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# The NetworkNature Semester on Nature-based solutions and Standards

## *Final Output Report*

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## 1. Introduction

Nature-based solutions (NBS) are locally adapted, cost- and resource-efficient, systemic interventions, which can simultaneously provide environmental, social and economic benefits and build resilience to climate change.<sup>1</sup> As such they have a real and transformative potential to address the two-fold planetary emergency of climate change and biodiversity loss, while positively affecting human health and societal well-being. However, to realise their transformative potential of NBS, their practical implementation must be accelerated and the evidence-base of NBS outcomes and impacts must be further strengthened.<sup>2</sup> As implementation efforts accelerate, it also becomes more important to ensure that implemented NBS interventions set high-quality standards for their own operations and for future projects.

Despite standardisation in NBS is still in its early stages, special attention is being paid to it. First, European and international bodies are supporting standardisation in the field of NBS and biodiversity. On the one hand, according to the EU Biodiversity Strategy for 2030 “*the Commission will develop in 2021 methods, criteria and standards to describe the essential features of biodiversity, its services, values, and sustainable use*”<sup>3</sup>. On the other hand, standards organizations (International, European and National) are working in some standards related to NBS and are launching specific working groups in relation to NBS. Secondly, different administrations (International, European and National) have been working on informal standardisation (such as IUCN with its NBS Global Standard) or developing guidelines, handbooks, etc., to facilitate the use and implementation of the NBS, which can be the basis for standardisation processes.

The latest Network Nature semester on “[NBS and Standards](#)” focused on better understanding what high-quality NBS means in practice and how quality principles and criteria can be translated into universally applicable standards.

Concerning the quality aspects, the semester focused on the following questions:

- *How can we ensure that NBS projects live up to their promises and deliver multiple environmental and societal benefits?*
- *How can we avoid the intentional and unintentional misuses of NBS to deliver high-quality solutions that effectively address societal challenges?*

Directly related to the above questions, in terms of standardisation ensuring quality, the semester has sought to answer the following questions:

- *What needs and demands in the field of NBS can be standardised? Which ones are a priority?*

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<sup>1</sup>European Commission (n.d.): Nature-based solutions

<sup>2</sup> Almassy, D. (2022) Realising the Potential of Nature-Based Solutions for a Transformative Societal Change. The British Academy, COP26 briefings.

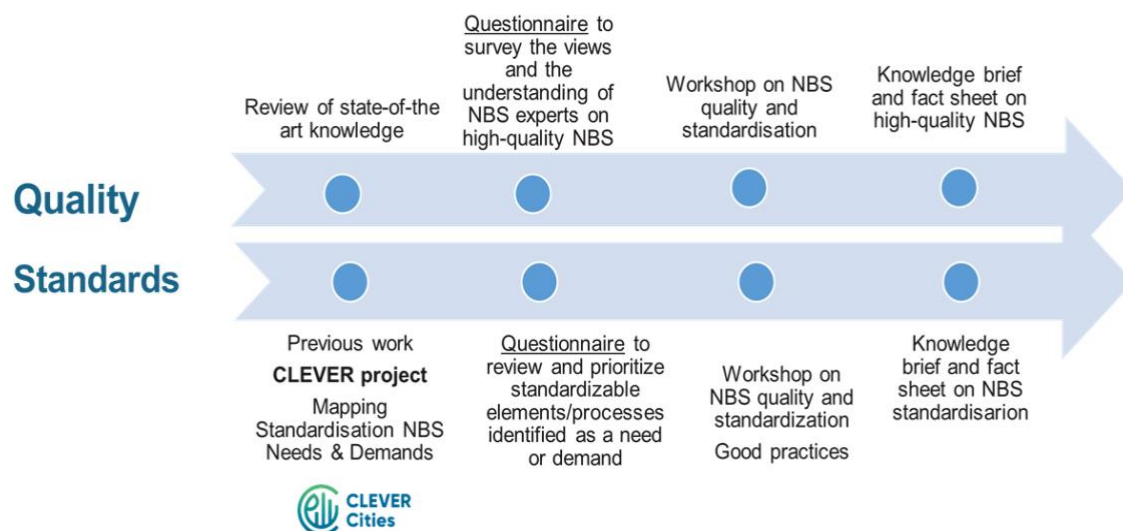
<sup>3</sup>EU Biodiversity Strategy 2020

- *What good practices exist within the framework of non-formal standardisation that can respond to these demands?*
- *Where do we start if we have to address formal standardisation? What could be the next steps in formal standardisation?*

## 2. Overview of the NBS quality and standardisation research

The Network Nature semester on "NBS and Standards" was articulated through two lines of work, one on high-quality (A) and other on standardisation (B), which ran in parallel. In both cases, firstly, a preliminary reflection has been carried out based on a desk study. Secondly, the results of the first phase were cross-checked by a questionnaire. Responses to the questionnaire were collected in May 2022 and in total, 39 submissions were received from experts in the field. Thirdly, their results were presented at the NetworkNature workshop "The way towards high quality NBS and standards: What we learned so far" held on 26th July, 2022. And finally, the results for the six-month period are included together in this Policy Brief.

**Figure 1: Research process**



- A. In order to better understand what high-quality NBS means in practice and how quality criteria and requirements can be translated into universally applicable standards, the semester focused on identifying the essential criteria and requirements to plan and deliver high-quality NBS. As a first step, we have reviewed various reports and research articles that focus on NBS quality requirements. As a second step in the process, we launched a questionnaire to survey the views and the understanding of NBS experts on high-quality NBS and relevant quality standards. Responses to the questionnaire were collected in May 2022, and in total, 39 submissions were received from NBS experts.

The results of the desk review and the survey were consulted during a Network Nature workshop, focusing on NBS quality and standardisation.

- B. Considering that it is a key moment to try to coordinate efforts and define a common roadmap for NBS standardisation in Europe, the standardisation work in the third NetworkNature semester was based on the work developed by TECNALIA in CLEVER Cities project. It aims to develop the Clever Standardisation Roadmap, that could be useful to define that European standardisation roadmap. In order to contribute to define that roadmap, a questionnaire to review and prioritise the standardisation needs and demands on NBS identified in CLEVER Cities project was launched. Then, the results were presented in the Network Nature workshop “The way towards high quality NBS and standards: What we learned so far”. That workshop aimed at identifying good practices in standardisation activities and different matters around NBS standardisation were discussed. The outputs of these activities are included in this policy brief to inform and make results available to the public audience.

## 2.1. Overview of the NBS quality research

Considerable knowledge has been built about NBS in recent years concerning the type of challenges they can address, the forms in which they can take place, the governance structures and the financing mechanisms which can support the implementation and the impacts they can deliver. However, there still exist several knowledge gaps in our knowledge.

**Figure 2: State-of-the-art knowledge of nature-based solutions**



A recent Network Nature mapping of NBS knowledge gaps identified 30 broader topics and 171 knowledge gaps requiring research and collecting practical lessons learnt. Among these, several knowledge gaps can be linked to the issue of quality, including:

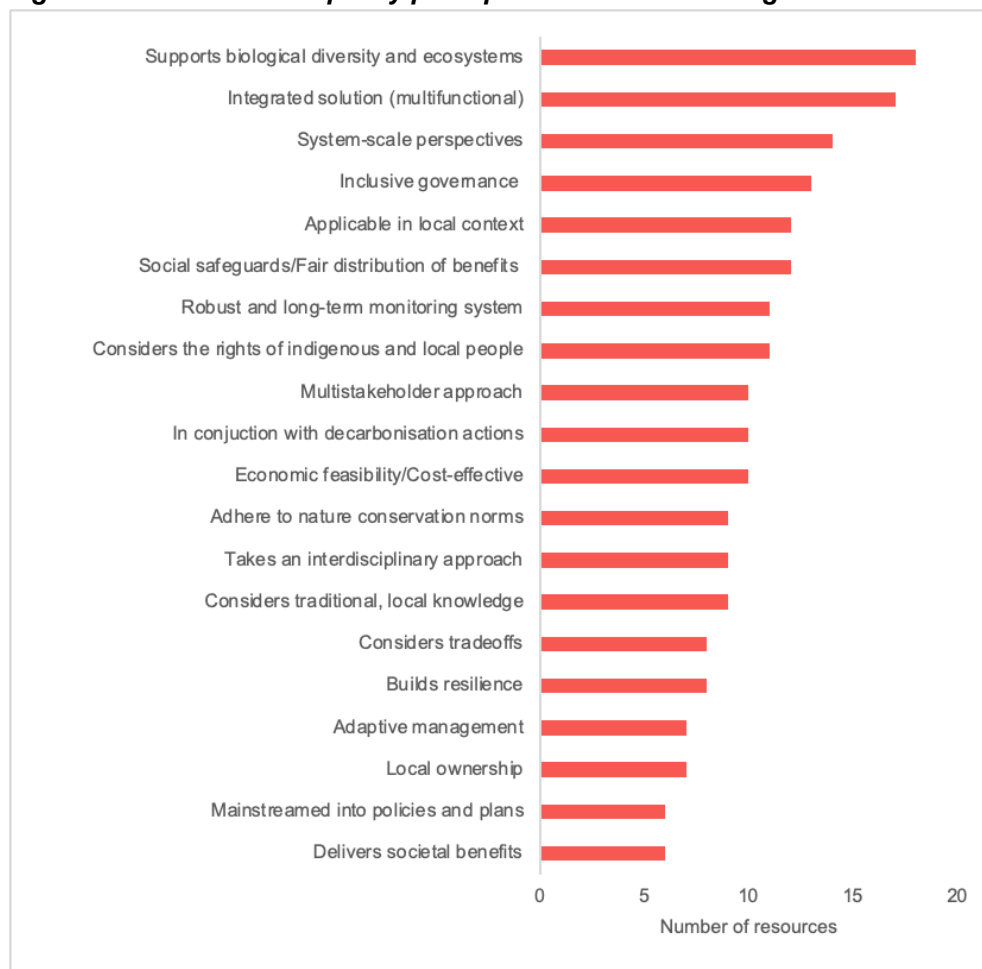
- *Costs/benefits*
- *Effectiveness of different approaches*
- *Negative impacts or risks*
- *Synergies and trade-offs*
- *Social cohesion*
- *Environmental justice*

### 2.1.1. Review of resources concerning the Criteria and Requirements for High-Quality Nature-based Solutions

To systemically map and assess the discourse around the criteria and the requirements of high-quality nature-based solutions, we have identified a list of resources that include and discuss NBS quality considerations. The resulting list, including over 30 publications, consists of resources offering a comprehensive approach to NBS quality considerations and documents focusing on specific aspects of NBS quality or a particular type of NBS (e.g., green roofs). The reviewed publications and research articles are listed in Annex 1.

