consider those local communities living in the urban landscapes where NBS are to be implemented in the decision-making process. These communities are usually the most affected by NBS implementation – often positively but as discussed above not always. With NBS implementation there is always a risk

of *green gentrification*, for example, with greening efforts resulting in higher property and rental prices, potentially pushing out less affluent residents from neighbourhoods.

Several tools are available to support stakeholder mapping. We mention a specific one here but others are available as well. You can also use approaches or tools for stakeholder mapping that you are familiar with. This can include a simple post-it exercise in which you and others first write the stakeholders you can think of on individual notes, then bring them all together to group these and outline relationships.

Specifically for NBS, Malekpour et al. (2021) categorise stakeholders according to their influence and interest (Fig. S1.2), based on earlier work by Mendelow (1991). Influence is determined by decision making power and ability (or resources) to affect the desired NBS. Interest basically depends on the impact of the NBS (those most affected are usually also the most interested).

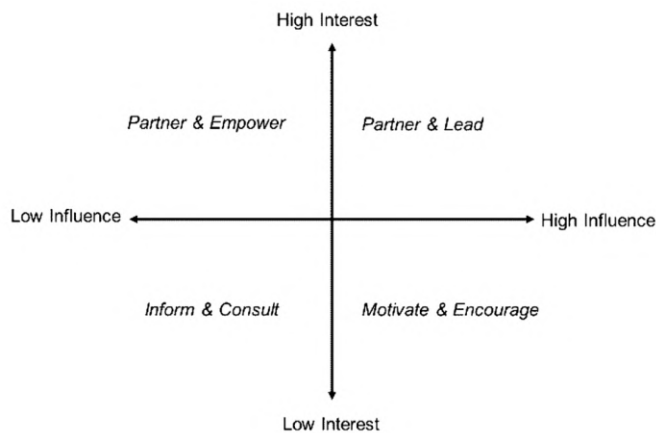


Fig. S1.2. Stakeholder mapping for NBS (Malekpour et al., 2021).

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 co-creation of NBS, including advice on how to do stakeholder mapping and foster their engagement (Morello and Mahmoud, 2018).

Step 1 - Tasks checklist

Tick off the checkbox when a task is completed ☒

Addressing main challenges

- ☐ Take note of long-term trends, economic structures, cultural norms and institutional framework that influence your context
- ☐ Identify practices that contribute to these trends and link back to the information you initially gathered
- ☐ Spotlight emerging niche initiatives that are representative of your context

✂ Tools for stakeholder mapping

- Malekpour's influence-interest framework

Identifying potential solutions

- ☐ Pinpoint strengths, weaknesses, opportunities, and threats that may influence your NBS
- ☐ Divide a sheet into four quadrants to organize your findings into the four categories

Determine your context

- ☐ Define the NBS scope: is it a city-wide, a neighbourhood or a site-specific intervention?
- ☐ Variables: Dive deep into the local community dynamics, governance, climate, policies, and more

Gather information

- ☐ **Local insights:** understand social, economic, and environmental characteristics of your area
- ☐ **Implementation area:** consider landscape features, current land cover, biodiversity, and infrastructures
- ☐ **Policy and legislation:** be aware of existing frameworks that could influence the NBS implementation

Stakeholder Mapping

➔ Identify

- ☐ Key decision-makers
- ☐ Beneficiaries
- ☐ Stakeholders who might experience drawbacks or are otherwise affected

➔ Understand

- ☐ Influence and interest levels of different stakeholders in relation to your NBS
- ☐ Potential risks (e.g., gentrification)

✂ Tools for stakeholder mapping

- ☐ Malekpour's influence-interest framework

Once you have completed Step 1, you are ready to move on to Step 2 and to craft your NBS vision.

Step 2

Develop a Vision for NBS Implementation

🔍 Basics

A well-articulated vision sets a clear direction and ambition for the 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 purpose. It requires foresight and a understanding of the challenges and opportunities identified in Step 1.

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 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 and will often be completed in parallel. Having some idea of what type(s) of NBS you would like to implement can help in formulating a clear vision. However, the vision to be formulated, especially when it is more general, would often still allow for a different (mix) of NBS to be chosen. Think of enhancing the greenness of a schoolground to enhance cooling, learning, and play.

Even a vision that states that green cover of the schoolground is to be doubled, many choices still remain. How much of this new green will be trees or other vegetation? Or maybe 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?

Developing a vision for your NBS compels you to answer foundational questions:

- 1) **Why** are you undertaking this initiative?
- 2) What **goals** do you aim to achieve?
- 3) Who will **benefit** from your NBS?
- 4) Who are your **collaborators** in this project?
- 5) **How** do you intend to bring this vision to life?

Answering these questions requires foresight, and an understanding of the **challenges** and **opportunities** at hand. However, the effort invested in this phase lays a robust 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** shows an ambition in terms of a 'better world' to be created and achieved, of a desired state 10 years or more in the future. A key strength of a good vision lies in its **conciseness**.

One more comprehensive approach to developing a vision is that of the PERSIST framework, which comprises of the elements Purpose, Engagement, Relate, Strategy, Innovation, Stakeholders, and Timeframe. It offers a framework for ensuring that your vision for NBS is both comprehensive and impactful. Persist when developing your vision, and document your considerations 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 approach early on is crucial. This is the backbone of your vision, the reason behind every decision made during the project. Ask yourself: why do I want to implement this specific approach? What are the fundamental objectives I want to accomplish with this initiative, both in the short and

longer term? What motivates the need for using NBS in my context? This not only sets a clear direction but 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 specific NBS-based initiative, the next logical step is to understand **for whom** you are implementing the initiative. Therefore, starting from the stakeholder mapping in Step 1, rethink and better define the **beneficiaries** of your initiative. Is it for a particular community, neighbourhood, or the entire city? Who are the primary beneficiaries of the NBS-based initiative? Who will perhaps be negatively affected? It is also important to delve into broader societal needs, ensuring your initiative aligns with the larger community objectives. With this in mind, remember 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 revitalizing this park is your intent, then you may want to consult residents and businesses surrounding the park to understand their needs and desires for this space. This ensures that the revamped park meets community needs and becomes a lively hub.

Relate

As you move forward, regularly **relate back to the challenges** identified in Step 1. How will your approach respond to these problems and challenges, in more broad terms? How will the success of your initiative be measured against these challenges? This ensures 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 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 realise 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, in conjunction with Step 3. Whether it involves habitat restoration, green infrastructure, or a combination of approaches, ensure that these components align with the purpose outlined. For example, if tackling air pollution, your strategy might involve planting more trees. As you gain a clearer understanding of your specific NBS (in Step 3), revisit this step to update and refine the strategy and your overall vision. For instance, if your initial focus is planting trees but you've come to realise that there is too little space for trees, come back here if you opt for an approach that also included other vegetation and green roofs. This iterative approach enhances the practicality and effectiveness of your overall vision.

In a coastal town witnessing shoreline erosion, one strategy could involve implementing natural barriers such as mangroves or constructed wetlands. Even though the specific plants and construction details will come later, the broad strategy 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. 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. 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. Here, the innovation lies in the integration of urban greening with community-driven design and governance.

Stakeholders

NBS are the result of a collective effort. To ensure 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. Once again, use your initial stakeholder mapping from Step 1. 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 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, and nature itself to take its course. Therefore setting a clear **timeframe** is essential. A vision for NBS should be set for a 5–10 year horizon, if not longer. When envisioning a new green corridor in a city, for example, one must account for the time it takes to acquire land, 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?

The core vision statement

By following this simple PERSIST framework, you are now equipped to frame a core vision statement that should sound like:

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

For example: **“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. **Our approach includes** collaborating with local farmers for expertise, involving students in garden design and maintenance, and incorporating garden produce into school meal programs. **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, agricultural technicians, and school canteens **to ensure the success of the initiative.”**

With your vision firmly in place, 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 NBS offer.

