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Valuing the Invaluable(?)—A Framework to Facilitate Stakeholder Engagement in the Planning of Nature-Based Solutions

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Abstract: Nature-based solutions (NBS) have emerged as an important concept to build climate resilience in cities whilst providing a wide range of ecological, economic, and social co-benefits. With the ambition of increasing NBS uptake, diverse actors have been developing means to demonstrate and prove these benefits. However, the multifunctionality, the different types of benefits provided, and the context-specificity make it difficult to capture and communicate their overall value. In this paper, a value-based framework is presented that allows for structured navigation through these issues with the goal of identifying key values and engaging beneficiaries from the public, private, and civil society sector in the development of NBS. Applied methods such as focus groups, interviews, and surveys were used to assess different framework components and their interlinkages, as well as to test its applicability in urban planning. Results suggest that more specialized "hard facts" might be needed to actually attract larger investments of specific actors. However, the softer and more holistic approach could inspire and support the forming of alliances amongst a wider range of urban stakeholders and the prioritization of specific benefits for further assessment. Consequently, it is argued that both hard and soft approaches to nature valuation will be necessary to further promote and drive the uptake of NBS in cities.

Keywords: nature-based solutions; greening cities; urban governance; urban planning

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1. Introduction

Nature-based solutions (NBS) have been widely promoted as an important means for cities to combat the pressing challenges of climate change and ongoing urbanization. Beyond their direct contributions to lowering risks associated with climate-related pressures such as flooding and heat stress, NBS can also deliver diverse indirect co-benefits related to aspects such as health and well-being, economic opportunities, or addressing social issues [1]. According to the European Commission they are defined as "actions inspired by, supported by or copied from nature and which aim to help societies address a variety of environmental, social and economic challenges in sustainable ways" [2]. As cities seek to increase their resilience against climate change impacts whilst dealing with budgetary constraints, the effective valuation and communication of these multiple functions of NBS have become increasingly important [3,4]. However, the strong context-dependency, the diffuse nature of many ecosystem services, as well as the multifunctionality of NBS make it difficult to paint a clear picture of the specific value NBS create for different urban stakeholders. It is at least partly for these reasons that the development of alternative business, governance, and financing models, taking into account diverse public and private actors, has been identified as an important challenge for mainstreaming NBS in urban planning and design [1].

This paper presents and discusses the logic and individual components of a framework, which aims to enable targeted and user-friendly navigation through this complex issue of NBS valuation. It has been developed within the SCC2 project Urban Nature Labs (UNaLab), which is funded by the European Commission under the Horizon 2020 research and innovation program and seeks to contribute to "the development of smarter, more inclusive, more resilient and more sustainable cities through the implementation of nature-based solutions" [5]. The framework aims to support urban planners and practitioners with identifying NBS values in a structured way to inform decision-making and stakeholder engagement around NBS implementation [6]. The first section discusses the challenges and trade-offs associated with nature valuation and makes a case for "softer" value assessment tools to encourage awareness-raising, stakeholder engagement, and mobilize local actors around NBS to complement "harder" valuation mechanisms. The second section provides an overview of the methods applied to develop the framework. The third section describes the different framework components and their linkages. In the final section, some reflections are made on the utility of such an approach and its relevance for future (applied) research.

1.1. Challenges and Trade-Offs in Approaches to NBS Valuation

The term "value" is rooted in philosophy and only from there entered economics and financial theory [7]. Against the background of nature valuation, Costanza 2003 states that "value ultimately originates in the set of individual and social goals to which a society aspires" [8] (p. 24). Whereas conventional economic value is mostly focused on the maximization of individual utility and its expression in monetary terms, NBS also strongly relate to other goals (and resulting values), such as sustainability or social wellbeing [7–9]. As a result, an assessment of value should be based on the contribution to achieving these multiple goals [8].

Many initiatives and approaches have been developed which seek to better describe and capture the values of NBS and green infrastructure components. It is assumed that through a better understanding and being able to effectively quantify the benefits, the evidence base will pave the way for the development of new financing and business models to facilitate planning and uptake of NBS in cities. In "The Economics of Valuing Ecosystem Services and Biodiversity," Pascual et al. give an overview of different approaches to nature and ecosystem valuation. Most importantly, they distinguish between biophysical valuation which derives value by measuring the physical costs involved (such as labour, energy, or material input), and preference-based methods that build on the assumption that value derives from the subjective preferences of humans [9]. Whereas such approaches may contribute to better value assessment, capture, and communication, controversies remain with regards to expressing the variety of different values and benefit types in a single unit of measure, such as money [10,11]. Out of this discussion, multi-criteria analyses have emerged as an alternative to formally integrate multiple values of different units in decision-making [12].