The desk review identified over 25 potential quality criteria and implementation requirements, which can be necessary to ensure high-quality NBS. Among these, the majority of the studied resources identified the need for NBS projects to support biological diversity and ecosystem conservation objectives; deliver integrated and system-scale solutions addressing multiple societal goals and challenges; promote multistakeholder and inclusive governance and introduce social safeguards. See Figure 3.

**Figure 3: Identified NBS quality principles and criteria during the desk research**



As a next step, the principles and criteria identified during the desk research were grouped under five main themes to support further analysis. Accordingly, we distinguish principles and criteria for NBS quality concerning the following topics:

- *Objectives*
- *Design*
- *Feasibility*
- *Implementation*
- *Post-implementation*

In addition, the desk review also identified potential weaknesses or misuses, which can result in flawed NBS implementation. Potential quality problems can result from NBS design when projects apply monocultural approaches to tree plantations, promote industrial and agricultural processes, or negatively impact biodiversity. Another set of concerns is when project owners implement NBS as a greenwashing tool to offset emissions (thus using NBS as a substitute for fossil fuel phase-out) or to offset biodiversity losses. A third set of risks can arise from the lack of or limited social considerations during NBS planning and implementation, resulting in land grabs and displacements, gentrification, or the unfair distribution of NBS benefits.

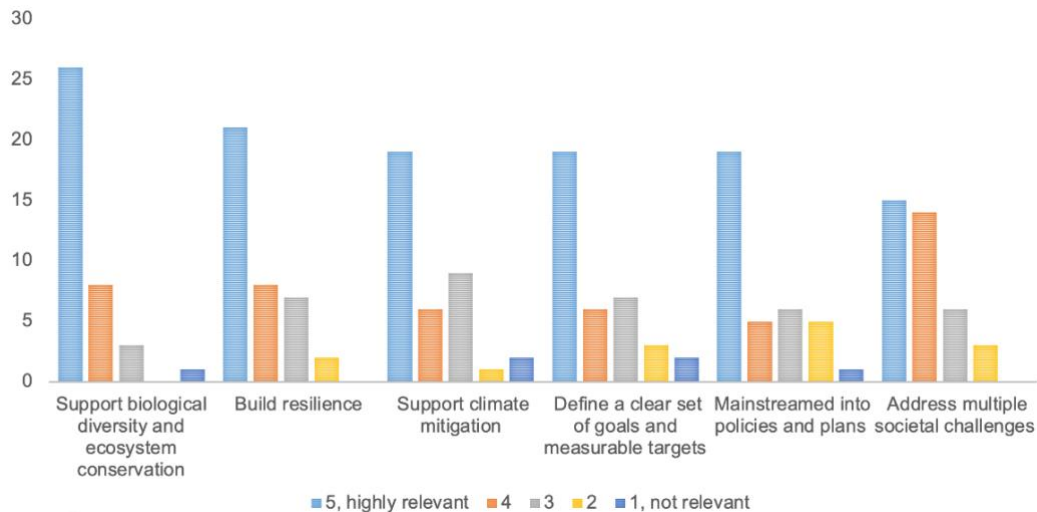
### **2.1.2. Questionnaire to survey the views and the understanding of NBS experts on high-quality NBS**

The questionnaire aimed to assess the importance of various quality criteria identified during the desk research, assess the relevance of various NBS misuses and identify the most important approaches to translate quality criteria into NBS standards. We present the results of the questionnaire below.

#### **NBS objectives**

Setting adequate objectives for NBS projects to secure high-quality and high-impact outcomes is crucial. The desk review identified various factors concerning goal setting. According to the questionnaire respondents, NBS objectives should support biodiversity and ecosystem protection, contribute to climate resilience and support climate mitigation. The importance of setting social goals was also highlighted by the majority of the responding experts, although to a somewhat lesser extent. Regarding the procedural aspects of goal setting, respondents also confirmed the importance of defining a clear set of measurable targets for the NBS projects and ensuring that the project objectives align with relevant sustainability policies and plans.

**Figure 4: Questionnaire results for NBS quality principles and criteria – Theme 1: Objectives.**



How can project developers set a comprehensive set of objectives that support the planning and implementation of high-quality NBS? For example, the **Library of trees in Milano (Italy)**, a park and botanical garden designed to create a central connection between residential, commercial and service areas, aims at supporting biodiversity objectives by creating a unique botanical garden and building resilience by offering an escape to residents from the urban heat. In addition, the project supports multiple social goals, such as promoting social interaction and objectives, providing opportunities for physical activities and environmental education, preserving cultural and natural heritage and promoting cultural diversity. The goals of the project were set in line with the recovery plan of the Porta Nuova area, aiming to mix nature and architectural designs to tackle environmental issues and restore derelict urban areas in the city of Milan.<sup>4</sup>

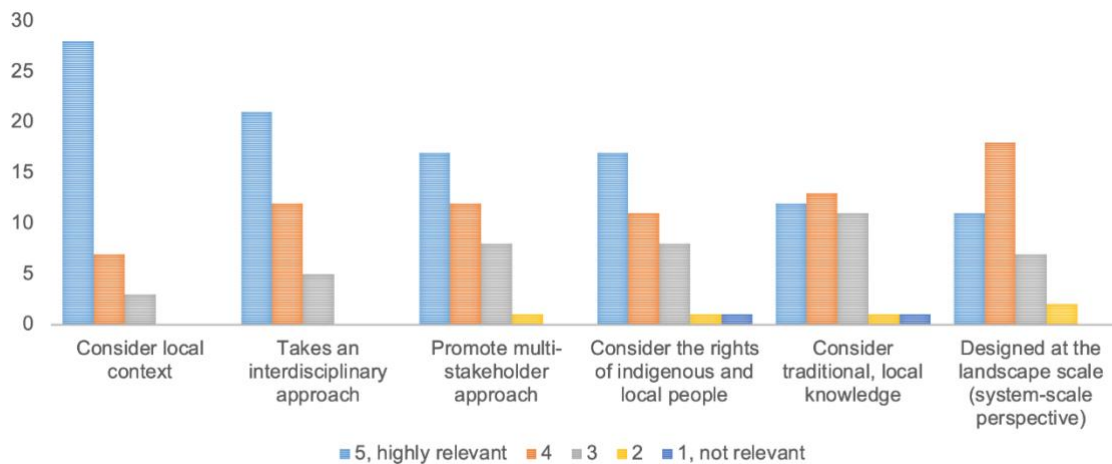
## NBS Design

Once the objectives of the NBS project are established, it is crucial to develop and put in place a comprehensive implementation plan. The reviewed publications and research articles suggest that NBS design should consider the local context and circumstances that potentially influence the outcomes of the NBS. Design processes should also make use of interdisciplinary knowledge practices. They should also involve different implementation actors and beneficiaries via multidisciplinary approaches, including the local and indigenous people directly affected by the NBS implementation. The respondents of the questionnaire also confirmed the importance of these factors. To a somewhat lesser extent, responding experts also suggested that consideration should also be given to traditional and local knowledge when designing an NBS project. Respondents also agreed that system-level considerations should be a factor in the design process but assigned somewhat lower importance to this.