Step 2 - Tasks checklist

Tick off the checkbox when a task is completed 

P – Purpose

- ☐ Define why NBS is necessary
- ☐ Understand its goals, both short and long term

E – Engagement

- ☐ Identify the beneficiaries and potential “losers”
- ☐ Understand community needs

R – Relate

- ☐ Address the specific challenges identified in Step 1
- ☐ Determine how you will measure success against these challenges

S – Strategy

- ☐ Outline the general NBS approach
- ☐ Provide an overview of the type of NBS you are envisioning
- ☐ Think about adaptability to unforeseen circumstances

I – Innovation

- ☐ Determine what makes the NBS unique
- ☐ Understand how it improves upon existing solutions

S - Stakeholders

- ☐ Identify key STAKEHOLDERS, partners and collaborators needed
- ☐ Broadly outline their role in the initiative

T – Timeframe

- ☐ Understand long-term objectives and expected results

The Core Vision Statement

Use the PERSIST framework to create your core vision statement.

“By...(Timeframe), we aim to...(Purpose).

This commitment arises from...(Relate) and is directed towards...(Engage).

Our approach encompasses...(Strategy).

This paves the way for...(Innovation).

Our initiative acknowledges and engages...(Stakeholders) to ensure the success of the initiative.”

With a vision in place, the next step is to thoroughly define the practical and technical details of your NBS initiative. Let's move on to Step 3.

Step 3 Describe your NBS

🔍 Essentials

In Step 3 you consider the baseline situation and context of your chosen project site or area, also in terms of opportunities and barriers, along with the challenges identified in Step 1 and the vision and objectives set in Step 2. This step aims to ensure that the chosen NBS aligns with your vision and meets the needs of the local community and environment. Due consideration is given to relevant details and technical aspects, prioritising NBS that address multiple challenges.

A step-by-step approach

In this third step one or more NBS are chosen from a large set of possible solutions based on widely-used NBS typologies. This is done in a structured way, using information from your previous analysis of context, problems and challenges, as well as the vision you have set for your initiative.

Aligning NBS with your context and needs

When choosing NBS options, you might sometimes have to **decide between solutions that have differing outcomes** or those that **serve multiple purposes**. For instance, consider establishing a wetland park in an urban area: while it can help manage stormwater and become a habitat spot, it may also become a breeding ground for mosquitoes. Would you be willing to manage the mosquito issue in exchange for stormwater management and bird habitats and carry the cost for this? 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 these, especially when working with limited resources.

In some cases it could be tempting to **replicate a solution from another city without due consideration**. For example,

suppose 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 skills, and are local stakeholders willing to support the initiative? If yes, there may be cases whereby internal dynamics, such as regulations on urban design or specific policies, may also push you towards some solutions over others. That is why it is essential to have the right approach towards NBS and select those solutions that are appropriate to your local context and needs and capacity.

Defining your approach

One well-established way to categorise NBS approaches includes:

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

This type of NBS focuses on optimizing the use and protection of existing ecosystems, e.g., protecting urban wetlands which have evolved over time with minimal human interference. The maintenance of this type of NBS primarily revolves around 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 forest recently revitalised.

- **Type 3 – Creation of entirely new NBS**

This NBS type of approach entails creating new ecosystems or making significant changes to existing ones. 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 cost and the maintenance it will require (also called operational costs). Different approaches demand varying levels of engineering, stakeholder involvement, and have distinct implications for the ecosystem services delivered. Generally, the higher the number of services and stakeholder groups is targeted, the lower the capacity to maximize the delivery of each service and simultaneously fulfil the specific needs of all stakeholders involved (Eggermont et al., 2015) (Fig. S3.1).

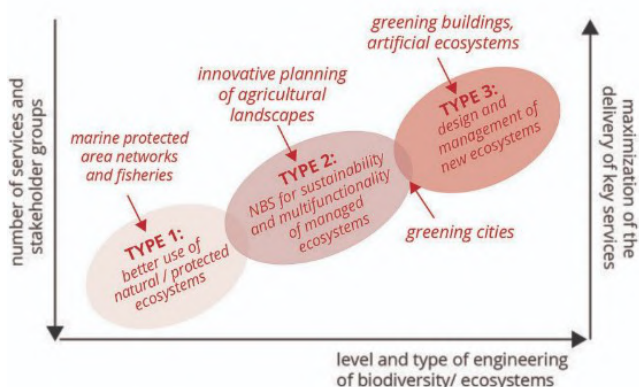


Fig. S3.1. The three overall NBS Types are defined, differing in the level of engineering or management applied to biodiversity and ecosystems (X-axis), and in the number of services to be delivered, the number of stakeholder groups targeted (left Y axis), and the likely level of maximization of the delivery of targeted services (right Y axis). Source: Eggermont et al., 2015

When protecting an existing ecosystem (Type 1 approach), it is important to consider that expanding its purpose (Type 2 approach), e.g. with the introduction of recreational areas, could dilute its core functions like flood control or water purification. Such an intervention may involve more frequent upkeep and, as it starts catering to more services, optimizing each service at the same time may require a more complex approach.

When creating a completely new NBS (Type 3) that serve 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.

Consider a solution such as a green roof, designed with the primary objectives of providing urban gardening space and support local food production. As community needs evolve, the design might 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 demands a higher level of adaptability to unforeseen circumstances, including the changing needs and preferences of the beneficiaries targeted by the NBS.

Having a clear idea of which approach to choose also helps in estimating lifecycle trajectories, enabling prediction of how the solution will evolve over time.

While NBS might not always replace technical solutions, they can bolster and complement pre-existing infrastructures, offering an **integrated approach** for urban resilience. An integrated approach does not view nature-based and grey solutions as competing entities but as collaborative forces. For instance, a city experiencing flooding due to heavy rainfall, rather than solely relying on expanding stormwater drainage systems, can also create a hybrid system that includes urban wetlands and parks to absorb excess water (Fig. S3.2). In this way, NBS can augment and complement the existing grey infrastructure, gradually increasing the overall capacity of the system and enhancing its efficacy and efficiency in risk reduction, while also adding co-benefits to the urban environment.

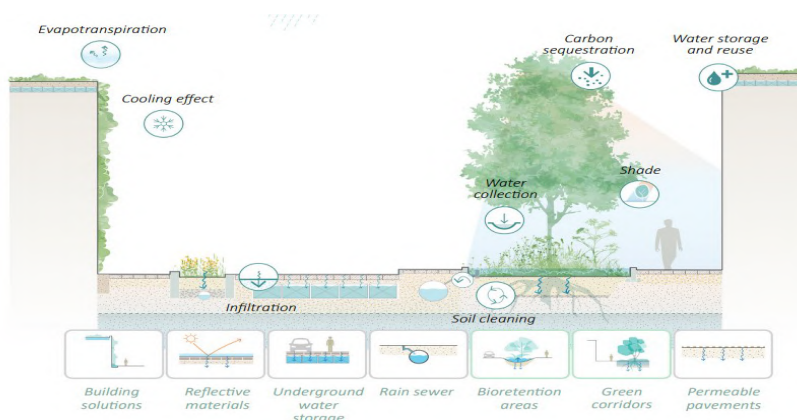


Fig. S3.2. Example of a hybrid solution integrating green and grey infrastructure. Source: World Bank (2021)

Understand NBS technical aspects

Urban areas can harness a myriad of NBS, and by understanding the possibilities and restrictions of specific NBS types, as well as their benefits and costs, you will ensure solutions are really tailored to your context 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) and the [Nature Based Solutions Technical Handbook](#) of the UnaLab project (UNaLab, 2019a) offer valuable detailed categorisations of NBS. Fig. 3.3 shows for examples of different NBS for urban application.

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

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](#) (available online: <https://www.urbangreenup.eu/resources/nbs-selection-tool/nbs-selection-tool.kl>). This tool 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.



Fig. 3.3. Examples of NBS for urban application. Source: World Bank (2021)

Describe technical interventions

Before diving further into Step 3, revisit the information you gathered in Step 1. The context you have delineated combined with the stakeholder mapping, and the identification of local challenges should guide your NBS description.