Against this background, various methods and instruments exist, ranging from calculative approaches, such as established market valuation techniques, to more holistic assessments incorporating wider sustainability impacts [4,9]. These methods of valuation serve different purposes and should collectively play an important role in mainstreaming NBS. Whilst hard quantification and monetization techniques are typically highly technical and NBS specific (i.e., developed to assess impacts of specific NBS types), softer valuation approaches are emphasizing advocacy and awareness-raising [9]. However, there are certain trade-offs involved in the development of tools to assess the diffuse and complex nature of the benefits associated with NBS and to take context-specific preconditions into account. Along with the benefits, the associated beneficiary structure and the individual potential and willingness to invest in such an NBS differ greatly. For example, an intensive green roof with public access in a cold northern European city will likely create very different benefits for different beneficiaries than it would on a private building in

a warm southern European city. This is because the various functions of NBS translate differently into benefits depending on the demands and preconditions of the surrounding context. This strong context specificity, the diffuse nature of many ecosystem services, as well as the multifunctionality of NBS imply that the establishment of the generic business models for NBS that would attract sustainable sources of finance is rather challenging. This uncertainty factor significantly increases when trying to anticipate the impacts of a planned future intervention (ex-ante). Thus, the creation of tools to better understand value creation through NBS will inevitably create trade-offs between their effectiveness in quantifying the benefits and their role in communication, advocacy, and mobilizing support. While both are of significant importance, the former will allow NBS to be more effectively integrated into prevailing value calculation systems, while the latter can function as a means to expand comprehensions of value creation, provide insights into other points of view and integrate different types of benefits and meanings that stakeholders associate with them.

This framework was developed within a large European Project involving eight European cities and two observer cities, all with varying cultural, institutional, and climatic contexts. It should also function as a mechanism to support future interventions (ex-ante). Thus, the imperative of interoperability of the framework between diverse contexts further limits the potential for hard valuation approaches. Therefore, the ambition of the described approach is not to quantify or monetize specific benefits of NBS, but rather to serve as a means for awareness-raising and mobilizing local support in diverse urban contexts.

1.2. A Case for "Softer" Approaches to NBS Valuation

One of the central strengths of the NBS concept is its broader more holistic consideration of links between social and ecological systems, as well as the potential broader societal impacts of interventions in complex systems. Due to its integrative, systemic approach, NBS has the potential to overcome a prevailing bias for developments that focus on short-term economic gains and effectiveness [13]. Additionally, associated benefits can be more public or private in nature (or often a combination of both), making them susceptible to collective action problems [14]. The importance of mobilizing local support behind NBS is reflected in their proponents' emphasis on open stakeholder engagement processes with diverse actors that are hoped to support with the bridging of social and economic interests [1,3]. This is reflected in recent rounds of European funding associated with NBS, in which NBS are typically combined with prescriptions of integrating alternative governance models and a high degree of stakeholder engagement and co-creation [2]. As a rather recent, rapidly evolving, and applied concept co-creation thereby describes the co-design process in a group of stakeholders [15]. Effective partnerships amongst local actors have been identified as a central enabling factor for effective NBS rollout, while awareness-raising activities and mobilizing amongst local actors can play an important role in addressing some of the central barriers to NBS uptake including countering path dependencies, institutional fragmentation, and the uncertainty associated with NBS implementation processes and benefits [16]. Due to the abstract benefits associated with a given NBS, effective discussions and decision making amongst stakeholders are challenging when its values are not represented in a visible way. By presenting soft benefits in a systematic and adaptable way, informed discussion can be possible, and arguments may be steered through visible examples. This could help overcome the routine lock-in by increasing awareness amongst urban planners (and other urban actors) of the impacts of NBS from their own and other actor perspectives, facilitating communication between silos. Beyond building intersectoral bridges, such approaches can support improved integration of knowledge between academics and planners, which has been identified as an important factor for supporting NBS uptake [17].

Others have articulated the importance of effectively communicating nonmaterial benefits of NBS in a persuasive manner in ways that benefits can be accounted for and traded off in common framings [18–20]. It is in this context that the described framework has been developed. Taking into account the trade-offs associated with nature valuation and

attempting to develop an approach that is applicable in multiple contexts ex-ante, it aims to support urban planners and practitioners with identifying NBS values in a structured way to inform decision-making and stakeholder engagement around NBS implementation in early stages of NBS development. This approach does not aim to discount "harder" approaches to nature valuation, but rather tries to integrate these through directing users towards potential valuation methods, based on their own selections. Nevertheless, the primary function of the framework is communication and awareness-raising, and it should be applied at the early stages of collaboration processes around NBS development.

2. Methodological Review

The development of the framework followed a rather applied research approach. Broad desktop research was performed to develop an overview of existing evidence related to NBS functions, benefits, and beneficiaries, as well as existing valuation and quantification tools and financing options. After organizing the findings, diverse focus group sessions, expert interviews, and surveys were conducted to fill existing knowledge gaps and link the identified components of the resulting framework. Focus group sessions consisted of interdisciplinary working groups of researchers (e.g., from economics, environmental sciences, social sciences, urban planning, or biology background) and city experts from the UNaLab consortia. All focus groups were conducted in the frame of UNaLab project activities and, depending on the topic, different experts were involved. Finally, the logic of the framework was operationalized and applied as part of a series of NBS roadmapping workshops in the five cities Stavanger (NO), Cannes (FR), Castellón (ES), Prague (CZ), and Başakşehir (TU). Furthermore, feedback on its applicability and usefulness in current planning processes was gathered through targeted and semi-structured interviews with 12 experienced urban planners across Western Europe (Eindhoven (NL), Arnhem (NL), Tilburg (NL), Apeldoorn (NL), Zwolle (NL), London (UK), Gent (BE), Freiburg (DE), Hamburg (DE), and Ludwigsburg (DE)). The gathered reactions helped to finetune and improve the framework, as well as to better define potential application areas. Table 1 summarizes the different methods used to develop the different framework components and highlights the links to other research activities within the H2020 UNaLab project.