<sup>4</sup> Urban Nature Atlas website (n.d.): *Library of Trees*



**Figure 5: Questionnaire results for NBS quality principles and criteria – Theme 2: Design.**



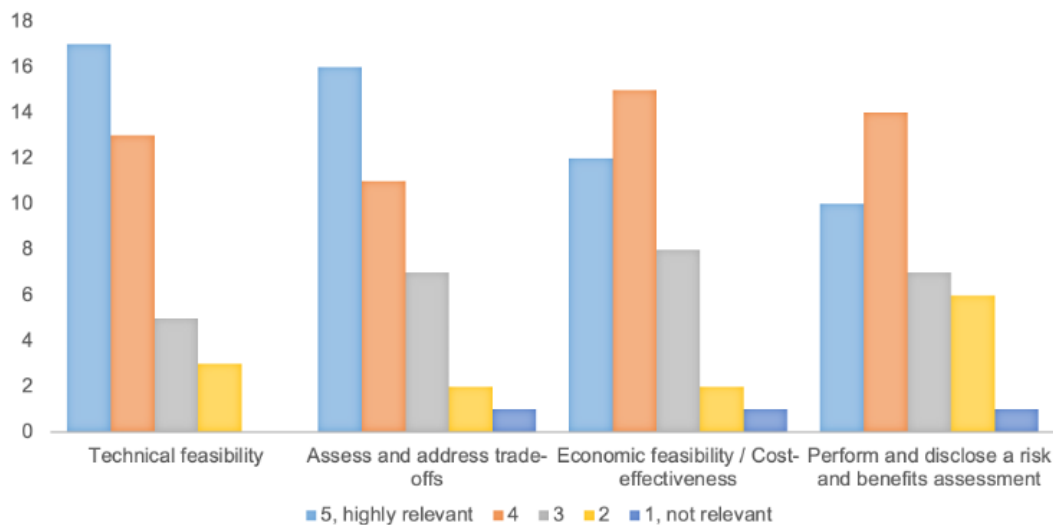
For example, the Urban Agriculture Program of Rosario, Argentina, was designed to tackle urban inequality and climate change in an integrated manner.<sup>5</sup> The program aimed to transform wasteland and vacant land areas into community gardens and help food provision to the urban poor. Another essential part of the program is the involvement of various local stakeholders and develops multiple social programs (e.g., for youth and elders), promoting a culture around food production. Over the years, the program has become the cornerstone of Rosario’s inclusive climate action planning, addressing increased flooding and heat events.

## Feasibility

Another critical stage in the implementation process of high-quality NBS is related to its feasibility aspects. Technical feasibility was confirmed as a crucial quality criterion to secure efficient operations and positive outcomes. The respondents also highlighted the relevance of economic feasibility, but it was somewhat less pronounced. Evaluating potential trade-offs related to the NBS implementation is also a key factor in securing high-quality NBS. While NBS has the potential to address multiple sustainability challenges and deliver various environmental and social benefits simultaneously, their potential negative implications (such as the risk of gentrification in the implementation area) should be considered and tackled to the extent possible. Respondents also agreed with the importance of risk and benefit assessments in connection to potential implementation challenges and adverse effects. Besides carrying out such assessments, disclosing their outcomes and revisiting the implementation plan and NBS design based on these outcomes is also essential.

<sup>5</sup> Urban Nature Atlas website (n.d.): *Resilient Rosario*

**Figure 6: Questionnaire results for NBS quality principles and criteria – Theme 3: Feasibility**



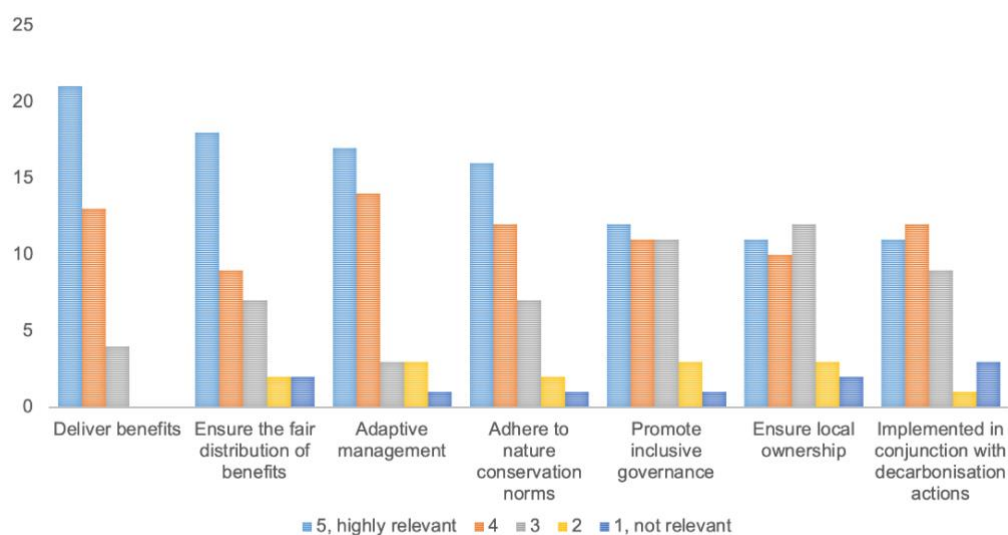
The Porous Alley Demonstration Project (Boston, USA)<sup>6</sup> is a good example of how the feasibility of an NBS can be validated. The Porous Alley was designed and implemented in the South End neighbourhood of Boston as a demonstration project to test the feasibility of using porous asphalt to increase groundwater recharge and reduce flooding and water pollution. The project started with selecting an ideal area for the demonstration project based on several environmental and technical criteria. In the next step, the project carried out on-site soil tests and several public meetings to ensure that area residents were comfortable with and well informed about the project. After the developers confirmed the project's feasibility, they started the implementation. They created a storage area beneath the porous asphalt layer from coarse gravel with a capacity of 425 cubic feet (approximately 12 m<sup>3</sup>) of water storage, installed an overflow pipe from the storage area into the existing sewer to prevent any possible overflow from the storage area and a 6-inch diameter well. The project brought promising results: the ambient groundwater levels increased during all seasons monitored. In the project's first year, 273,000 litres of water were recharged into the ground, and about 20 kilograms of sediment was captured.

<sup>5</sup> Urban Nature Atlas website (2022): *Porous Alley Demonstration Project*

## NBS implementation

Comprehensive goal setting, careful design and feasibility testing are key elements to high-quality NBS delivery. However, the NBS project should also consider and monitor various aspects throughout the implementation process. Several of these aspects corresponds to criteria that were established prior to implementation. NBS projects must ensure that they deliver the provisioned social and environmental benefits, and they deliver these in a fair distribution. Secondly, the management of the projects should be adaptive to changing circumstances. Questionnaire respondents also outlined that NBS projects must follow existing nature and ecosystem conservation norms throughout the implementation (such as considering previously established protection zones or prioritising native species). Somewhat less importance was given to stakeholder involvement aspects, but inclusive governance and local ownership was also found relevant to secure high-quality NBS implementation.

**Figure 7: Questionnaire results for NBS quality principles and criteria – Theme 4: Implementation**



A project focusing on constructing the Bjerkedalen Park in Oslo, Norway,<sup>7</sup> was part of a broader municipal program to support adaptation to climate change, improve water quality and biodiversity and promote outdoor recreation and improved health. The project resulted in the creation of a large park, the reopening of the Hovin river, and the ecological restoration of the riverside. The park now acts as a recreational area with outdoor activities facilities and is accessible to everyone.

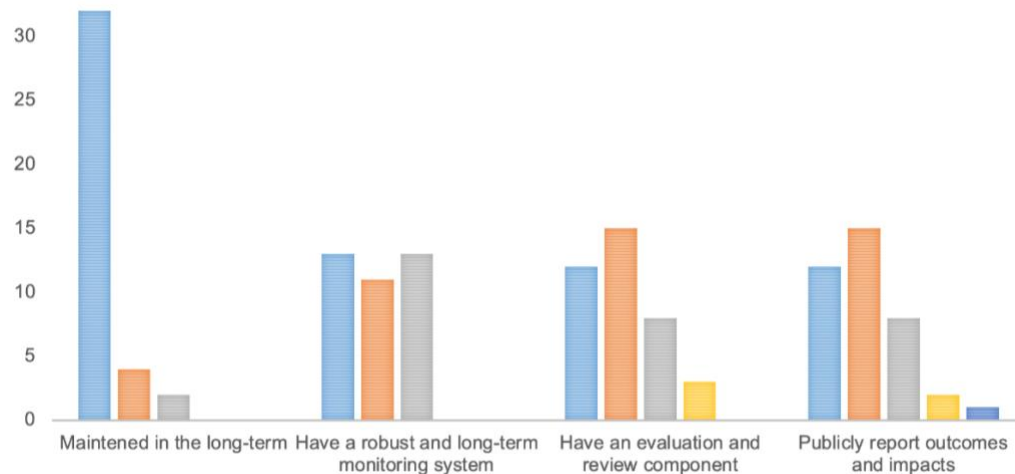
## Post-implementation

Survey respondents confirmed that once NBS projects are implemented, long-term NBS maintenance can be critical to ensure the delivery of the intended benefits. Other

<sup>7</sup> Urban Nature Atlas website (2022): *Bjerkedalen Park and Reopening of the Hovin River*

factors, such as a formal and consistent monitoring system, the introduction of an evaluation and implementation review process and a public report on the project outcomes and impacts, were all identified as relevant implementation principles.

**Figure 8: Questionnaire results for NBS quality principles and criteria – Theme 4: Implementation**



The results of the Monavale Vlei wetland conservation project (Harare, Zimbabwe),<sup>8</sup> have been successfully maintained in the long-term via awareness-raising and education activities. The project's overall goal was to address biodiversity issues by restoring the Monavale Vlei urban wetland area, increase community biodiversity awareness through environmental education and training, improve community livelihood prospects, and tackle climate change issues. Project implementation started in 2009 by the Conservation Society of Monovale (COSMO). Activities included the restoration of parts of the wetlands by removing invasive species and supporting the indigenous species take over; the organization of a campaign for the removal and collection of waste dumps and an educational program for school children. Over the years, COSMO has continued the wetland awareness walks for schools, university students and other interested parties, organised composting and vermiculture workshops to the Monavale community. COSMO also monitors implementation outcomes: a baseline ecological survey of the wetland area recorded over 120 different wetland adapted plants, orchids, and grass species, and over 244 bird species.

