



Knowledge gaps database update

Methodology and results - 2026

WP3

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August 2026

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List of acronyms/abbreviations

Acronym	Full Name
CINEA	European Climate, Infrastructure and Environment Executive Agency
EEA	European Environment Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
ICLEI	Local Governments for Sustainability
IIED	International Institute for Environment and Development
IISD	International Institute for Sustainable Development
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN	International Union for Conservation of Nature
JRC	Joint Research Centre (European Commission)
NbS	Nature-based Solutions
OECD	Organisation for Economic Co-operation and Development
REA	European Research Executive Agency

UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECE	United Nations Economic Commission for Europe
UNEP- WCMC	United Nations Environment Programme World Conservation Monitoring Centre
WoS	Web of Science
WWF	World Wide Fund for Nature

Executive summary

This report presents the **2026 update of the NetworkNature knowledge gaps database for Nature-based Solutions (NbS)**. Building on the previous database updates in 2021 and 2024, this update aims to reflect the evolving NbS research and innovation landscape, identify emerging knowledge needs, and support the future update of the [European Research and Innovation Roadmap on NbS](#).

The update was based on a desk study conducted between January and July 2026, covering scientific and grey literature published primarily between April 2024 and March 2026. The literature review identified 108 relevant scientific review articles and 36 relevant documents from grey and institutional literature. Together, the 144 publications resulted in the extraction of 553 individual knowledge gap quotes. These were aggregated and combined with knowledge gaps from previous database updates, resulting in a final dataset of **443 knowledge gaps supported by 946 unique citations spanning 2019 – 2026**.

The categorisation framework was revised, **and all knowledge gaps are now categorised by [keywords](#), [Societal Challenges](#), [Ecosystems](#), [NbS Types](#) and Scales**.

Alongside the updated content, the 2026 update introduces a [redesigned database interface](#). The new keyword-based system allows knowledge gaps to be associated with multiple themes and explored through improved browsing, filtering and search functions. The database is also designed as a **collaborative and evolving resource**, allowing registered users to contribute new knowledge gaps and comment on existing entries.

The results highlight the **continued importance of fundamental knowledge and data in NbS research and innovation**. Of the four Action Areas of the EU Research and Innovation Roadmap on NbS, Advancing NbS Knowledge and Data is associated with the largest number of gaps (299), followed by Closing the NbS Research-Implementation Gap (174), Exchange, Capacity Building and Awareness (105), and Mainstreaming NbS in Policy (63). The lower

number of policy-related gaps is consistent with the scope of the database, which focuses on gaps that can be addressed through research and innovation.

Across the keywords used, the most prominent topics include **Governance and Management, Performance, Impacts and Resilience, and Knowledge, Methods and Assessment**. At the individual keyword level, **Effectiveness** is the most frequently identified theme, highlighting the continued need to better understand and demonstrate the real-world effectiveness of NbS. **Monitoring, evaluation and long-term performance** also emerge as recurring research needs.

The analysis also shows that **Climate Resilience and Knowledge and Social Capacity Building** are among the most frequently addressed societal challenges. In terms of ecosystems, **urban environments are strongly represented**, reflecting the prominence of urban NbS and blue and green infrastructures in the current evidence base. However, low numbers of documented gaps in other ecosystems should be interpreted with caution, as they may reflect either more mature knowledge or limited research attention and documentation.

Overall, the updated database provides a structured **overview of current NbS research and innovation needs and supports the identification of areas requiring further attention**. While the findings should be interpreted in light of methodological and categorisation limitations, the database offers a foundation for researchers, funders and practitioners to identify emerging priorities and contribute to the continued development of the NbS knowledge base. As a living resource, it can evolve alongside the NbS research landscape and support future research and innovation agendas.

Introduction

In 2021, NetworkNature first published a **database on knowledge gaps around Nature-based Solutions (NbS)**, accessible on the [NetworkNature website](#). This resource was created to compile knowledge needs on NbS and played a key role in supporting the identification of core action areas in the development of [the European Research and Innovation Roadmap on NbS to 2030](#).