For properly describing your intervention:

First, conduct an **inspection** of the intended NBS project area, documenting specifics through **measurements** and **photographs**. Evaluate the **surrounding ecosystem**, encompassing both urban and natural elements like buildings, streets, plant species and animal habitats. Such insights are important when selecting the most appropriate plants, materials, and NBS components.

Then, **describe** the NBS you aim at, detailing its **extent** and **characteristics** (for example : how many trees are you planting, and of what species and size?)

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 like roads, buildings, and other gray 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 **evolution and transformation** of the NBS over time. Especially 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.

Maintenance should be an important consideration from the very start, not just for the first years after establishment but also on the longer term. Considerations should include both routine tasks and seasonal or infrequent requirements.

Engaging key **stakeholders** and especially the local community is essential, and should happen throughout the entire life of the project, from planning to maintenance. In many cases local stakeholders can be mobilised for the longer-term success of the NBS as well, e.g., 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 from your region or regions with similar attributes, as these can provide valuable insights and lessons.

Step 3 – Tasks checklist

Tick off the checkbox when a task is completed 

The following checklist will guide you through all the details that an NBS intervention description should include. Note that not all points might apply to every project, and some projects might have unique requirements not captured in the checklist.

NBS type and purpose

- ☐ Identify and describe the NBS and its type, as well as its technical features
- ☐ Relate back to the main challenges the NBS is meant to address.
- ☐ List key ecosystem services the NBS should provide (link to Step 2). Identifying these services will subsequently facilitate the NBS value proposition (Step 4).
- ☐ Highlight how the NBS and ecosystem services provided contribute(s) to specific Sustainable Development Goals (SDGs). This can also make your NBS more appealing to international agencies, donors and investors.
- ☐ Describe how the NBS will impact or integrate with the local ecosystem (urban or other) as well as with the local resident community.

Design foundations and location

- ☐ Which conditions (e.g., climate, geographies) is this NBS tailored for?
- ☐ Specify ideal soil and water conditions for a well-functioning NBS.
- ☐ Provide NBS specifics such as size, shape, or area.
- ☐ Detail features that add functionality to the NBS, such as playgrounds in parks or bird-watching areas in wetlands, benches and so on.

Conditions for implementation

- ☐ Provide a comprehensive overview of the proposed location, including measurements of the area, sunlight, soil quality, and existing vegetation. This site analysis builds on your initial analysis carried out in Step 1.
- ☐ Address any regulatory considerations. Being aware of regulations ensures the project's smooth progression. Some of the legal and policy framework has been defined in Step 1.

Design details

- ☐ Take pictures of the intervention area. This visual documentation will be useful to provide a visual record and make before-and-after NBS comparisons.
- ☐ Start with preliminary sketches, progressing to detailed layouts.
- ☐ Describe how different components will be organized.

Materials and components

- ☐ Create a list of required materials. These could be tangible items like plants, soil, and water or intangible ones like permits, community approvals, or expert consultations.
- ☐ Explain the rationale behind material and plant choices (e.g., certain plants might be chosen for their ability to absorb or buffer water, others for attracting pollinators or for aesthetic reasons).

Infrastructure and buildings interaction

- ☐ How does the NBS integrate or interact with existing infrastructure and buildings? Discuss how the proposed NBS seamlessly blends or stands out in its surroundings. Consider how it connects or interfaces with other urban elements like roads, buildings, or public transport hubs.
- ☐ Discuss whether this NBS can be replicated in other parts of the city or in other cities entirely. What might be the challenges or considerations for scaling?

Growth and evolution

- ☐ For vegetation-based NBS, outline how plants will grow and mature, resulting in changes in the look and function of the NBS over time? Consider that vegetation growth and changes may affect pathways, seating areas, and other built structures.

Maintenance

- ☐ List regular tasks like watering, weeding, tree pruning, and structural inspections. Consider special care in the initial stages of development (especially for Type 3 NBS).

In Appendix C an example is shown of using the NBS description checklist.

Step 4 Develop the NBS value proposition

Basics

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

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 in how one or more specific NBS are selected based on an analysis of the present state and a formulation of a vision and associated objectives.

Determining the set of values to be delivered

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

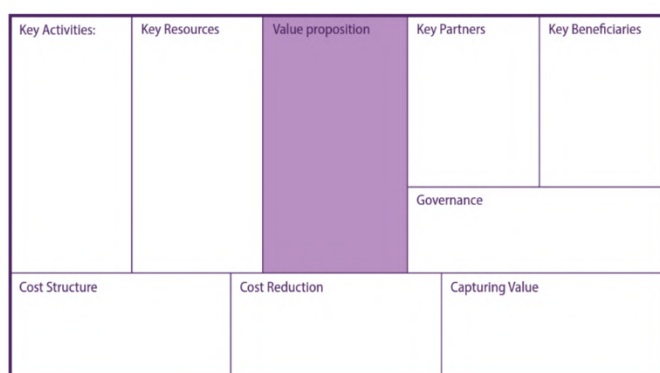


Fig. S4.1. Placement of the value proposition within the NBS Business Canvas Model (Connecting Nature, 2019).

In the original NBS Business Canvas Model, focus is on three value categories: Environmental, Social, and Economic. Given the potential importance of health impacts and the specific ways of assessing these (through so-called health impact assessments), we add Health values as 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 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 also enhancing mental health of pupils and staff.
- What is the **Economic Value Proposition**? How will the NBS help address priority economic challenges at site, neighbourhood, city, or metropolitan level? As an example, a new community garden can provide marketable produce while potentially also contributing to a greener neighbourhood where people are willing to pay more for houses and rents.

These four value categories are intricately connected, and this interconnectedness should be reflected in the value proposition. Environmental values related to e.g., 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 also address this.

As will be elaborated in Step 5, it is crucial to determine how different values will affect different stakeholders. Key beneficiaries will often be in focus (who is supposed to benefit most?) but often there are impacts on a wider range of stakeholders. Often when people think of NBS like a park or green space, they consider only the direct end-users, i.e., the citizens. They do not consider other beneficiaries e.g., businesses benefit from proximity to a park, schools and sports clubs benefit from the facilities, and the city as a whole benefits from the environmental benefits provided. As highlighted in the earlier steps, however, local communities (e.g., local residents) need to be in focus and opportunities should be explored for co-design, co-creating, and local stewardship (see the next steps).

The value proposition needs to be realistic and include a **time dimension**. How likely is it that different values will be generated by the NBS? How long will it take for the full values to be realised? Are the predictions realistic? What are some of the risks and uncertainties that need to be addressed and managed? Will new trees planted really achieve the predicted age where they will provide the full range of ecosystems services? Or will they be less vital 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 on the longer term? What are the maintenance requirements? When will redesign, replanting be needed? In the case of loss of a certain percentage of trees planted, the cost of replacement planting will need to be considered.

Synergies, trade-offs, and disvalues

Next, it is important to determine whether synergies and trade-offs between different values can be expected. In many cases, as mentioned in Step 3, 'bundles' of ecosystem services and values can be created, enhancing the positive impacts of the NBS. An example of this is the planting of more trees on a schoolyard, which can result in environmental values such as cooling and more biodiversity, social values related to play, learning, and social interactions, health values connected with physical

activity and mental wellbeing, and economic values associated with lower air conditioning cost and less staff sick days.

There can also be trade-offs between values, however. These can be between the different value categories, as in the case of an urban woodland being closed off for recreation to ensure drinking water quality. Trade-offs can also occur within value categories. An example of this within the social values category relates to encouraging specific forms of recreation (such as festivals or mountain biking) that push out other forms (such as nature observation and hiking).

In some cases, 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 drop leaves in gutters and in private gardens, or when roots pose a trip hazard. In the literature these impacts are sometimes categorised as disservices or **disvalues** (Lliso et al., 2022). In most cases these are well outweighed by the values and benefits of the specific NBS, but as they can result in local community resistance and come with a cost of their own it is important to make these explicit in the value proposition as well.