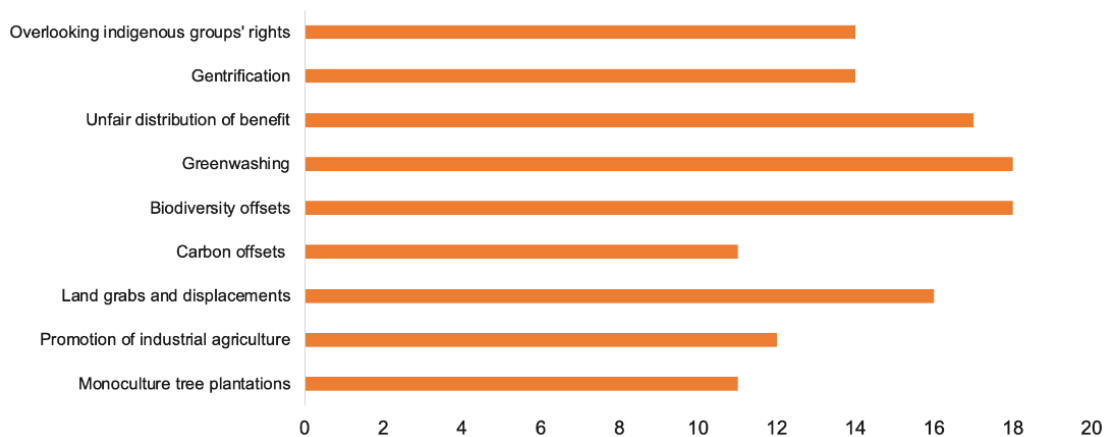
### Misuses

Respondents of the questionnaire also assessed the relevance of different risks connected to NBS implementation, which can negatively affect the outcomes of projects. During the desk research, we identified various misuses, which can jeopardise and reduce the overall quality of NBS projects. Respondents of the questionnaire identified greenwashing and biodiversity offsetting as the most frequent and relevant risks affecting the overall quality of NBS projects. Social concerns, such

<sup>8</sup> Urban Nature Atlas (n.d.) *Monovale Vlei Wetland Conservation*

as unfair benefit distribution, displacements and gentrification were also considered high-risk factors for successful implementation.

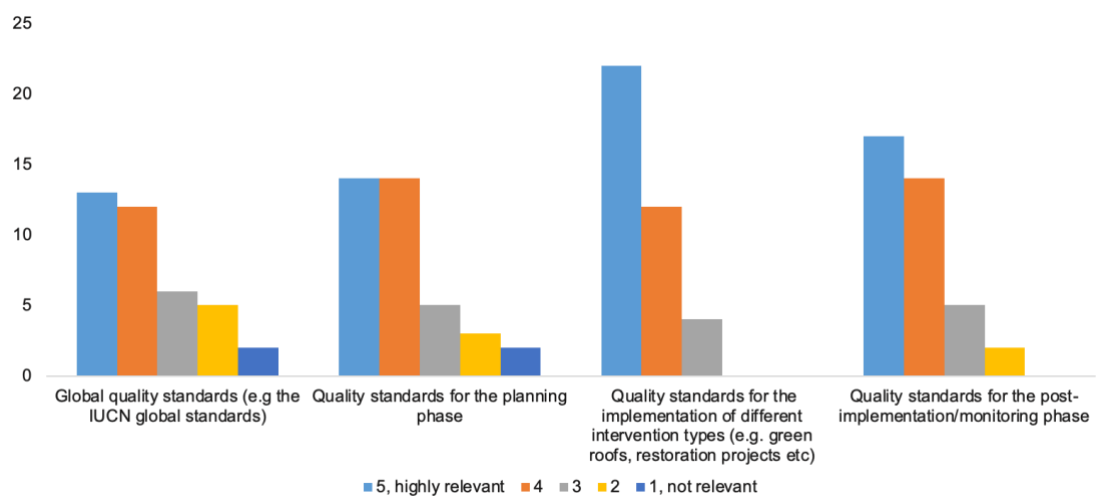
**Figure 9: Questionnaire results concerning intentional and unintentional misuses of NBS**



### Approaches to translate quality objectives to standards

Standards and standardisation approaches can offer a practical framework to promote and secure high-quality NBS projects. Respondents to the questionnaire were asked to evaluate the relevance of different standardisation approaches that can support the delivery of high-quality NBS. According to the answers, respondents found it especially important to have a set of standards guiding the implementation of different NBS intervention types, such as green roofs or restoration projects. Secondly, most respondents also considered post-implementation and monitoring standards highly relevant for securing successful NBS projects.

**Figure 10: Questionnaire results concerning approaches to translate quality objectives to standards**



## 2.2. Overview of the NBS standardisation work


























Standardisation of NBS related products, services and processes can offer significant benefits such as clarity improvement, quality assurance and removal of technical barriers which result in an increase in market potential of NBS. The work around standardisation developed within CLEVER Cities and the latest Network Nature semester aim to support the standardisation of NBS. The results of the activities concerning standardisation are presented in the present section.

### 2.2.1. Mapping Needs and Demands (CLEVER Cities Project)

CLEVER Cities project aims to determine conditions and promote activities that support NBS market uptake. Consequently, a standardisation roadmap for NBS is being developed in this context. The definition of a common roadmap for NBS requires a previous understanding and work on existing knowledge gaps in regard to NBS as well as NBS market demands. However, not all these needs may be relevant or feasible to go under a standardisation process. Thus, following to the analysis of these needs the identification of standardisable elements in the field of NBS was carried out. Finally, the needs were cross-checked with existing formal and informal standards. The methodology to perform the above-mentioned desk-top work is summarized below:

- *To identify the gaps and needs several EU-funded NBS projects and recent publications were analysed (See Annex II).*
- *The proposed standardisable elements were classified as seen in Table 1 around 5 spheres (NBS Technical Design and Implementation, Policy and Governance, NBS Planning, NBS Financing and Economic Activities, and Communication and Awareness Raising) and 5 standardisation categories (Terminology, Process, Impact assessment, NBS architecture, and Technological).*
  - *This analysis allowed to identify 18 standardisable elements/processes which can be distinguished between those specific to the NBS (black) and those that have a transversal nature, but which could be applied to NBS (grey)*

**Table 1: Standardisable elements/processes identified in Clever Cities Project classified by Thematic spheres and Standardisation categories**

THEMATIC SPHERES	STANDARDISABLE ELEMENTS/ PROCESSES	STANDARDISATION CATEGORY
<b>NBS Technical Design and Implementation</b> 	Terminology	 Terminology
	Technical references and standards	 NBS Architecture
	Protocol for assessing the effectiveness of various NBS and decision support (including cost-benefit comparability considerations)	 Process  Impact Assessment
	Definition of an NBS monitoring and evaluation strategy/plan (Specificities to consider when assessing the impact of NBS)	 Process  Impact Assessment
<b>NBS Planning</b> 	A planning process on how to take NBS into account in planning to achieve environmental and sustainable objectives	 Process
	Guidelines on considerations and steps to support scaling up of NBS	 Process
<b>Policy and Governance</b> 	Process to promote political consensus and commitment that legitimizes NBS	 Process
	Process on how to find the best composition of stakeholder groups	 Process
	Process for improving horizontal and vertical coordination (administration)	 Process
	Process to strengthen collaborative governance	 Process
	A planning process on how to improve the processes of co-design	 Process
	A planning process on how to strengthen capacity building	 Process
	Process on how to improve the development of socially inclusive policies	 Process
<b>NBS Financing and Economic Activities</b> 	Methodology for assessing the cost-benefit ratio of NBS	 Impact Assessment
	Methodology on the monetization of the benefits of NBS or ecosystem services	 Impact Assessment
	Methodology to carry out investment rating	 Impact Assessment
	Process on how to develop (alternative) business and finance opportunities and models for NBS	 Process
<b>Communication and Awareness Raising</b> 	A process for developing an effective communication and awareness-raising strategy	 Process



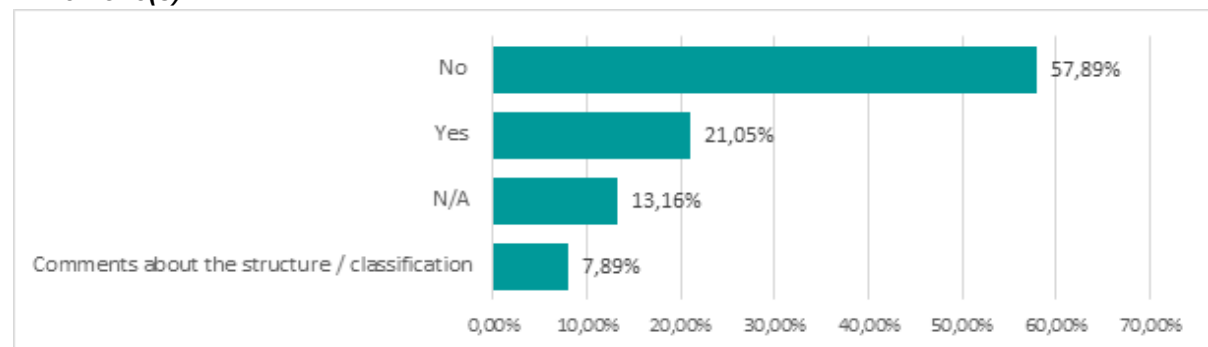
## 2.2.2. Cross-check of the identified NBS standardisable elements and their prioritisation

A survey was developed to validate the results obtained from the desk-top study on the needs and demands around NBS. The focus of this survey was on the identified standardisable elements or processes as a result of the mapping of NBS needs and demands carried out in CLEVER Cities Project (see Table 1).