Table 1. Data sources and methods used to develop the different framework components.

Framework Component	Method	Link to UNaLab Research
Challenges, nature-based solutions (NBS), and functions	Desktop research on NBS functions and existing valuation and performance measurement approaches (2018–2019)	NBS Technical Handbook [21]
Linking functions to beneficiaries	Expert survey (December 2019 to January 2020) involving 26 participants from 15 different countries, all involved in NBS-related projects (65% answering from research and 35% from city perspective)	
Beneficiaries, benefit types, and value capture potential	Desktop research and expert focus groups on beneficiaries, benefit types, and value capture potential (2018–2019)	
Financing Options	Desktop research and expert focus groups on financing options and strategies (2018–2019)	Business Models and Financing Strategies for NBS [22]
Testing of the framework	Semi-structured interviews with 12 urban planners (March 2019 to June 2019) to test the usability of the concept Application and discussion of the framework logic in Roadmapping Workshops in five European cities	Use of the framework in strategy development within the UNaLab follower cities [23]

3. Results

3.1. A Value-Based Framework for Stakeholder Engagement in NBS Development

The presented framework should enable planners and users to take different types of benefits into account (even if not quantified) and identify key beneficiaries and potential financing options that could be involved and applied in a given NBS project. It builds on three major pillars:

1. The different functions of NBS and their relation to specific urban challenges
2. The key beneficiaries of NBS functions and their individual benefits
3. Different financing options for NBS

Figure 1 shows the different components, linkages, and the general logic of the framework, all of which will be further discussed in the following sections.

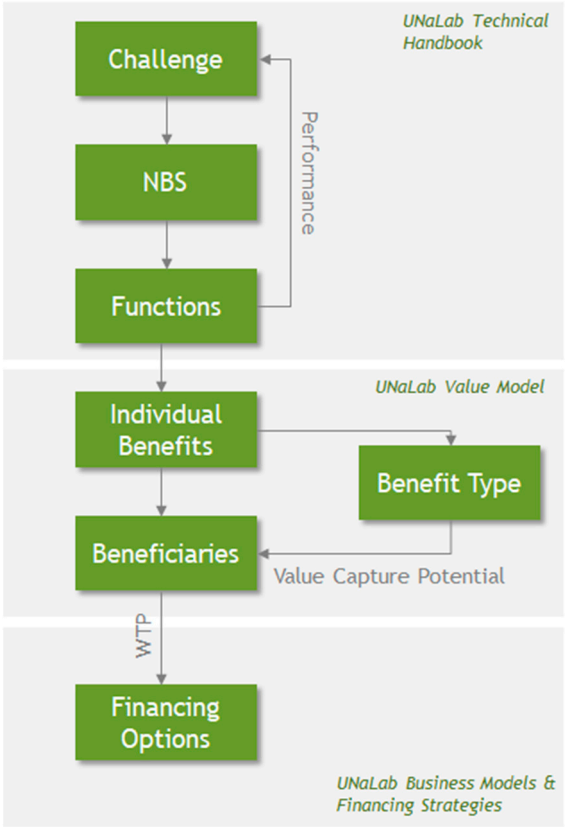


Figure 1. Components and logic of a value-based framework for stakeholder engagement around NBS (further developed from Mok et al., 2019 [6]).

3.2. NBS to Solve Urban Challenges

The concept of NBS has only recently evolved and covers different existing approaches, such as green infrastructure or ecosystem-based adaptation. It can thus be best understood as an overarching umbrella concept, which unites those various approaches from different research domains or policy contexts. However, a common feature of NBS is the focus on addressing societal and urban challenges through a range of different functions and ecosystem services [24,25]. In the frame of the UNaLab project, a technical handbook is being developed, which builds on these urban challenges, describes different NBS, and indicates their multiple functions alongside an estimate of the individual performance. Functions are thereby of a technical nature and can for instance relate to the ability of NBS to provide shade, retain surface water runoff, or filter the air. As context-specificity plays a big role in estimating the individual performance, approximate values in terms of no, low, medium, or high performance are indicated for each NBS and function [21]. Whilst the

handbook will be further developed until the end of the project, Figure 2 summarizes the different categories and functions, which were used in the presented framework. The focus was thereby laid on functions that address climate and water-related urban challenges, as well as such that cover social services and biodiversity aspects.