In addition, there is the issue of alternatives to NBS implementation, and the **opportunity cost** associated with this. Perhaps the establishment of a local tiny forest replaces a basketball court, shifting the local user base and pushing those formerly playing basketball to other areas. Using urban land for NBS will also mean that less space is available for other uses, e.g., less ground surface 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 prioritised values will be maximised, how synergies will be enhanced, and how trade-offs will be managed.

To determine values, possible disvalues, synergies, trade-offs, as well as potential opportunity cost, key stakeholders should 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 a next step, values can be

grouped and prioritised, and expected synergies and trade-offs can be determined.

A practical example of an NBS value proposition is provided in Appendix D.

Further 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 help in valorisation. Values expressed in monetary means will help decision makers and potential funders who usually understand the language of monetary costs and benefits. However, value capture needs to go beyond this, integrating non-monetary valuation as well. Good examples of this are the impacts on biodiversity (will the project result in gains or losses, in terms of specific species, habitats?) and health (how will the health of local community members be affected?) - both of which are also linked to central Sustainable Development Goals.

It is particularly important to relate the value proposition to the baseline, the situation prior to NBS implementation. Otherwise, it will be difficult to make a convincing valorization case. This also means that values need to be assessed and monitored over time, something which comes at a cost that needs to be considered.

Most valuation of NBS tends to focus on the benefits of nature to people. Nature of course also has value of its own (intrinsic value) (e.g., Rea and Munns, 2017). This element can be difficult to include in the NBS valorisation process but should not be ignored, also dependent on e.g., local political objectives and priorities, nature conservation policies, and so forth. The inclusion of biodiversity values in the Environmental Value Proposition can help with this.

Step 4 - Tasks checklist

Tick off the checkbox when a task is completed ☒



Value mapping activity

- ☐ Engage all stakeholders in a brainstorming
- ☐ Write down different values on post-it notes with distinct colours for the respective value category
Environmental: How will the NBS help address key environmental challenges identified in Step 1?
- ☐ Social: How will the NBS help address social challenges identified in Step 1?
- ☐ Health: How will the NBS help address key health and wellbeing challenges identified in Step 1?
- ☐ Economic: How will the NBS help address priority economic challenges identified in Step 1?
- ☐ Identify synergies and trade-offs between value categories
- ☐ Identify possible disvalues to be managed and values potentially lost by implementing the NBS

Further Considerations

- ☐ Relate the value propositions to the baseline situation
- ☐ Address opportunity costs and alternatives
- ☐ Recognise non-monetary values of NBS

Once you have outlined and detailed your value propositions, you can address their creation and delivery in the subsequent Step 5.

Step 5 Value creation and delivery

Basics

Starting from the initial understanding of context, site, and scale (Step 1), to formulating a vision and objectives (Step 2), and 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 benefits (creating tangible and intangible values) across environmental, social, health and economic domains. This Step 5 delves into the activities, resources, partners, and beneficiaries that contribute to create and deliver the NBS proposed value. All of this is underpinned by a governance structure that ensures the effective creation and delivery of NBS value.

Key components of value creation and delivery

In the context of 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 solutions 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 core of the NBS Business Model Canvas lies in its value proposition. Now, it is important to dive back into the previous steps and reflect on the data, choices, stakeholders, and resources you have — and those you still need. In the NBS Business Model Canvas, the quadrants that are associated with and enable value creation and delivery are: creation and delivery are: key activities, key resources, key partners and key beneficiaries.

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 urban context in which the NBS will be implemented.
- Directly support a specific value proposition area.

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.

Key Resources

Key resources are the essential assets you need to realize the value propositions of your NBS initiative. Resources, be it funding, information, technologies, or human expertise, have to be planned and sourced. 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. As discussed in previous steps, funding and other resources will be needed in the planning and design phase and the implementation phase, but also for the subsequent maintenance of the NBS.

Key Partners

These are the 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 mobilise the Resources you identified? What roles will each partner have in realizing the specific value propositions (environmental, social, health and economic)?

If your NBS project is about creating a city park that promotes 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 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 to create and deliver the proposed NBS values.

Key Beneficiaries

These are the stakeholders that derive direct or indirect benefits from NBS implementation. Key Partners and Key Beneficiaries are positioned side-by-side in the NBS Business Model Canvas as this reflects the overlap which sometimes exists between partners and beneficiaries involved with NBS.

Local communities, for instance, are often at the crossroads of being both. Take the example of a coastal town undertaking shoreline restoration with mangroves. The local fishermen might be beneficiaries due to the increased fish population these mangroves support. At the same time, they might be key partners, offering their expertise of the local coastal environment and labor for the restoration work.

The Key Beneficiaries quadrant also includes **co-beneficiaries** who indirectly benefit from the NBS initiatives. As seen in previous steps, local businesses around your NBS might flourish thanks to their proximity to a park, which generates a **co-value** for them as well. 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**. These are entities and stakeholders that might face challenges or disadvantages due to the implementation of NBS.

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 collaboration between diverse actors across different urban sectors. How will the NBS be managed and operated on an ongoing basis? What **governance structure** will best facilitate stakeholders' cooperation? Understanding the management and operation of NBS requires recognizing the need for **governance models 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 clear and sound governance structure, with clear actor roles and responsibilities and well-defined ways of making decisions, helps manage relationships between partners and beneficiaries, optimize resource utilization, and execute activities that create long-lasting value, ensuring that 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** have been considered to be the more suitable governance models for NBS projects, especially when urban scales are addressed (Egusquiza et al., 2019). These governance models entail multiple centres of decision-making, each autonomous but part of a larger governance network, instead of 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 achieve individually. For example, while the private sector can fund a project, the public sector can provide policy support, and the civil society can 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.

In the NBS Business Model Canvas, the Governance quadrant comprises Partners and Beneficiaries space just because cooperation between both types of stakeholders is paramount for gathering all the necessary resources (be it material or immaterial) and for creating and delivering the NBS proposed values.

In order to understand what 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 what type of **policy or legal instruments** are needed to facilitate the NBS governance in your context. This 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 realising the benefits of specific NBS:

- 1) **Regulatory instruments**: These are the “sticks” which mean penalties or restrictions 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. Failing to adhere to these regulations would result in sanctions.
- 2) **Economic instruments**: These are the “carrots”, providing incentives (positive or negative) to encourage specific behaviours. Examples include subsidies for

green infrastructure projects or tax relief for developers incorporating NBS in their urban projects. On the flip side, penalties might be imposed on projects which do not adhere to sustainability criteria or which damage existing natural solutions. For example, payments for urban carbon sequestration, like the REDD + framework for forests, could be envisioned for cities with substantial green spaces that help in reducing urban heat islands and promote carbon offsetting.

- 3) **Information 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 persuasion mechanisms. 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.

NBS monitoring and evaluation

Other than policy instruments, another crucial aspect that may influence the value delivery of your NBS, and sustainability over time is **monitoring**. By assessing and monitoring the performance of your NBS, stakeholders can grasp its tangible benefits, also as these 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, wrong choice of species, issues with the design and management, or perhaps community misuse. Once identified, these challenges can be addressed promptly if a clear governance structure was previously established, ensuring 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 have the potential to offer returns. One evident benefit is the possibility of saving resources in the long run. When challenges are promptly identified and addressed, they prevent more extensive, costlier interventions later. Moreover, consistent and thorough monitoring and evaluation helps showcasing the actual tangible benefits of your NBS. This strengthens the case for NBS among decision makers, funders, and the broader community.