### Review the standardisable elements and processes identified

On the one hand, one of the most important objectives of the questionnaire was to check whether any NBS standardised needs were missing. However, to the question: *Do you think there are any missing standardisable needs? Which one(s)?*, most of the respondents, around sixty percent (57,89%)<sup>9</sup> answered "no" to that question.

**Figure 11: Answers to Do you think there are any missing standardisable needs? Which one(s)?**



Respondents who claim to identify needs that were not among those identified in the previous analysis (21,05%) include:

- An **ecosystem characterisation**
- A **goal setting** (design, evaluation, and monitoring)
- A **pre-project assessment** to understand local needs and existing initiatives first and foremost
- References to **negative environmental and economic impacts**.
- Quantification of **the holistic benefits** as well as acknowledges (and hopefully minimizes) the compromises that we settle for in creating a feasible project
- A **societal cost-benefit analysis**
- Implementation
- Outcomes

<sup>9</sup> Around 8% of people focused their comments on issues related to the conformation of the proposed analysis matrix (no questions were asked about it) and around 13% answered don't know, no answer



Through the analysis of these proposals, it was possible to distinguish three main blocks:

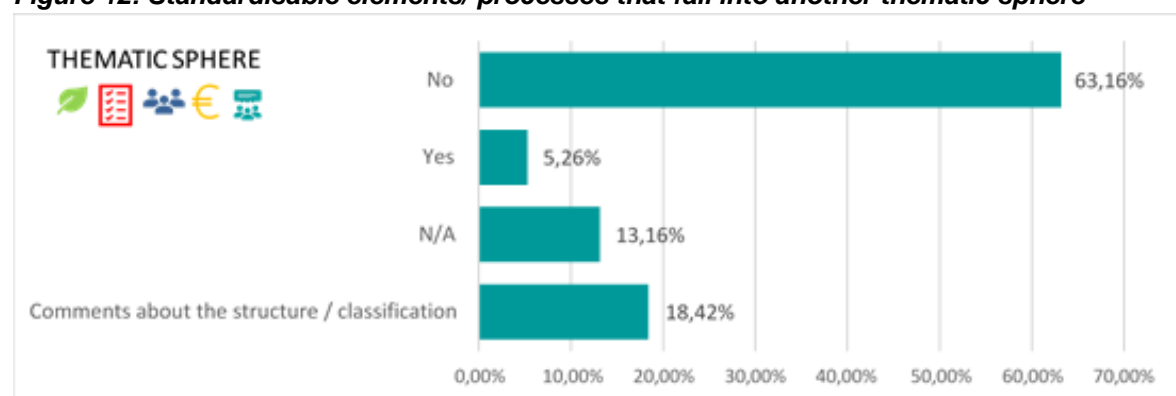
- *One related to the ecosystem characterisation and the identification, prior to the start of the project, of needs and existing projects, which will make it possible to determine the objectives of the project.*
- *Another related to the assessment of all, negative and positive, economic, social and environmental impacts (and/or if considered from the cost-benefit analysis), with a holistic vision that favours the project feasibility.*
- *And a last one, more generic, but necessarily applied to concrete cases on implementation and outcomes*

In the light of these proposals, only one possible new standardisable process came up: **A pre-NBS project assessments to understand local needs and existing initiatives to set feasible goals.** The second block of proposals related to impact assessment was considered to be included in *Methodology for assessing the cost-benefit ratio of NBS*. And the third one was considered to be included in *Technical references and standards*, because the implementation and the outcomes depend on the NBS used.

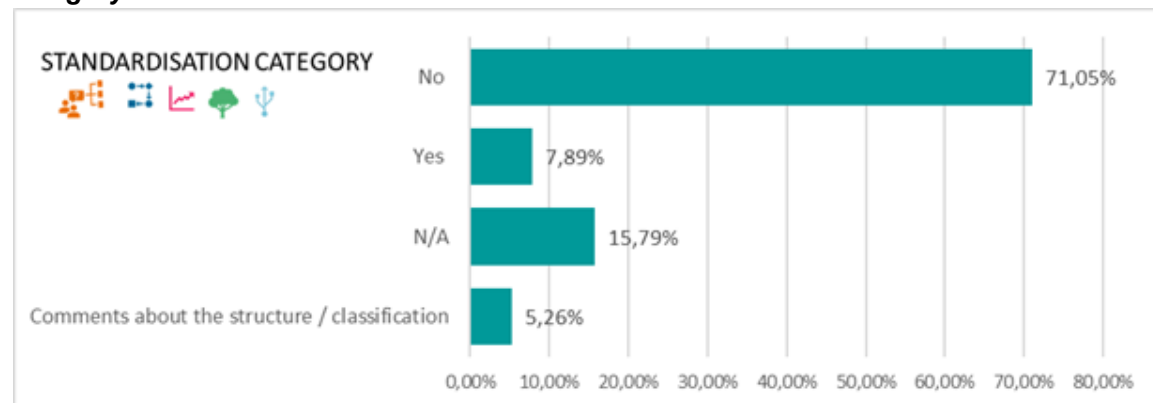
On the other hand, it could be considered that there was some consensus that standardisable elements or processes were well classified, both thematically and in the standardisation category (see Figure 12 and Figure 13). However, in some cases it was considered that in addition to the category in which they are placed, they could be related to other. For example:

- *some respondents noted that some standardisable elements or processes were covering multiple thematic spheres (e.g., Methodology for assessing the cost-benefit ratio of NBS could be in the Policy and Governance sphere).*
- *some respondents considered that elements, in planning and communication for example, linked also to impact assessment.*

**Figure 12: Standardisable elements/ processes that fall into another thematic sphere**



**Figure 13: Standardisable elements/ processes that fall into another standardisation category**



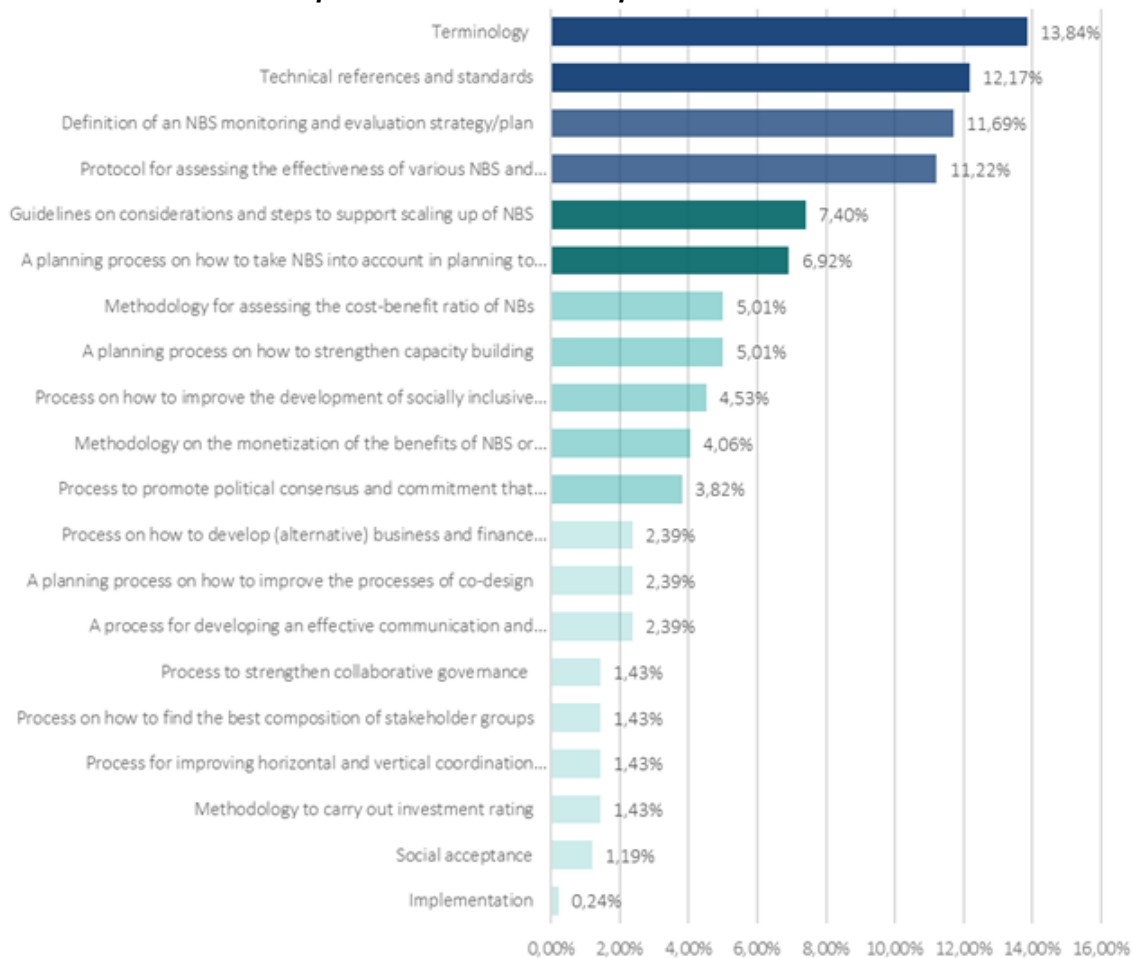
### **Prioritisation of the standardisable elements and processes identified**

The prioritisation of standardisable elements or processes was carried out in the questionnaire through two questions:

- Considering the standardisable needs identified, and those you have included in the previous question, please select the **5 that you consider to be a priority**
- Please **rank your selected 5 standardisable elements/processes** from highest to lowest priority (1 most important 5 less important).