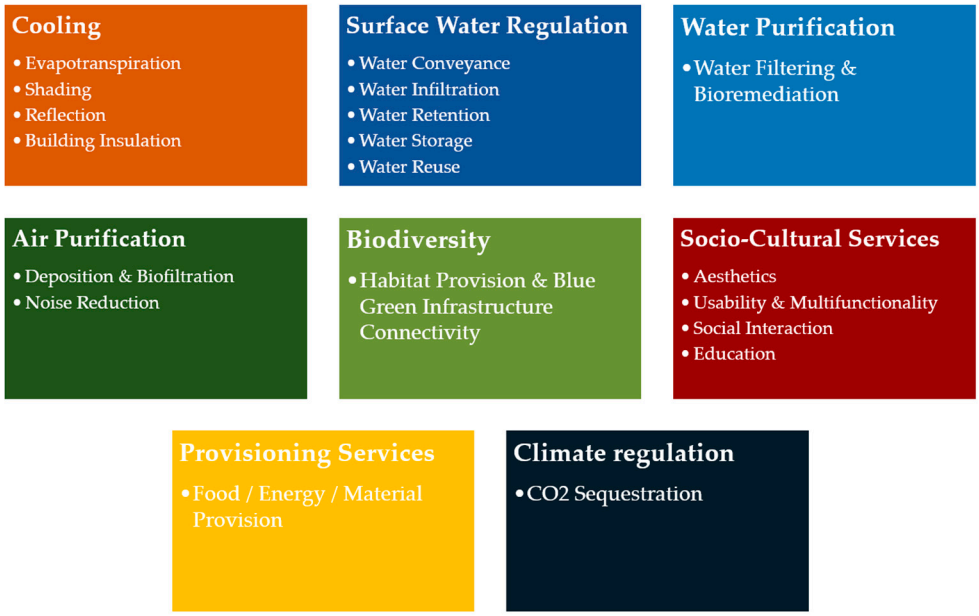


Figure 2. NBS function categories (in bold) and functions (in bullets) based on the UNaLab Technical Handbook [21], which were used to build the value-based engagement framework.

3.3. From NBS Functions to Beneficiaries

In this step, the technical NBS functions were translated into individual benefits of different beneficiary groups. Public authorities are frequently grouped as a single homogeneous actor, which can oversimplify the different prevailing logics and priorities between municipal departments and public agencies. Thus, potential beneficiaries in the framework differentiate between municipal departments or public agencies and private entities in the urban realm, as well as citizens and other stakeholders from civil society. Figure 3 shows the results of an expert survey in which the extent of benefit from the given technical functions of NBS was estimated for different types of urban stakeholders. Knowing both, the technical performance of different NBS functions, as well as an estimation of the extent to which urban stakeholders might benefit from these, may help in understanding the potential beneficiary constellation of a selected solution. It is assumed that the identified stakeholders with high benefits across the different functions will have a deeper material vested interest in implementing such NBS and could thus be valuable partners to engage in the planning, design, implementation, and financing stages of related projects. In this framework, the material vested interest could be expressed in terms of Willingness to Invest (WTI), which is introduced in the subsequent sections. If such an interest appears to be absent, this might suggest an information gap or lack of awareness of such benefits. This perspective does not take aspects related to power and power imbalances into account, which must be considered by the planner on a case-by-case basis due to their typical context specificity.

Several trends could be observed when analyzing the survey results. Overall, it was indicated that socio-economic functions, biodiversity, and water purification are the easiest functions to rate, with 89%, 82%, and 81% of participants describing the ease of linking beneficiaries to functions as “rather easy” or “very easy.” On the other hand, provisioning services, cooling, and climate regulation were perceived as the most difficult ones with 50%,

37%, and 36% of participants indicating the rating to be "rather difficult" or "very difficult." Generally, research representatives tend to rate benefits higher than city representatives—a tendency that was particularly noticeable with regards to the "role" of the urban planning department and what it would benefit from (up to 30% higher benefit rating for individual functions by the research representatives). Varying perceptions and some uncertainty could also be perceived as to how much the health sector (health agencies and insurance companies) would benefit from NBS functions. Lastly, the overarching category of "citizens" received some criticism and, due to its broadness and the nature of NBS services, was rated as "top beneficiary" for almost all of the considered functions.