Step 5 - Tasks checklist

Tick off the checkbox when a task is completed ☒

Value Creation and delivery approach

- ☐ Revisit data, stakeholders, and resources from previous steps
- ☐ Fill in the NBS Business Canvas Model (Connecting Nature, 2019)

Key Activities

- ☐ Outline key activities that drive your NBS value proposition
- ☐ Tailor them to your NBS, urban context, and value proposition(s)
- ☐ The activities must support a specific value proposition

Key Resources

- ☐ Define the resources needed for performing key activities (e.g., funding, information, technologies, human expertise)
- ☐ Consider resources you already have and those you need

Key Partners

- ☐ Write down who will collaborate in creating and delivering the proposed NBS values. Examples: Local small-medium businesses, NGOs, city councils, community groups

Key Beneficiaries

- ☐ Define who will directly benefit from the NBS
- ☐ Spotlight co-beneficiaries who indirectly benefit, e.g., neighbouring businesses
- ☐ Identify stakeholders that would experience drawbacks due to the NBS

Governance

- ☐ Define how the NBS will be managed over time
- ☐ Understand 'why', 'what', with 'whom', and 'how' to collaborate

Define instruments to facilitate governance

- ☐ Regulatory: legal penalties or restrictions if there is a deviation from prescribed behaviours
- ☐ Economic: incentives (positive or negative) to encourage or discourage specific behaviours
- ☐ Information: motivate and inspire people about the relevance of the initiative because of its value proposition

Monitoring and evaluation

- ☐ Define how you will assess and monitor performance and tangible benefits of the NBS

After defining how to create and deliver your proposed values, it is essential to understand how to capture the values associated with the NBS project. Proceed to Step 6.

Step 6 Capturing value

Basics

To capture the values of your NBS project, it is essential to provide a clear and realistic overview of its entire financial situation. This involves being clear about the NBS costs but also identifying ways to optimize and minimize them. Most importantly, you must ensure to capture both the NBS tangible and intangible benefits to present a compelling business case for its adoption. Once again the NBS Business Canvas Model is used.

Capturing NBS value and cost

After the preparation of the value proposition (Step 4) and determining how value creation and delivery will be done (Step 5), this next step looks at how to 'capture' values associated with the NBS project. **Capturing value** relates to making money from a value proposition but it is not limited to that. As discussed in previous steps, in the case of NBS, capturing value in direct monetary terms will often be limited, so other ways have to be used, from indirect monetary valuation to non-monetary value capture. Thus ways have to be found to capitalise 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, community gardens, and the like. The reduced air conditioning and air filtration needs that can result from increasing urban tree canopy result in cost reductions that could incentivise local utility companies to co-fund the NBS.

Once again, we draw upon the NBS Business Canvas Model (Connecting Nature, 2019) for this step in the valorisation process. As shown in Fig. S6.1, this step has three key components: Cost Structure, Cost Reduction, and Capturing Value.

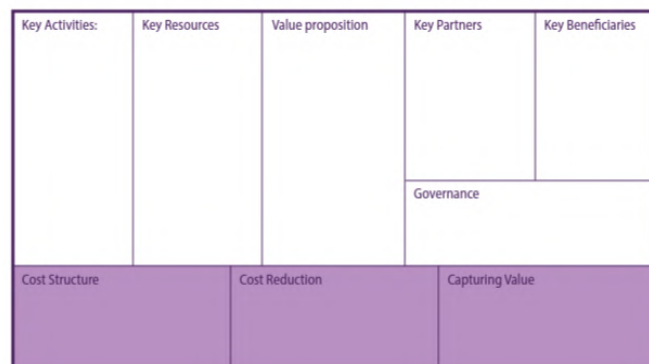


Fig. S6.1. The value capturing components of the NBS Business Model Canvas (Connecting Nature, 2019).

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 not be convincing to decision-makers and potential funders, however, 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

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 Fig. S6.2, several types of costs are associated with NBS implementation.

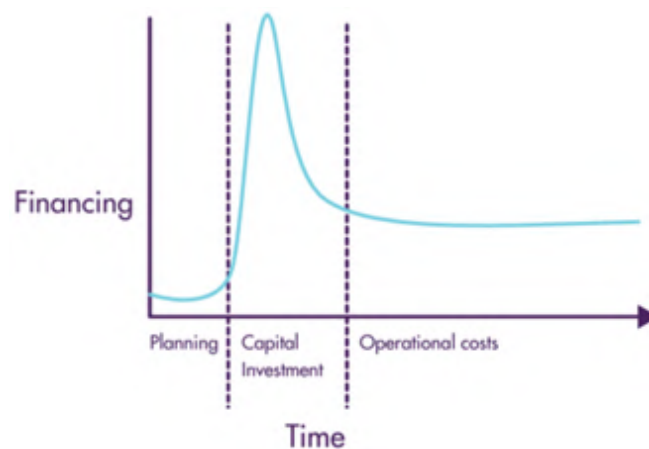


Fig. S6.2. Financing and types of cost of NBS over time (Connecting Nature, 2019).

Capital investment cost, that is the cost incurred when installing / establishing an NBS are an essential component of the overall cost of the solution. Cost included here relate to, for example, soil or building preparation, vegetation growing, purchase, and establishment (e.g., tree planting), installing of infrastructure and facilities (e.g., irrigation systems), but also e.g., cost of communication about the new NBS. It is important, however, not to only include these capital cost in the cost structure.

First of all, the planning of NBS **implementation** also comes at a **cost**. This includes cost for a wide range of planning and preparatory activities, from site analysis to public engagement cost. Even the cost associated with making the business case, including assessing baseline conditions prior to NBS implementation, are to be included here.

Often overlooked but essential are the **operation costs** of NBS implementation. These 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 but also cost of community engagement and communication, as well as of proper monitoring of the impacts of the NBS. Some cost will be fixed (e.g., cost of dedicated maintenance staff) while other cost will be variable (e.g., watering of vegetation depending on the weather, cost of trees and plants to be replanted).

Cost in all these categories include personnel cost (either in-house, externally contracted, or a mix of these) and costs of materials (including plants). As highlighted in the Connecting Nature (2019) guidance, research has shown that very often the importance of ongoing community animation and engagement activities is underestimated as are the costs associated with it.

Cost reduction and efficiency

It is also important to consider the efficient implementation of the NBS in order to keep cost to a minimum. Are the ways in which NBS costs can be reduced? Questions to be asked here include, among other:

- What are the current state-of-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?
- Are there opportunities to collaborate with other social service providers to deliver services which may help to reduce the costs of park maintenance?
- Are there opportunities for volunteering and local stewardship to support future maintenance?
- 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, including NBS implementation and maintenance, by the organisation? 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. An example is the cooling effect of trees and other vegetation that can lower air conditioning expenses. The issue of the cost of the NBS versus the cost of alternative (e.g., technological) solutions.

Ways of capturing value

Will the potential values of the NBS also materialise? **How can we assess the different environmental, social, health, and economic values, in monetary and non-monetary terms?** Capturing value is often used as referring to enterprises making money from their value proposition. In the case of NBS we need to look broader and use possibilities of capitalising on both market and non-market, monetary and non-monetary values.

For most types of NBS, however, generating direct revenue is still challenging. This is particularly the case where the output is considered to be a shared 'public good,' as in the case of improved air quality and cooling by trees or parks. Usually funding for such public goods comes from public sources, that is European, national, or local funding incentives related to environmental or social benefits. In order to access such funding, it is important to be able to capture the value created through relevant indicators, such

as indicators to measure air and water quality, biodiversity, or indicators to measure impact on improved social interactions and health. Some of the economic indicators are summarised in Table S6.1.

Table S6.1. Examples of economic indicators, contributions, and market values associated with NBS. Note that increases in property values will impact some people positively (e.g., owners) and others negatively (e.g., newcomers to property markets).

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.
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The step of value capturing requires revisiting the Value Proposition, the Activities, the Partners, and the Beneficiaries and consider the following questions:

- What are the **direct revenue generation possibilities** from the Activities planned?
- What **indicators can be used to capture 'non-monetary' value** e.g., environmental indicators, social indicators (including health and wellbeing where relevant), economic indicators?
- 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 cost of delivery? Are there funding opportunities?
- Consider **alternative funding sources** like philanthropy, funds from corporate social responsibility, crowd-funding, or other?

As mentioned, 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) offer 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. 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).