Regarding the results (see Figure 14), it can be observed that, in general, those considered as priorities, were specific to the NBS, while the elements that were transversal, mainly related to governance, engagement and awareness-raising processes, were considered to be of lower priority.

**Figure 14: Prioritisation considering the highest priority among the selection of 5 standardisable elements/processes identified as priorities**















The four elements/processes that were considered to be the highest priority fall into the NBS Technical Design and Implementation sphere (see Table 2):

- *The first, NBS Terminology, in the standardisation category of Terminology;*
- *The second, Technical references and Standards, in the NBS Architecture*
- *and the next two, Definition of an NBS monitoring and evaluation strategy/plan and a Protocol for assessing the effectiveness of various NBS and decision support, in Impact Assessment.*

Behind them, there are two processes, *Guidelines on considerations and steps to support scaling up of NBS and A planning process on how to take NBS into account in planning to achieve environmental and sustainable objectives*, included in the NBS Planning sphere.

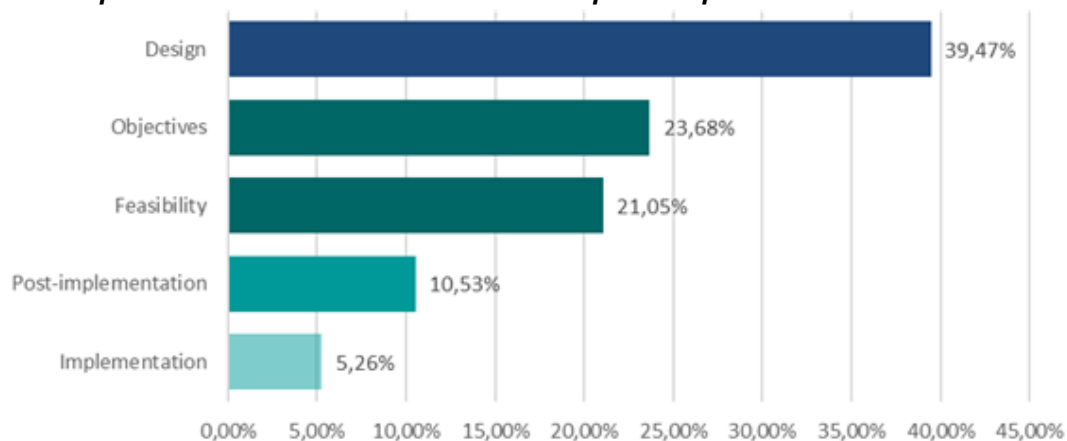
**Table 2: The most frequently selected among the five priorities by thematic sphere and standardisation category**

STANDARDISABLE ELEMENT/PROCESS PRIORITISED	%	T	S
Terminology	13,84%		
Technical references and standards	12,17%		
Definition of an NBS monitoring and evaluation strategy/plan	11,69%		
Protocol for assessing the effectiveness of various NBS and decision support	11,22%		
Guidelines on considerations and steps to support scaling up of NBS	7,40%		
A planning process on how to take NBS into account in planning to achieve environmental and sustainable objectives	6,92%		

### High-quality in standardisation

Finally, in relation to the highest priority standardisable element/process, the features that was considered most important for delivering high-quality nature-based solutions was the Design (39,47%). This is consistent with the standardisable elements and processes by the top ranked thematic sphere: NBS Technical Design and Implementation. *Objectives and Feasibility* (23,68% and 21,05% respectively) were identified as second and third most important high-quality features followed by *Post-Implementation* and *Implementation* with at least twice less support.




















**Figure 15: Features for delivering high-quality nature-based solutions considered the most important for the standardisable element/process prioritized**



### Results

Considering the results of the questionnaire, the list of standardisable elements/processes was revised. The prioritised list of standardisable elements/processes was consolidated as seen in Table 3.

**Table 3: Review and prioritisation of the Standardisable elements/processes identified in CLEVER Cities Project classified by Thematic spheres and Standardisation categories**

THEMATIC SPHERES	STANDARDISABLE ELEMENTS/ PROCESSES	STANDARDISATION CATEGORY
NBS TECHNICAL DESIGN AND IMPLEMENTATION	★ Terminology	
	★ Technical references and standards	
	★ Protocol for assessing the effectiveness of various NBS and decision support (including cost-benefit comparability considerations)	
	★ Definition of an NBS monitoring and evaluation strategy/plan (Specificities to consider when assessing the impact of NBS)	
NBS PLANNING	Pre-project assessments to understand local needs and existing initiatives first and to set goals	
	★ A planning process on how to take NBS into account in planning to achieve environmental and sustainable objectives	
POLICY AND GOVERNANCE	★ Guidelines on considerations and steps to support scaling up of NBS	
	Process to promote political consensus and commitment that legitimizes NBS	
	Process on how to find the best composition of stakeholder groups	
	Process for improving horizontal and vertical coordination (administration)	
	Process to strengthen collaborative governance	
	A planning process on how to improve the processes of co-design	
	A planning process on how to strengthen capacity building	
NBS FINANCING AND ECONOMIC ACTIVITIES	Process on how to improve the development of socially inclusive policies	
	★ Methodology for assessing the cost-benefit ratio of NBS	
	Methodology on the monetization of the benefits of NBS or ecosystem services	
	Methodology to carry out investment rating	
COMMUNICATION AND AWARENESS RAISING	Process on how to develop (alternative) business and finance opportunities and models for NBS	
	A process for developing an effective communication and awareness-raising strategy	
Legend	★ Priority	Incorporated after the review Specific of NBS Non Specific of NBS

### 2.2.3. Workshop feedback. Standardisation good practices

A few guides, handbook and informal standards showcase good practices on methodologies and aspects related to NBS that could be considered good practices on standardisation. Three reference documents were identified during the Network Nature workshop “*The way towards high quality NBS and standards: What we learned so far*”:



- *At international level, the IUCN Global standard and IUCN Mediterranean Standards, presented by Andrés Alcántara (Coordinator at IUCN Mediterranean centre).*

*IUCN led the development of a Global Standard on NBS which aim is to “help users design, implement and verify NBS actions providing clear parameters for defining NbS and a common framework to help benchmark progress” (IUCN Global Standard for NBS). An example of the use of this standard is the project Planning and delivering Nature-based Solutions in the Mediterranean cities.*



- *At European level, the assessment handbook “Evaluating the impact of Nature-based Solutions: a handbook for practitioners” developed by the EU NBS Task Force 2 and presented by Laura Wendling (Senior Scientist at VTT Technical Research Centre).*

*The integrated impact assessment framework was developed by Task Force 2 (in collaboration between 17 EU-funded projects and related programmes). It tried to do is to gather the most relevant existing information, like a common ground. It collected 426 different indicators and methodologies in 12 societal challenge areas.*



- *At national level, the Guide to municipal green infrastructure of Spain, presented by Gabino Carballo (Landscape architect and Project manager. Technician of the Conservation and Biodiversity Division of Parks and Gardens of Barcelona. Member of AEPJP )*

*The initiative was born of the need of explain to those that oversee green spaces what a green infrastructure and NBS are. It helps the green spaces managers and the companies that work for the municipality to develop, implement, and maintain successfully this kind of solutions.*

After a brief presentation of best practices and their possible relationship with standardisation, a round table with all the speakers, moderated by Efrén Feliu, was hold. The goal of this part of the workshop was to discuss the following questions:

***i) what elements of the presented experience could be subject of formal standardisation?***

According to [Dora Almassy](#), thanks to the IUCN global standard, there is, in general, a good understanding of what is expected of NBS. However, local governments, developers, green spaces managers, etc. need more support in the NBS implementation phase. Therefore, is considered a priority the standardisation of tools that help implementation, such as the *Guide to municipal green infrastructure*.

[Laura Wendling](#) noted, the need for *standardisation of monitoring of both the process and the NBS implemented, that could help to understand NBS effectiveness*. In addition, [Gabino Carballo](#) pointed out that the existence of metrics that show or allow calculating the return on investment is considered key. On the other hand, [Laura Wendling](#) highlighted the importance of standardise the processes, although it was not considered a priority in the results of the questionnaire. She argued that it is difficult to say whether the benefits of implementing an NBS can be separated from the co-design, co-implementation or co-monitoring process.

In addition, [Andrés Alcantrá](#) pointed out that standards for planning perspective must also be considered. And [Ángela Matesanz](#), pointing to the result of the questionnaire, said that the standardisation of a common terminology is a priority in order to be able to develop the rest of the standards.

**ii) what benefits would be related to that formal standardisation?**

The main benefit noted was that standardisation favours the implementation of the NBS.

More specifically, Laura Wendling considered:

- *on the one hand, that the “use of standard metrics and protocols clarifies processes and enables comparisons among different NBS actions; supports knowledge retention and consistent quality of monitoring data”.*
- *and on the other hand, that “standardisation of NBS processes and technical design can improve process clarity, and quality & predictability of outcomes Standardisation of co-creation and co-management processes associated with NBS actions can help guide stakeholder engagement, ensure adherence to NBS principles”, such as IUCN guidelines.*

In the same line, [Gabino Carballo](#) highlighted that those standards could provide safety and confidence in NBS use and could be very useful for measuring the effects of these NBS and making it easier to obtain investment. It could also incentive the use of NBS by the private sector, which is a key for the NBS mainstreaming in our cities.