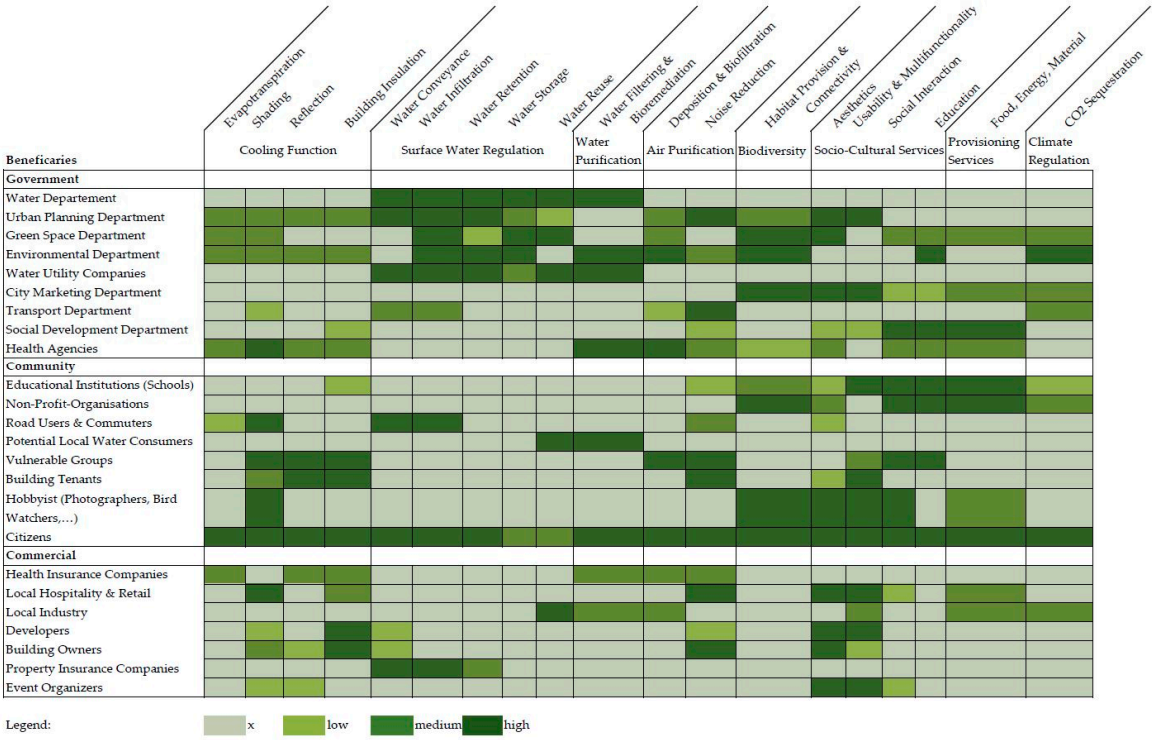


Figure 3. Survey results ranking the extent (low, medium, high) to which different urban stakeholders from public, private, and civil society sector would benefit from different NBS functions. Fields indicated with an "X" were not assessed.

3.4. Benefit Types and Value Capture Potential

Next to the beneficiary constellation, the value capture potential of a given benefit will have a big effect on the individual interest and willingness to invest. In an attempt to better integrate the benefits provided by nature into conventional accounting structures, monetary value capture has been a popular and much-discussed approach (see Figure 4 for more specific methods concerning monetary value capture). It has also been applied to various ecosystem services [9,11,26]. However, most of these approaches are highly context-specific, based on many assumptions, and thus come with a high degree of abstraction and uncertainty. Against this background, we argue that depending on the nature of an individual benefit it might be easier or harder to materialize. In cases where such an approach would lead to a high abstraction level or require in-depth expert knowledge, it might be more tangible to use alternative or complementary assessment methods to capture and communicate the value at hand. To better depict this issue, the potential benefits from NBS were categorized in six different benefit types, which provide a basis for value allocation that includes both monetary as well as non-monetary value of NBS (Figure 4).

Benefit Type	Description	Examples	Assessment Method Examples
Revenue & Income	The beneficiary directly increases his/her income through the intervention	Increased property values, improved sales through increased foot traffic in business areas	Hedonic pricing, cash flow analysis, business model canvas, NPV analysis
Cost Savings	The beneficiary saves money due to the intervention	Better insulation and reduced energy costs, flood risk mitigation	Contingent valuation, cash flow analysis, business model canvas, NPV analysis
Compliance	The intervention helps the beneficiary to fulfill a mandate or comply with regulations	Fulfilling environmental standards, achieving city goals, risk reduction	Audit, stakeholder consultations, risk and policy mapping, performance indicators
Active Use	The beneficiary can make direct use of the intervention	Opportunities for recreation and sports	People and visitor counters, qualitative surveys and interviews
Local Identity & Image	The beneficiary gains recognition and visibility or identifies better with the place	Improved city marketing, CSR, sense of place	Qualitative surveys and interviews, media analysis
General Wellbeing	The beneficiary's quality of life/health/wellbeing is improved through the intervention	Better air quality, increased contact with blue green spaces, improved mental and physical health	Physical indicators (temperature, air quality, stress levels,...), qualitative surveys and interviews

Higher — Monetary Value Capture Potential — Lower

Figure 4. Benefit types and related value capture (exemplary compilation by the authors, further developed from Mok et al., 2019 [6]. Icons by flaticon.com).

3.5. From Beneficiaries to Financing Options

Building on the identified NBS functions and beneficiaries pillars, the framework concludes with different financing options. The objective of this pillar is to inspire the urban stakeholders to consider several potential NBS financing options based on the stakeholder constellation relevant in the local context. In this framework, the connection between the beneficiaries and the financing options relies on the concept of the Willingness to Invest (WTI). It is an adaptation of the Willingness to Pay (WTP) method, where the users of the ecosystem are asked to assign monetary values to the services upon which, following a contingent valuation approach, an aggregate WTP of the population for the specified ecosystem service can be derived. This framework is based on the assumption that beneficiaries have differing interests and capabilities to invest in NBS. It encourages to explore the potential WTI of selected beneficiaries in a given context when planning NBS. The development of the financing options attempts to move from existing case studies whose governance constellations are tied to the site-specific context toward more generic options that can be used to inform the development of new NBS financing constellations.

3.6. NBS Financing Options

Whether a good or service is more of a private or a public nature has direct implications on how it will be governed, financed, and managed [14]. For instance, private sector finance is more likely to be available for NBS that provide marketable products with private good characteristics (e.g., property price premium or agricultural produce). Similarly, NBS, which generate mostly public services (e.g., enhanced water retention due to public green infrastructure, reduced urban heat island effect, etc.) would more heavily rely on public investments [27]. From a private sector perspective, investing in NBS with predominantly public benefits is often not very attractive, due to a weak business model. This is a result of the spatially and temporally diffuse benefits implying a high risk of investments with a questionable availability of high return to compensate for the risk [28–30]. Overcoming this

challenge of the limited ability to pinpoint a suitable and rather traditional business model for financing NBS calls for identifying the viable combinations of public-private financing and partnership models, which would allow for sharing of the risks and benefits over time [19]. The potential governance and subsequent financing constellations around NBS interventions should be documented to provide an evidence base for generating further knowledge and inspiration on the available sources of investment.