However, valuation can be somewhat challenging, depend on the availability of available data. It will often be based on more indirect economic valuation than on market-based valuation. Examples of economic valuation of different values include using the cost of alternative (technological) solutions, as in the case of the cooling effect of trees (vs. air conditioning). For recreational and social benefits, methods such as the travel cost method and ways of placing an economic value of people's time spend in parks and green spaces provides an economic value estimate. For health benefits, the avoided cost by keeping people physically, mentally, and socially healthy can be calculated. In the case of specific products and some services, direct market values can be used. Think of timber and biomass produced, or fruit and vegetable production in community gardens.

Zooming in on assessing different value categories and types

Environmental and biodiversity values

Several tools and methods are available for assessing environmental values of NBS, such as values related to cooling, stormwater regulations, air pollution reduction and carbon sequestration, energy saving, and wind and noise reduction. Useful for NBS value capturing can be, for example:

i-Tree suite of software (i-Tree, 2023; see also Step 5). For trees and shrubs this is probably the most promising set of assessment tools. Focus is on a set 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 as this requires including country-specific meteorological, species, and other data), but some basic assessments can be made with some of the simpler tools (such as i-Tree Canopy).

InVEST (Natural Capital Project, 2023a). This Integrated Valuation of Ecosystem Services and Tradeoffs is a suite 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 suite 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 suite are applicable to urban systems, including pollination, climate change mitigation (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 **ciriabest Benefits Estimation Tool** (CIRIA, 2023) provides a structured approach to evaluating a wide range of benefits from blue-green infrastructure (particularly SuDS and natural flood management) often based upon the overall performance of the chosen intervention. It follows a simple structure, commencing with screening and qualitative assessment to identify the benefits to evaluate further. Where feasible, it provides support to help quantify and monetise the potential benefits and can help underpin collaborative working.

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

For biodiversity assessment it is possible to use a wide range of tools as well, many of which have become well

established. These can relate to e.g., species and habitat inventories, the use of indicator species, landscape assessments, and the like. For more comprehensive assessments of biodiversity, tools such as the following could be considered:

- The **Biodiversity Metric** development by the UK Department for Environment, Food & Rural Affairs and Natural England (2021) as part of the Biodiversity Net Gain principle.
- The **Green Space Factor** initially developed for the city of Malmö in Sweden. This has less specific focus on biodiversity but is a scoring system for different vegetation, green space, and other biodiversity components (Kruuse, 2011).

Less suitable at the site or smaller scale, several tools are available for assessing biodiversity larger (e.g., city) scales. Examples of these 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).

For all of the above detailed guidance manuals are available. Often cities also have biodiversity assessment frameworks and tools of their own which should be considered.

Socio-cultural values

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

Although impacts of social cohesion in a neighbourhood can be very important, these are also difficult to assess. Jensen (2010) offers examples of how this could be done through a set of indicators.

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

- **InVEST**, as discussed above, for scenic value and recreation.
- **Measuring the impact of the NBS on tourism**, as shown for the case of Central Park by Appleseed (2015). Tourism impacts can relate to e.g., number of hotel nights, money spent by tourists, etc.
- **Capturing recreational values** using e.g., travel cost methods, willingness to pay, and placing a value on the time spent in parks and other green spaces.
- **Crime rate reductions** and the cost saved in terms of e.g., lower incarceration.
- **Hedonic pricing** to evaluate the impact of the NBS on property values and rents.

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 on the shorter and longer term. Some of these are more epidemiological in nature and use existing health data, e.g., related changes in specific health indicators to NBS implementation (e.g., greening of a neighbourhood), while others use self-reported health surveys.

Health impact assessments (HIA) are tools to make more comprehensive assessments of the expected or actual health impacts of projects and interventions. Similarly, to environmental impact assessments, HIA estimate the potential positive and negative effects of a policy, program, or intervention on the population's health. HIA also assess how these effects are distributed across different socio-economic groups. WHO (2023) provides an overview of the HIA process, with the steps of screening, scoping, appraisal, reporting, and monitoring. Organisations like the Barcelona Institute for Global Health have undertaken HIA specifically for NBS and urban greening programs (see for example Vidal Yañez et al., 2023), relating increases in green cover and NDVI to changes in self-reported mental health, medical visits, and medicine sales. HIA can in general be used to relate green interventions to changes in morbidity and mortality, dependent on the availability of data and plausible understandings of how green impacts different health indicators.

Health impacts of NBS implementation can potentially be expressed in monetary terms as well, e.g., through assessing changes in medication and use of the medical system. Examples of this include the impact of increasing canopy cover on less 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 with the main objective to make the process of building a baseline and impact assessment plan straightforward and simple for anyone who wishes to do so, with the final report providing advice around suitable methodologies based on scale and project characteristics. CO-IMPACT guides you step by step through an intuitive process, where the user selects the targets, they intend to reach with their NBS/ project, and the tool provides a set of indicators adapted to these benefits.

Economic values

Part 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 make 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 have an economic impact as well in terms of recreation and tourism, as discussed above. Some of these values can be captured more directly, e.g., through park event or entrance fees and concession fees for restaurants, cafés, and hotels.

As also mentioned before, the impact of NBS and green in general on property prices can be estimated by using hedonic pricing and other economic assessment methods. In many other cases, focus is on cost 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 cost of technologies, energy etc. to be used for cooling, air pollution reduction, and stormwater regulation? In Table S6.2 an example of value capturing of a specific NBS is provided.

Table S6.2. Example of value capturing of NBS

NBS Value	Cooling effect of tree planting and canopy cover increase (as compared to baseline). E.g., from 8% canopy cover in a specific neighbourhood to 15% (in 15 years).
Value impact	Cooling of xx degrees C / cooling during hottest days (environmental and health value).
Value capturing in monetary and non-monetary terms	Compare with cost of other cooling tools to reach similar effect (e.g., canopies to shade, air conditioning). Saved energy cost. Also: less morbidity and mortality, especially during heat waves. Expressed in e.g., premature deaths avoided, less sick days and doctor's visits.
Assessment tools and methods	Assessment tools to be used temperature measurements and thermal comfort surveys, i-Tree and InVEST (for also calculating monetary value), health impact assessments.
Likelihood of impact / risk	Likely to very likely. However, depends on the survival and vitality of trees, growth of canopy to expected level. This links to proper maintenance, including watering.
Who wins or loses?	Winners: Most local people (less problems during heatwaves). Losers: Maybe some nearby residents who see their properties shared too much/frequently.
Synergies and trade-offs.	More trees also can result in social benefits, biodiversity gains, stormwater management benefits. These can be captured in monetary and non-monetary terms. 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 risk of green gentrification. Too much shading could e.g., result in lower property prices.

Further considerations

The values of NBS are not static but will 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, but also e.g., a park or green roof will take some time to achieve full functionality. On the other hand, vegetation ages and trees and other plants will decline and no longer be as functional after a certain time. Parks can decline as well, e.g., due to changing recreational preferences and ageing facilities. Rain gardens and SUDS can lose their functionality e.g., when not maintained properly.

It is important to give a **realistic idea of how revenue streams 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 cost on the longer term being ignored. A **life-cycle approach** of the NBS will be needed, as also 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?

Bringing together the different values captured

Although various values can be expressed in monetary terms, not all can. Therefore, ways have to be found to **compile and weigh the different values for making the business case**. Aside from **cost-benefit analysis** this can include methods such as **multicriteria analysis** and **risk-opportunity analysis** (e.g., Chausson et al., 2023). At minimum, a clear overview and estimate has to be provided of the full range of values and all cost over the lifetime of the NBS project.