However, the audience and [Laura Wendling](#) warned that if we standardise too much, we risk becoming too rigid and block the innovation. Nevertheless, other speakers considered that it is difficult that this will happen, as many local specificities must be considered in the design and implementation of the NBS.

**iii) key conditions or suggestions for developing that standardisation.**

During the workshop some few recommendations were given in the light of NBS standardisation:

1. *The IUCN standard was considered a great step towards the NBS standardisation. Test on concrete examples how standardisation is working in practices and use the feedbacks and the comments to feed into the processes and to improve that standards was proposed as a next step.*
2. *Considering the IUCN proposal, it could be useful to create a standardise framework for determining how closely are the specific NBS implementation actions aligned with these guidelines.*
3. *Finally, capacity building of civil servants and people that work in those issues for urban planning, strategic plans for cities were pointed out as a key for the standardisation process.*



### 3. Sharing reflections

As the concept of NBS is moving from niche to mainstream, the criteria of high-quality NBS interventions must be widely promoted:

- *The most critical thematic aspects of high-quality NBS include their potential to address climate challenges and biodiversity loss, while also delivering social benefits (fairly distributed).*
- *Procedural aspects during the implementation process are also crucial: setting comprehensive goals, considering local context, trade-offs and contextual factors, and applying adaptive management practices.*
- *Lastly, the research results highlighted that the long-term maintenance and post-implementation monitoring of projects is also essential to secure the delivery of high-quality.*

At the local level, where actual planning happens, explaining and promoting the use of green/blue infrastructures compared to grey infrastructures is still needed. Education and capacity building can play a vital role in this, as well as in promoting how high-quality NBS can be delivered. Potential target groups for such education and training activities can include policy and decision-makers at national but especially at local levels, public institutions, and private actors, who can act as project developers.

In order to take into account, the above issues in the NBS mainstreaming process, the role of standardisation is key, however it should be considered:

- *There is some consensus on the benefits of standardisation, especially as a tool to support the implementation (to guide the implementation process, to increase confidence in its use, to improve quality of NBS etc.); the effectiveness assessment (to provide quality of the impact assessment services, to provide a trustful NBS benchmarking, to encourage investment), and the NBS process (to improve transparency of NBS related processes, to support equitable of NBS, to connect decisions and their implementation with the most appropriate NBS, etc.).*
- *In relation to the previous point, among the standardisation priorities, those related to the NBS technical design and implementation (terminology, technical references, and assessment methods) and NBS planning are highlighted.*
- *Some experts emphasize the importance of standardizing the NBS process, including co-creation and co-management processes.*
- *The IUCN standard is considered a good starting point to advance in the standardisation process through the application to practical cases.*
- *In relation to the above, piloting can be key to implementing and improving standards.*
- *In addition to the administration, the private sector plays a key role in the standardisation process*
- *Capacity building in the public and private sector is essential for the development of new NBS standards and for their consolidation.*



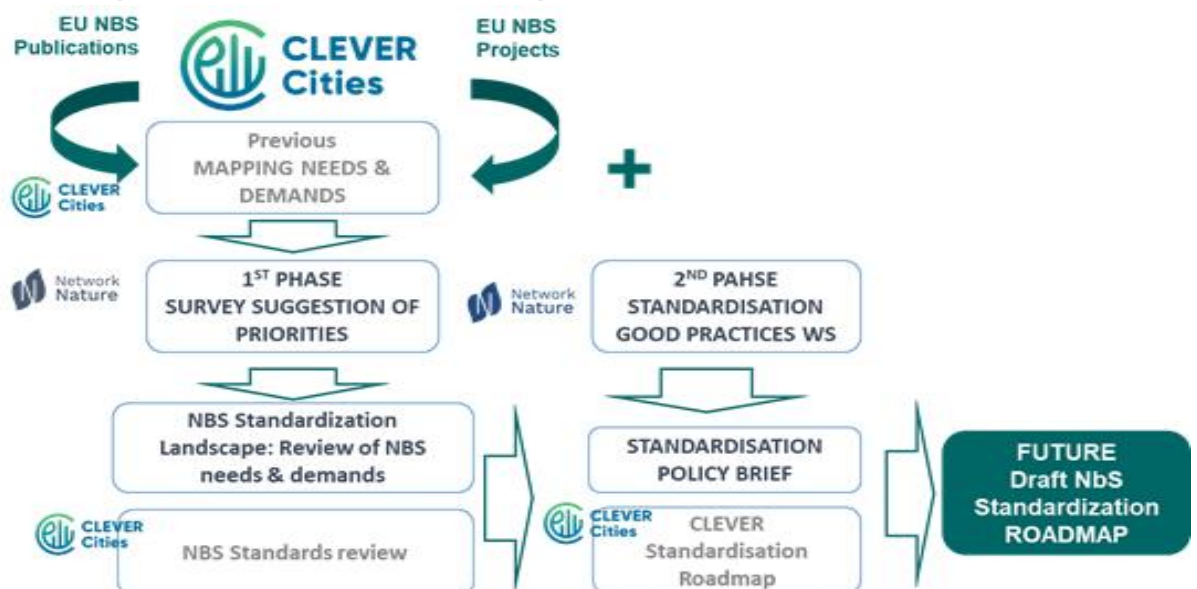
## 4. Way forward with Standardisation

The work carried out throughout the NetworkNature Semester “[NBS and Standards](#)”, articulated with the progress of the European standardisation bodies, sought to contribute to the joint definition of a standardisation roadmap that favours the implementation of high-quality NBS:

- *It allowed us to review and prioritize the standardisation needs detected in the CLEVER Cities project, identifying the standardisation of NBS terminology as key for the NBS standardisation process.*
- *It has made it possible to jointly discuss the NBS Standardisation’s benefits and priorities through existing good practices.*

In parallel, on the one hand, within the framework of the CLEVER Cities project, a *Review of existing standards related to NBS* has been carried out (in order to contribute to develop a CLEVER Standardisation Roadmap). On the other hand, thanks to the work developed by the CEN-CENELEC-ETSI Task Group on Nature-Based Solutions, co-chaired by Efrén Feliu, a New Work Item Proposal that “aims at defining a common reference of Nature-Based Solutions (NBS) terms and definitions in order to support the aforementioned objectives” was proposed in CEN/TC465 – Sustainable Cities and Communities in September.

**Figure 16: Contributions of the NetworkNature Semester “NBS and Standards” to the European Standardisation RoadMap**



Given all this, as possible next steps to achieve the definition of a European standardisation roadmap:

- *The revision of the “Review of the existing standards related to NBS” within the working group of the European standardisation bodies could be proposed.*
- *The cross-checking of identified standardisable elements/processes and Review of existing standards, could be the next step for identifying both gaps*

*and existing standards that could serve as a basis or could be adapted for use in the NBS field.*

- *On the basis of these two proposed steps and considering the progress made in the standardisation of terminology, defining a European standardisation roadmap.*

In summary, it can be concluded that although there is still a long way to go, important steps are being taken towards achieve high-quality and the standardisation of the NBS, and we hope that this semester will be one of them.

## ANNEXES

### Annex 1: List of publications included in the desk review of NBS quality criteria and principles

Author/Publishing organization	Title	Year of publication
IUCN Emmanuelle Cohen-Shacham et al.	<a href="#">NBS principles</a> <a href="#">Core principles for successfully implementing and upscaling Nature-based Solutions</a>	2016
IUCN	<a href="#">NBS global standards</a>	2020 (draft)
NetworkNature	<a href="#">Concept note on NBS quality</a>	2022
Sowińska-Świerkosz, B. and García, J.	<a href="#">What are Nature-based solutions (NBS)? Setting core ideas for concept clarification</a>	2022
Barbara Sowińska-Świerkosz and Joan García	<a href="#">A new evaluation framework for nature-based solutions (NBS) projects based on the application of performance questions and indicators approach</a>	2021
Albert, C., Spangenberg, J. & Schröter, B.	<a href="#">Nature-based solutions: criteria</a>	2017
World Bank	<a href="#">A Catalogue of Nature-based Solutions for Urban Resilience</a>	2021
NbSI and signatories  Seddon, N. et al.	<a href="#">Nature-based Solutions to Climate Change</a>  <a href="#">Getting the message right on nature-based solutions to climate change</a>	2020
NbSI	<a href="#">On the misuse of nature-based carbon offsets</a>	2021
Dansk Institut for Internationale Studier (DIIS)	<a href="#">Right-based approaches to NBS</a>	2022
Nesshöver, C. et al.	<a href="#">The science, policy and practice of nature-based solutions: An interdisciplinary perspective</a>	2017
CarbonBrief	<a href="#">Can nature-based solutions help address climate change?</a>	2021
Friends of EbA (FEBA)	<a href="#">Making Ecosystem-based Adaptation Effective</a>	2017
World Bank	<a href="#">Implementing nature-based flood protection</a>	2017
WWF	<a href="#">Guidance on high quality NBS</a>	2021
IIED/BOND	<a href="#">Nature-based Solutions in Action: Lessons from the Frontline</a>	2021
ThinkNature	<a href="#">NBS Handbook</a>	2019
Hai-Ying Liu, Marion Jay, and Xianwen Chen	<a href="#">The Role of Nature-Based Solutions for Improving Environmental Quality, Health and Well-Being</a>	2021
Monteiro R, Ferreira JC and Antunes P.	<a href="#">Green Infrastructure Planning Principles: An Integrated Literature Review</a>	2020
Joint Nature Conservation Committee, UK	<a href="#">Nature-based Solutions Triple Win Toolkit</a>	2021
GYBN, YOUNGO, and Y4N	<a href="#">Global Youth Position Statement on Nature-based Solutions</a>	n.d.
BCSD Malaysia	<a href="#">Investing in high-quality nature-based solutions</a>	2021