The present framework builds on 11 financing options that have been compiled as part of the UNaLab project as stated in Table 1 [6,22]. It organizes the identified options following the common government-market-community trichotomy. In its traditional form, this trichotomy implies that any productive activity or resource is owned/executed by the government, market, or community [31]. However, the traditional model has been expanded to account for the hybrid solutions that can occur between the three extremes of the model, such as user fees. Additionally, comprehensive research on the potential external NBS financing schemes and sources was performed. The EU, as well as other international organizations and financial institutions, can, in some cases, be a major contributor to NBS implementation financing. Subsequently, an overview of the funds, financing facilities, and platforms has been compiled to draw the cities' attention to such financing possibilities, as well as their major eligibility criteria that often call for national and/or local political and financial support.

New governance constellations (such as grassroots initiatives or community-managed public space) around (nature-based) urban interventions have been included as well. These stakeholder constellations could sometimes be omitted from "financing models" of NBS as such, since the parties involved might not undertake capital investments in NBS per se. However, they can reduce the financial burden on the city through contributing labor, providing maintenance, or even supporting the construction of NBS. Hence, the framework includes these community-led initiatives under the term "invest" and encourages the user of the model to consider them among other financing options. Additionally, partnerships between private actors and the city for building and maintaining NBS often need to be complemented with a governance model to ensure that the benefits of the public good are realized and that long-term contractual arrangements are upheld (e.g., in Public-Private Partnerships). For these reasons, the framework attempts to integrate both financing, business, and governance models to facilitate a broader understanding of these aspects. Figure 5 illustrates the identified financing options and their allocation in the public-private-community domain.

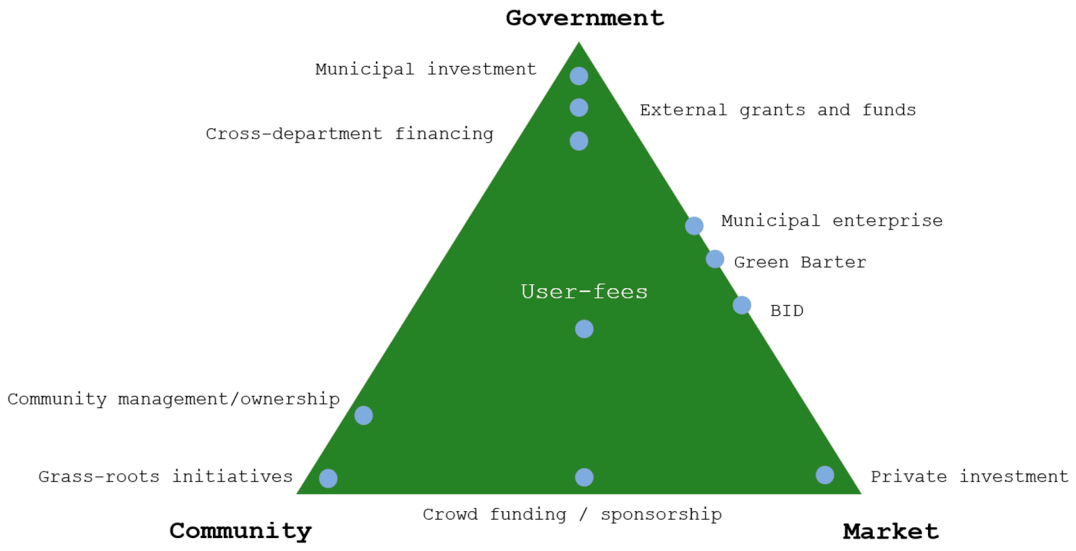


Figure 5. Financing options from UNaLab research, which were used to build the value-based engagement framework (taken from Mok et al., 2019 [6]).

3.7. Reactions to the Framework

Whilst applying and discussing the concept and logic of the presented framework, it became apparent that respondents of the interviews were still very much exploring the field of planning instruments that promote NBS and targeted tools are not structurally used. A much-heard argument against higher uptake was that these tools are very complicated and need expert information, which can become very costly for smaller public administrations. Further, tools were mainly used to monitor whether an intervention works or has the expected impact, and therefore not in a proactive planning manner.

Reacting to the logic and sequence of the presented framework, respondents were positive about how different steps of the framework take the user through a process that is often taken for granted by urban officials with a "green" background. Many indicated that the "soft" benefits are sometimes used as arguments for more NBS inclusion in urban planning and development, but not in such a systematic way, as most benefits are assumed to be known by everyone. It was agreed that by showing the benefits and beneficiaries of NBS more systematically, all actors could reach a similar understanding as to why an intervention is an improvement or necessary.

Reflecting the focus on hard facts and financial aspects in current planning practices, the main points of critique for this approach involved the lack of quantified values in monetary terms, as promoted by other natural capital valuation frameworks such as "The Economics of Ecosystems and Biodiversity" (TEEB) or iTree [9,32]. For instance, some respondents doubted that the soft benefits will be convincing enough to change existing processes and decision-making. However, it was acknowledged that the context specificity does not allow for generalized statements regarding financial outputs. Tools that try to account for different contexts were found to often end up with a large range of figures, which need to be interpreted and are difficult to apply in accounting processes as well. Furthermore, the issue was raised that care should be taken to also account for conflicting interests and potential disservices of NBS, as assuming that everyone will only benefit and want to build NBS could lead to unforeseen drawbacks and conflicts.