Step 6 - Tasks checklist

Tick off the checkbox when a task is completed 

Cost structure

- ☐ Identify **planning costs**: activities leading to NBS setup (e.g., site analysis, public engagement, business case development)
- ☐ Identify **capital investment costs**: costs related to NBS setup (e.g., soil preparation, tree planing, irrigation systems)
- ☐ Identify **operation costs** (fixed and variable): maintenance, personnel, community engagement, monitoring

Cost reduction

- ☐ Find efficient NBS implementation strategies with lower costs (techniques, materials, resources). Leverage collaboration, e.g., volunteering, social service providers, local stewardship
- ☐ Evaluate possible economies of scale by seeking synergy with other activities to utilize resources already at hand

Capturing value

- ☐ Identify direct revenues from planned activities, e.g., hosting events, concessions, sales (timber, garden produce, biomass)
- ☐ Identify public goods (e.g., air quality, cooling effects) often funded by public sources
- ☐ Identify partners whose interests align with these non-monetary public goods
- ☐ Explore collaborations to minimize costs and seek funding opportunities
- ☐ Explore alternative funding such as philanthropy, CSR funds and crowdfunding
- ☐ Determine indicators for capturing non-monetary values: environmental, social (including health and wellbeing), and economic metrics

✂ Tools for assessing value categories

- 1) **Environmental and biodiversity values**: tools include i-Tree, InVEST, Benefit Estimation Tool, Biodiversity Metric, the Green Space Factor, etc.
- 2) **Socio-cultural values**: tools include InVEST, travel cost methods, costs saved from crime rate reduction, property values, rent, etc.
- 3) **Health Values**: tools include CO-IMPACT, the Health Impact Assessments, epidemiological data, changes in morbidity and mortality, use of the medical system, etc.
- 4) **Economic Values**: direct marketable goods, property value impact, park entrance fees, events revenues, concessions, avoided costs, etc.

Further Considerations

- NBS values and costs are dynamic
- Adopt a life-cycle perspective: when is replacement or renovation needed?
- Find ways to compile various values for a compelling business case, using tools like multicriteria analysis and risk-opportunity analysis
- Offer a detailed overview of the entire lifespan of NBS project costs and values

After you develop the value case, you can proceed to the final step where all the previous steps are consolidated to craft a comprehensive valorisation case for your NBS.

Step 7

Making the NBS valorisation case

Basics

In this final step, all information from the previous steps is compiled. Based on this, a strong valorisation / business case is prepared for decision makers and funders. A bankable business plan can help with making the case but the valorisation case also needs to be made to those local communities impacted by the NBS. Making the right 'pitch' for different audiences is important and will require sound communication planning.

Bringing it all together

In the previous six steps of this valorisation guide, you have developed a business and value case for one or more NBS. This started with describing the specific context and scale of NBS implementation and the key problems and challenges to be addressed (step 1), followed by developing your 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 2). Next, using the NBS 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 ones are brought together and based on this **a strong valorisation and business case is to be 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 valorisation process but also to 'package' this information in a strong narrative aimed at the specific target audience(s). Often more than one audience is in focus and will require a somewhat different **narrative and 'pitch'**.

Targeting funders: Bankable business plans

Although you now have most building blocks for making the valorisation case, you will often have to present this in the form of a comprehensive, well-structured, and convincing **business plan** for example when you approach funders.

A lot of guidance is available on how to develop a business plan. Much of the information to be included can be derived from your use of the NBS Business Canvas Model and the valorisation steps you have followed. Important components of a business plan are, for example according to the FAO guidance on developing bankable business plans (for forest producers and their organisations) (Boscolo et al., 2021):

- **The business (or product) idea:** 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 business environment** and relevant legal, policy, and other issues.
- **A market outlook:** in this case of NBS this relates to e.g., the way the specific NBS compares (from a business and value perspective) to alternative solutions.
- **The organisation, governance, and resources needed** for value delivery, including logistics, technologies, knowledge, etc.
- **Financial analysis:** what will be the cost and benefits on the short and longer term? How can value be captured? What are the funding and investment needs?
- **Risk analysis:** what are the risks associated with NBS implementation? How likely are predicted revenues and costs over time? 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 specially mentioned as well.

The different business plan components were all addressed in the different steps of this valorisation 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 invested money will be well spent. Often funders and investors will (ultimately) expect revenue and profit but in the case of NBS there can be other motivations, such as environmental and social corporate responsibility considerations and finding ways to deal with own or more general negative environmental (and social) impacts.

Targeting decision makers: Pitching the NBS case and alternative

Decisions on whether or not to implement specific NBS are often taken by municipal authorities and other public actors. Sometimes decisions are made within the administrative structure while in other cases, 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 (as in the case of not-for-profits).

In many cases the decision makers to whom the NBS solution is pitched are also (potential and/or part) 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 is really the wider valorisation case. What are the environmental, social, health, and economic values of the proposed NBS, what will be required for delivering these, and how can value be captured? What can be said about the likelihood of delivering these values and what will be required to do so? 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 e.g., within local government, the information compiled in the different steps of this valorisation guide can be presented in a report. Added to this more detailed, comprehensive information should be an executive summary that describes the

valorisation case in one or two pages. The use of **visuals and visualisations** (for example 'poster style') can also help with pitching the valorisation 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 we have stressed throughout this guide, it is essential to engage those local communities (e.g., local residents) that will be impacted by NBS implementation in the valorisation and decision-making process. The 'pitch' and narrative will be different here, also depending on to what extent these local communities have been involved throughout the valorisation and NBS development process.

A clear and fair 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 about potential drawbacks and disvalues. Maybe some of the latter are only short-term or they 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 optimising the positive ones.

Also in the case of communicating the value case with local communities it can be really helpful to use **visuals** and to have examples of similar NBS implementation available. This will make the proposed implementation more 'real' for local residents.

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

Making an integrated and strong valorisation case

The above components and activities should be brought together in a **comprehensive valorisation plan**, which can be built from 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.

Once again it is important to stress that a longer-term perspective needs to be used for cost and revenue streams, including e.g., a realistic overview of longer-term maintenance cost that will secure value delivery. It is also important to define ways of monitoring the NBS project to see whether value delivery works as planned or required adjustments and transformations.

Step 7 - Tasks checklist

Tick off the checkbox when a task is completed 

Bankable Business Plan for funders

- ☐ Justify the investment, present SCR considerations and long-term benefits
- ☐ Compile all the information derived from the Business Model Canvas and the previous steps

Components

- **Business idea and value propositions:** propose the NBS as a solution to address specific challenges, incorporating your value propositions
- **Business environment:** highlight the surrounding business environment, legal framework and policy analysis
- **Market outlook:** compare the NBS to alternative solutions from a value perspective
- **NBS needs:** identify governance, resources, logistics, technologies, and expertise required for the NBS values delivery
- **Financial analysis:** determine short-term and long-term costs and benefits, value capture methods, cost structure, reduction, cost-benefit analysis and funding needs
- **Risk analysis:** understand potential risks, predictability of revenues over time, and present risk mitigation strategies

Pitching to the NBS case to decision makers and local communities

- ☐ Organize your insights from this guide into a coherent report, using visual aids and including a brief summary of key points
- ☐ Highlight the NBS value proposition for different environmental, social, health, and economic values, the resources needed for their delivery, and value capture strategies
- ☐ Compare with NBS and non-NBS alternatives
- ☐ Highlight the involvement and possible stewardship of local communities involvement and explore possibilities of NBS
- ☐ Be transparent about positive impacts and potential drawbacks, and present long-term perspectives and maintenance costs
- ☐ Prepare a targeted communication strategy
- ☐ Discuss how you will monitor NBS implementation, also on the longer term

To build a strong valorisation case for your NBS, understand your audience, highlight the unique value of your project and communicate it effectively.

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APPENDIX A – Considerations for the valuation of NBS

As discussed by Chausson et al. (2023) it is essential to go beyond market-based mechanisms when it comes to NBS and their financing. A narrow focus holds various pitfalls, according to the authors:

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, and mainly, those that are instrumental, tangible, or easily measured with numerical metrics. The cost of NBS should include transaction cost, costs of implementation, as well as cost 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 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 offer a set of recommendations for dealing with these pitfalls:

Recognise 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.

Recognise 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 marginalised actors within broader communities, and that have appropriate accountability mechanisms in place.

Recognise alternative modes of finance. Harmful government subsidies need to be repurposed and environmentally harmful activities need to be taxed, while environmentally beneficial activities are incentivised. Direct funding of nature is needed as well.

Shift away from the imperative for economic growth. Embrace alternative metrics accounting undervalued public goods and services, including through ecosystems and biodiversity, and the socioeconomic distribution of these.