Elias M; Ihalainen M; Monterroso I; Gallant B; and Paez Valencia AM.	<a href="#">Enhancing synergies between gender equality and biodiversity, climate, and land degradation neutrality goals: Lessons from gender-responsive nature-based approaches</a>	2021
Rosasco, Paolo & Perini, Katia	<a href="#">Selection of (Green) Roof Systems: A Sustainability-Based Multi-Criteria Analysis.</a>	2019
Albert, Christian & Brillinger, Mario & Guerrero, Paulina & Gottwald, Sarah & Henze, Jennifer & Schmidt, Stefan & Ott, Edward & Schröter, Barbara	<a href="#">Planning nature-based solutions: Principles, steps, and insights</a>	2020
UK Green Building Council	<a href="#">Principles for delivering urban Nature-based Solutions</a>	2021
The Nature Conservancy	<a href="#">Strategies for Operationalizing Nature-Based Solutions in the Private Sector</a>	n.d.
Schneider, V.	<a href="#">Are nature-based solutions the silver bullet for social &amp; environmental crises?</a>	2021
Society for Ecological Restoration	<a href="#">International Principles and Standards for the Practice of Ecological Restoration, Second Edition</a>	n.d.
IUCN	<a href="#">Science-based ecosystem restoration for the 2020s and beyond</a>	2021

## Annex II: List of publications and EU projects included in the desk review of NBS standardisation needs and demands includes in CLEVER project

Author/Publishing organization	Title	Year
European Commission	Evaluating the impact of nature-based solutions. - <a href="#">policymakers</a> - <a href="#">A handbook for practitioners</a> - <a href="#">Appendix of methods</a>	2021
European Commission	<a href="#">Nature-based solutions Horizon 2020 research projects tackle the climate and biodiversity crisis</a>	2021
Castellari, Sergio ; Zandersen, Marianne ; Davis, McKenna ; Veerkamp, Clara ; Förster, Johannes ;	<a href="#">Nature-based solutions in Europe policy, knowledge, and practice for climate change adaptation and disaster risk reduction</a>	2021
IUCN	<a href="#">Nature based Solutions for Societal Needs - a standardised approach for design and verification of interventions IUCN</a>	2021
Bulkeley, Harriet ; Naumann, Sandra ; Vojinovic, Zoran ; Calfapietra, Carlo ; Whiteoak, Kym ;	<a href="#">Nature-based solutions. State of the art in EU-funded projects</a>	2020
European Commission	<a href="#">Nature-based solutions towards sustainable communities. Analysis of EU-funded projects</a>	2020
European Commission	<a href="#">CORDIS results pack on nature-based solutions. Unlocking nature's potential</a>	2020
European Commission	<a href="#">Nature-based solutions for climate mitigation. Analysis of EU-funded projects</a>	2020
Mačiulytė, Ernesta ; Durieux, Elsa	<a href="#">Public procurement of nature-based solutions. Addressing barriers to the procurement of urban NBS: case studies and recommendations.</a>	2020
European Commission	<a href="#">Biodiversity and nature-based solutions. Analysis of EU-funded projects.</a>	2020
Vojinovic, Zoran	<a href="#">Nature-based solutions for flood mitigation and coastal resilience. Analysis of EU-funded projects</a>	2020
Calfapietra, Carlo	<a href="#">Nature-based solutions for microclimate regulation and air quality. Analysis of EU-funded project</a>	2020
Wild, Tom	<a href="#">Nature-based solutions improving water quality &amp; waterbody conditions. Analysis of EU-funded projects</a>	2020
IUCN	<a href="#">IUCN Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NBS</a>	2020
Herzog, Cecilia P ; Antuña Rozado, Carmen ; Freitas, Tiago ; Enfedaque, Josefina ; Wiedman, Guilherme Themes	<a href="#">The EU–Brazil sector dialogue on nature-based solutions</a>	2019
European Commission	<a href="#">Towards an EU research and innovation policy agenda for nature-based solutions &amp; re-naturing cities. Final report of the Horizon 2020 expert group on 'Nature-based solutions and re-naturing cities' (full version)</a>	2015

European Environment Agency	<a href="#">Exploring nature-based solutions. The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards</a>	2015
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### Annex III: Projects analysed

Call topics		Cordis EU	Webpage
<b>SCC-03-2016: New governance, business, financing models and economic, impact assessment tools for sustainable cities with nature- bases solutions (urban naturing)</b>			
2016-2020	NATURVATION. NATure-based URban innoVATION	<a href="#">Link</a>	<a href="#">Link</a>
2016-2020	NATURE4CITIES. Nature-Based Solutions for re-naturing cities: knowledge diffusion and decision support platform through new collaborative models	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call Topic SC5-09-2016 Operationalising Insurance Value of ecosystems</b>			
2016-2020	NAIAD. Nature Insurance Value: Assessment & Demonstration	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call Topic SCC- 02-2016- 2017. Demonstrating innovative nature-based solutions in cities</b>			
2017-2022	CONNECTING. Connecting Nature	<a href="#">Link</a>	<a href="#">Link</a>
2017-2022	GROW GREEN. Green Cities for Climate and Water Resilience, Sustainable Economic Growth, Healthy Citizens and Environments	<a href="#">Link</a>	<a href="#">Link</a>
2017-2022	UNALAB. Urban Nature Labs	<a href="#">Link</a>	<a href="#">Link</a>
2017-2022	URBAN GREENUP. New Strategy for Re-Naturing Cities through Nature-Based Solutions	<a href="#">Link</a>	<a href="#">Link</a>
2019-2023	CLEVER Cities - Co-designing Locally tailored Ecological solutions for Value added, socially inclusivE Regeneration in Cities	<a href="#">Link</a>	<a href="#">Link</a>
2018-2023	EdicitNET Edible Cities Network Integrating Edible City Solutions for social resilient and sustainably productive cities	<a href="#">Link</a>	<a href="#">Link</a>
2018-2023	PROGIREG. Productive Green Infrastructure for post-industrial urban regeneration: nature for renewal	<a href="#">Link</a>	<a href="#">Link</a>
2018-2023	URBINAT. Healthy corridors as drivers of social housing neighbourhoods for the co-creation of social, environmental, and marketable NBS	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call topic Sc5-08-2017 Large- scale demonstrators on nature-based solutions for hydro-meteorological risk reduction</b>			
2018-2023	PHUSICOS. "According to nature": Solutions to reduce risk in mountain landscapes	<a href="#">Link</a>	<a href="#">Link</a>
2018-2023	RECONNECT. Regenerating ECOsystems with Nature-based solutions for hydro-meteorological risk rEduCTion	<a href="#">Link</a>	<a href="#">Link</a>
2018-2023	OPERANDUM. OPEn-air laborAtories for Nature baseD solUtions to Manage environmental	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call topic Sc5-13-2018-2019 International cooperation on sustainable urbanisation: NBS for restoration and rehabilitation of urban ecosystems</b>			

2019-2023	REGREEN. Fostering nature-based solutions for smart, green, and healthy urban transitions in Europe and China	<a href="#">Link</a>	<a href="#">Link</a>
2019-2023	CLEARING HOUSE. Collaborative Learning in Research, Information-sharing and Governance on How Urban tree-based solutions support Sino-European urban futures	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	CONEXUS. CO-producing Nature-based solutions and restored Ecosystems: transdisciplinary neXus for Urban Sustainability	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	INTERLACE. International cooperation to restore and connect urban environments in Latin America and Europe	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call Topic SC5 14-2019 Visionary and integrated solutions to improve well-being and health in cities</b>			
2020-2024	Europolis	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	Go green routes. GO GREEN: Resilient Optimal Urban natural, Technological and Environmental Solutions	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	Inhabit. INclusive Health And wellBeing In small and medium size ciTies	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	Varieties. Visionary Nature Based Actions for Health, Wellbeing & Resilience in Cities (Varieties)	<a href="#">Link</a>	<a href="#">Link</a>
<b>Call Topic LC-CLA- 06- 2019 Inter-relations between climate change, biodiversity, and ecosystem services</b>			
2020-2024	Dryver. Securing biodiversity, functional integrity, and ecosystem services in DRYing riVER networks	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	Futuremares. Climate Change and Future Marine Ecosystem Services and Biodiversity	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	MaCobios. Marine Coastal Ecosystems Biodiversity and Services in a Changing World	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	PONDERFUL. POND Ecosystems for Resilient FUture Landscapes in a changing climate	<a href="#">Link</a>	<a href="#">Link</a>
<b>Multistakeholders dialogue platforms for NBS</b>			
2020-2024	THINKNATURE Development of a multi-stakeholder dialogue platform and Think tank to promote innovation with Nature based solutions	<a href="#">Link</a>	<a href="#">Link</a>
2020-2024	NetworkNature - Advancing nature-based solutions together	<a href="#">Link</a>	<a href="#">Link</a>



# Network Nature



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