More practical feedback mainly focused on the importance of visible examples. There was broad agreement among interview partners that integrating case studies and showing NBS with pictures that describe the atmosphere and impact convinces more actors to include or support NBS in a planning process. Most respondents were not aware of co-investment strategies to include external financing outside of government sources of NBS. This shows that including components such as the different financing options may have a lot of potential to inform and make more people aware of alternative approaches. However, including and linking to many different factors and new insights inevitably raises the complexity of an issue, therefore good and careful moderation, as well as practical examples, were deemed essential to ensure the usefulness of the approach.

All in all, respondents indicated that the framework could be used in various situations. Firstly, it could be used to generally raise the awareness of urban planners regarding the impacts of NBS and inspire them to include more nature-based elements in their planning. Such a framework makes it easier for urban planners to include climate adaptation measures as it uses a discourse focusing on the NBS functionality. Secondly, it could be used for a better network management. It was mentioned that climate adaptation is a very abstract subject and therefore it is important to show the challenge to the partners and show what you want to do or be done about it. By showing benefits not only from a climate adaptation perspective but also including other themes and co-benefits such as aesthetics, health, leisure or education, it can connect targets from various stakeholders and help in forming alliances. It also proposes a standardized language on climate adaptation, functions, and benefits, which makes it easier for different departments to communicate. Thirdly, the framework was perceived as helpful for stakeholders to reach a consensus on what benefits should be prioritized. Lastly, because of the relative simplicity, it could also play a role in participation processes to show the importance of climate adaptation, but also the other functions of NBS.

3.8. Applying the Framework in a Workshop Setting

As a specific use case, the logic and components of the framework were also applied in individual NBS roadmap development processes in five UNaLab follower cities: Stavanger, Cannes, Castellón, Prague, and Başakşehir [23]. Different sets of inspiration cards with information on the three pillars (NBS functions and performance, value creation and beneficiaries, and financing options) were used to inform NBS project development sessions in interdisciplinary groups (see Figure 6). In accordance with the statements above, it could be observed that the link between NBS functions and urban challenges was rather intuitive to most, whereas the steps around identifying beneficiaries and alternative financing options needed more moderation (also deriving from the fact that most of the workshop participants had a more technical or planning-related professional background). Discussions around stakeholder engagement and financing strategies became more thorough the more concrete and advanced a specific NBS project idea was. However, many participants mentioned that dealing with these issues from the very beginning of a project development stage helped in building a more solid case and considering new aspects and alternative ways for realization from early on. It also led to interdisciplinary and cross-departmental discussions around which actors are (or should be) responsible for and involved in NBS implementation in public space. Unclear responsibilities are an important barrier to NBS uptake which could be tackled by more collaborative and joint approaches in project development and implementation [16,33]. It was mentioned by the participants that based on the identified beneficiary structures and financing options, a more in-depth analysis of the local stakeholders, as well as more detailed technical studies on the performance and extent of certain benefits would be necessary next steps to leverage on the learnings and activate the beneficiaries around the defined project. Overall, the approach helped to navigate the process and discover various available solutions and alternative approaches to realization, sparked discussions around different ways to capture identified functions and benefits, and proved to be a good tool for developing a joint and solid "storyline" and strategy for project implementation at an early stage. However, as most of the projects developed in these workshops were still rather vague or fictional (with no immediate intention of implementation), further operationalization and testing of the framework in real-life use cases will be necessary to fully evaluate its potential and impacts.



Figure 6. Examples of inspiration cards used to operationalize the framework in a workshop setting (compiled from Den Ouden et al., 2020 [23]).

4. Discussion

The presented framework can be applied to different types of NBS and highlights their multi-functional nature by suggesting a structured approach in which different functions, benefits, and beneficiaries can be factored in. Rather than opting for specialized quantification, the framework offers targeted integration of user knowledge and allows for flexibility of application, taking into account the importance of context-specificity regarding NBS value creation. These features, alongside the educative and communicative character, make it an interesting tool for urban planners and decision-makers in the early stages of NBS project development. Based on the findings in this research, it appears that integrating and operationalizing the framework in urban planning processes can widen the view on potential benefits and beneficiaries and help in forming alliances and joint NBS projects between different urban stakeholders. Forming partnerships with different local actors and understanding their perceptions and preferences has shown high potential for increasing success in the planning and implementation of NBS projects, e.g., by encouraging trust, ecosystem stewardship, and social learning [34]. Still, the fear of conflicting interests and a lack of consensus which would slow down urban planning and decision-making processes represents an important barrier to multi-stakeholder involvement [1]. With this regard, several cases have shown that an early involvement of key stakeholders in a dialogue to identify common goals and communicate concerns, as well as the building of a "common language" can help minimizing conflicts of interest and issues with green space management [35,36]. However, to avoid scientific biases and the influence of power asymmetries among the stakeholders, transparent processes and good moderation are necessary—aspects which often require additional resources [37].