Appendix B – Overview of NBS ‘families’ and specific typologies within these.

Table S3.1. Overview of NBS ‘families’ and specific typologies of NBS within these.

NBS family: Urban Forests - Forests (e.g., remnant woodland, managed forests, mixed forms, phytoremediation forests, ecological forest corridors) - Tree alley and street tree, hedge - Tree meadow / orchard - Tree-lined streets - Boulevards	NBS family: Urban Blue Spaces and Wetland Solutions - Lake, pond - River, stream - Dry riverbed, rambla - Canal - Estuary - Delta - Sea coast - Constructed wetlands (e.g., surface constructed wetlands, subsurface gravel wetland, floating wetlands) - River floodplains (e.g., river bypass or oxbow, re-activating the floodplain) - Coastal littoral/Mangrove forests - Salt marshes
NBS family: Urban Agriculture - Allotment garden - Community garden - Arable land - Grassland - Horticulture - Biofuel production/agroforestry - Raised beds - Amphibious farming - Floating farming	NBS family: Bioretention and Water Management Solutions - Bioswale - Rain garden - Detention pond - Retention pond - Water-sensitive urban design measures (e.g., infiltration basin, underground storage, biofilters)
NBS family: Urban Green Spaces - Large urban park - Historical park / garden - Green playground, school ground - Neighbourhood green space - Institutional green space - Green sport facility - Cemetery and churchyard - Camping area - Pocket park	NBS family: (River) Restoration and Bioengineering - Daylighting of rivers of streams - Reprofilng, extending flood plain area - Channel widening and length extension - Reprofilng the channel cross-section - Diverting and deflecting elements

- Botanical garden / arboretum - Residential park	- Living revetment - Measures of bioengineering (e.g., living fascines, revetment with cuttings, planted embankment mat)
NBS family: Building Integrated Green Solutions - Balcony green - Ground-based green wall - Facade-bound green wall - Extensive green roof - Intensive green roof - Atrium - Vertical Greening (e.g., noise barrier as ground-based greening, free-standing living wall, mobile vertical greening, moss wall, living plant construction) - Green roofs (e.g., smart roof, constructed wet roof)	NBS family: Natural and Semi-Natural Areas - Shrubland - Wetland (e.g., bog, fen, marsh, natural inland wetland) - Sandy shores NBS family: Other NBS and Innovative Solutions - Biofilters (air quality) - Mounds - Terraces and slopes (e.g., living smiles, wattle fences, vegetated gabions) - Private, commercial, industrial, institutional UGS and UGS connected to grey infrastructure
NBS family: Green Infrastructure and Corridors - Street green and green verge - House garden - Railroad bank - Green avenues - Urban green corridors - River and stream renaturation	

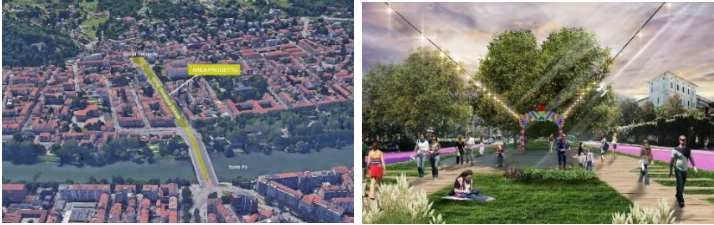
APPENDIX C – Example of using the NBS description checklist

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

Turin, Italy, provides an exemplary case of NBS application for rejuvenating unused or obsolete infrastructure. In June 2020, the Turin municipal administration established its inaugural linear park, Precollinear Park, established on a 700-meter stretch of an abandoned tramway. What makes the Precollinear Park stand out is not just its conversion but its roots in the community's needs as 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 neighborhoods. With minimal investment and a community-centered approach, Turin has showcased a replicable model, highlighting that urban rejuvenation can be achieved through innovative yet straightforward transformations.

NBS Description Checklist

Type of NBS and Purpose	NBS approach and type	NBS approach: enhancement NBS type: temporary green corridor
	Targeted Challenges	Rehabilitating unused tramway, combating urban heat, promoting biodiversity
	Ecosystem services	Climate regulation, habitat creation, recreational space, pedestrian pathway (mobility)
	Interaction with local biodiversity	Integration of mature trees and local plant species, and providing a habitat corridor
Design Foundations and Location	Components	Walking paths, benches, shaded areas, art exhibition spaces
	Implementation scale	Stretches along the entire length of the abandoned tramway
	Location/region of applicability	The Precollina neighborhood in Turin, crossing the River Po
	Site analysis	Presence of mature trees, existing metal tracks, and wild grasses between tracks
	Dimensional details	700 metres, linear shape along the tramway stretch
Conditions for Implementation	Land requirements	The abandoned tramway and some space on either side for vegetation
	Expert consultations	Collaboration with urban planners and Torino Stratosferica organisation
	Soil and water conditions	Use of existing soil and trees and minimal interventions for plant growth
	Local regulations	Conversions compliant with city regulations while preserving the tramway's historical aesthetics

Design Details	Sketching	Conversion of tramway into a temporary green corridor with separate sections for varied uses Far and close view 
	Spatial arrangement	Walking paths intertwined with green spaces, exhibition areas, and seating spots
Materials and Components	Material inventory	Native plants, recycled wood for benches, and exhibition materials
	Selection criteria	Native plants chosen for sustainability over time
Infrastructure Interaction	Urban integration	Integration with Turin's urban matrix while maintaining distinct identity as a green corridor
	Replicability	Replicable in other areas of the city and in other mountain cities with abandoned tramways
Growth and Evolution	Life cycle assessment	Evolution of vegetation over X years, with provisions for maintenance
Maintenance	Task list	Regular weeding, cleaning, and ensuring safety along the path
Stakeholder Involvement	Key stakeholders	Turin city council, local businesses, residents, volunteers, and Torino Stratosferica, no-profit association
	Community engagement	Cultural events focusing on urban and social themes, book presentations, sports and yoga lessons, live music, neighborhood events, school workshops, self-construction workshops, cultural initiative presentations

APPENDIX D – Example of a detailed NBS value proposition

NBS to be implemented: The greening of the schoolyards of a secondary school in a dense urban area, by increasing tree canopy cover by 10% and establishing a small school garden of 250 m2 for growing vegetables.	
Environmental Value Proposition	Cooling through shading and evapotranspiration, based on research experienced temperature under the trees can be 10 C lower. Biodiversity will be enhanced by creating more habitat for birds and insects. Air pollution can be reduced by especially capturing particles when trees are placed close to a busy adjoining road.
Social Value Proposition	Pleasant areas are created for play during school breaks. Cooler temperatures will make learning easier. The community garden can be used in teaching and educate children about growing vegetables.
Health Value Proposition	Better physical health due to cooler outdoor space that stimulates more games and play. Greener schoolyards with e.g., more visible green enhance learning and reduce stress (also of staff).
Economic Value Proposition	Cooling through trees can help reduce air conditioning cost in summer. Lowering of stress can result in lower sick leave among staff. The vegetable garden can produce vegetables and fruits which means that less of these need to be bought.
Possible value synergies to be enhanced	Many of the values described above can go hand-in-hand, e.g., cooling, mental health promotion, and enhanced biodiversity by planting trees. The vegetable garden stimulates learning and social interactions, while also producing fruit and vegetables.
Possible value trade-offs to be managed / minimised	Too much shading of the vegetable garden by trees can have a negative impact on some crops. Trees can have different properties (e.g., leave size) that impacts contributions in terms of aesthetics, cooling, air pollution reduction.
Possible disvalues to be managed	Some trees and other plans produce a lot of pollen and can result in allergic reactions. Trees and plants attract insects such as bees and wasps, which can result in stings and allergic reactions.
Potential values lost by implementing the NBS	Using part of the schoolyard for a community garden means that paved surface is taken which is currently used for sports activities. Taking space on the schoolyard means that plans for an additional shed with play equipment need to be changed.

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