Another potentially positive feature of the framework is the established link to different financing options. It allows for the exploration of alternative ways of financing and encourages non-expert audiences to think about the investment capacity and interest of different beneficiaries. While the framework does not provide definite conclusions on how a certain NBS could or should be financed, it aims to demonstrate the array of possibilities, especially among urban planners. Adding to the discussions on public and private actor activation for NBS, it also includes local community actors among the potential financiers of NBS. A common problem in public and especially citizen engagement is the fact that NBS stewardship is often perceived by residents as sole responsibility of the government [34,38]. Here, the argumentation with multiple and individual benefits on the local and community level could improve social mobilization. Studies on energy cooperatives have shown that while large, less spatially-bound communities are dominated by the return on investment as the key driver, smaller and spatially-close communities tend to put greater emphasis on the social and environmental aspects of their investment [39]. Perhaps a similar approach could hold for NBS investments as well, especially seeing that citizens are often perceived as the main beneficiary across many of the discussed NBS functions. As NBS tend to enhance the sense of place and provide a range of local social and environmental benefits to beneficiaries, local community initiatives for setting up or maintaining NBS have been emerging (e.g., "Adopt a Place" initiative in London, numerous adopt-a-tree initiatives). While such initiatives might remain on a relatively small scale, they could hold cost-saving potential for local municipalities by mobilizing small-scale private investment and in-kind contribution from the local beneficiaries. Hence, the value-added of this framework also lies in its ability to depict a range of potential constellations and promote a holistic dialogue between the different entities.

It is hoped that raising awareness and shedding light on these various aspects and their interlinkages can inspire, mobilize, and involve more stakeholders from the private, public, and civil society sector in future NBS development, allowing for new financing and governance constellations, and thus helping to tackle some of the key challenges in mainstreaming NBS implementation in cities [3,16,19]. The application and testing of the framework in more concrete real-life NBS case studies and a close monitoring of the resulting project outcomes would be suggested next steps. These could help to evaluate,

whether the use of such an approach will actually increase the priority of NBS in urban planning, achieve a higher involvement of different urban stakeholders, or lead to choice of alternative financing options. It would also give the opportunity to see the influence of information flow and qualitative valuation on the empowerment of different stakeholders, which we acknowledge as a very important aspect in the planning process.

Contrarily, our research has highlighted the tradeoffs between different ecological valuation methods. Valuation of any kind always involves a certain degree of simplification and it is important to be aware of the potential pitfalls involved with reductionist approaches to understanding interventions in complex socio-ecological systems [40,41]. It is not contended here that more narrow (reductionist) mechanisms of value quantification do not have an important role in supporting the establishment of interventions with broad (often abstract) value creation. The intention here is rather to underline the importance of establishing a multiplicity of tools to assess value creation and to demonstrate the utility of softer, more subjective, forms of value assessment. Thus, responding to the call to analyze and describe NBS from multiple perspectives which take the complex interlinkages between social and ecological systems into account [4,42]. As quantitative evaluation techniques might provide a stronger evidence base at the cost of a broader conception of value creation, softer approaches, such as the one discussed here, maintain a more holistic scope but at the cost of the "hard quantitative facts" that are considered imperative for justification of investment according to prevailing logics [43].

In accordance with this finding, the lack of the quantified outputs might be regarded as a fundamental limitation of the presented framework, especially seeing that urban infrastructure investments need to be deemed economically feasible to be undertaken in the first place. Whereas the built narratives may help stimulate informed discussions and convince decision-makers why NBS are worth the investment, the framework will not be able to provide any certainty about the final performance and return on investment. Feedback from different urban stakeholders have indicated that such information, as a result of more expert and data-intensive tools such as TEEB, Natural Capital Accounting, or other forms of quantified impact modeling will be needed to add more financial certainty and attract larger investor attention. However, setting out the full spectrum of potential benefits and beneficiaries associated with a given NBS can help considering NBS as a crucial urban infrastructure asset worth to be further investigated in the first place, and prioritize specific values and KPIs to be further studied.

However, in terms of further value assessment methods, we argue that capturing value in economic terms will be easier for certain types of benefits (such as increased revenue and income or cost savings), whereas others might be more efficiently captured by other means of impact assessment (e.g., compliance, active use, local image and identity, or general health and wellbeing). Under the title "Ecosystem services: The economics debate, "Farley discusses the implications of treating ecosystem services as market commodities, e.g., through assigning monetary values. He points out that the use of (monetary) exchange values inevitably implies a certain degree of substitutability and non-essentiality of natural functions, which has to be carefully applied and continuously re-evaluated, especially when ecological thresholds are approached [11]. Thus, keeping a certain degree of diversification in the approaches to valuation may lessen the extent of abstraction and allow for differentiated and targeted communication of different types of benefits, thereby highlighting crucial functions and dependencies. It is hoped that by presenting soft benefits in a more structured and holistic way, their relevance for the overall urban system and the indirect influence on different budgets can be shown. Moreover, targeted and differentiated communication may increase the individual perception of benefits and the meanings that different stakeholders assign to NBS, which can fundamentally shape the final allocation of value and influence the demand and individual support for NBS [20].

5. Conclusions

The present paper describes a value-based framework that was developed in the frame of the UNaLab project to facilitate stakeholder engagement in NBS implementation. It is shown that the multifunctionality and the range of (co-)benefits that NBS provide hold great potential to engage different stakeholders from the public, private, and civil society sector around one given project. It may also help in linking climate adaptation to other important goals of cities. Providing a structured approach which can be used in multiple contexts can facilitate navigation through the complexity of the issue. It may further help in building a common understanding and language between actors from different backgrounds, and thus support the formation of new alliances for NBS planning and implementation. Whilst the link between given values and alternative financing options is not so well-established in current NBS planning processes, taking this issue into account from early on may help unlocking new potentials for final project realization. Additionally, the paper highlights different ways to value NBS and argues that hard and soft approaches serve different purposes, but should complement each other in building a case for NBS.

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