In 2024, NetworkNature updated the database for the first time, using a more advanced screening methodology based on a literature review. The methodologies used in previous updates can be accessed here:

- [1st methodology \(2021 - database creation\)](#) Knowledge gaps until 2021 were collected following this methodology.
- [2nd methodology \(2024 - database update\)](#) Knowledge gaps from 2021 to 2024 were collected following this methodology.

In 2026, the database was updated for the second time to reflect the evolving NbS research landscape and provide up-to-date information on knowledge gaps in NbS research and innovation.

To better address the complexity and broad nature of NbS, and allow for a more user-friendly interface, this update is also revising the visuals and navigation system of the database. This includes new categories, a new filtering system, and the possibility for website users to upload their own knowledge gaps and comment on existing ones.

The result is a **living database** that can evolve as users add new knowledge gaps. This ensures that emerging research needs and priorities identified by experts and stakeholders are well reflected. This database update is also contributing to the upcoming update of the European Research and Innovation Roadmap on NbS to 2030 and beyond.

What is a knowledge gap?

Knowledge gaps are defined by NetworkNature as **pieces of knowledge, information or data that are missing or insufficient to allow the development or implementation of NbS at various scales**. These gaps can exist in research, data, or the access to and/or implementation of existing knowledge. In the scope of this database, only knowledge gaps that can be addressed by research and innovation or its funding are collected. This database does not include policy gaps.

Who is this database for?

This database is accessible and usable by everyone, everywhere. The collected knowledge gaps are global in scope. However, it was designed with European Research and Innovation in mind and is therefore particularly tailored to researchers and funders in the EU.

Methodology

The methodology was based on the two previous iterations of the database. A desk study was performed between January 2026 and July 2026 to collect knowledge gaps from scientific and grey literature. Given the growing volume of scientific literature on NbS, this study focused exclusively on scoping and synthesis studies.

Desk Study Framework

This framework was followed to undergo the desk study.

Topic studied	Nature-based Solutions (NbS)
Search for Language	Knowledge gaps in Research and Innovation English
Scale	Worldwide – with a specific focus on EU R&I
Time frame for the literature search	From 1st April 2024 to 31 March 2026
Selection criteria for the literature	- Scientific literature reviews, with an explicit mention of NbS and gap(s) in knowledge (or associated terms) - Grey literature (including institutional literature) on NbS See more in Screening process
Gap selection criteria	The selected gaps must: - Be a knowledge or implementation gap that R&I can work on - Be directly stated as such by the authors - Be actionable See more in the Decision Tree

Scientific Literature Review

Query searched in Web of Science

The scientific literature was collected via a search query in the Web of Science (WoS) platform, as in the 2024 update. The aim was to identify scoping reviews and synthesis studies on Nature-based Solutions and related terms (see [Annex 1](#)) that reported knowledge gaps between 1 April 2024 and 31 March 2026.

Several tests were conducted using the keywords from the previous update, and additional keywords were added to ensure consistency between the grey and scientific literature searches. Searches included terms related to “knowledge gaps” or “research needs” (including variations such as “lack of knowledge”, “overlooked”, and “understudied”) and various terminologies associated with NbS.

Here is the created query:

```
(TI=("agro*ecolog*" OR "agroforestry" OR "ecological engineering" OR "ecological restoration" OR "ecosystem-based adaptation" OR "ecosystem-based disaster risk reduction" OR "ecosystem-based management" OR "ecosystem-based mitigation" OR "green infrastructure" OR "blue infrastructure" OR nature based solution* OR "nbs" OR "protected areas")) AND (TS=((knowledge OR research) NEAR/3 (gap* OR need*) OR "overlook*" OR "understud*" OR "lack of knowledge"))
```

Additional searches were conducted in Google Scholar, for additional data using the same keywords as the WoS query and grey literature. See [Annex 1](#) for all keywords. 418 scientific articles were identified via this search.

Screening process

For all identified 418 scientific articles, a screening process was applied to exclude publications that did not meet the scope of the review, including non-review articles and articles not focused on Nature-based Solutions.

The screening was conducted in three stages:

1. **Article type screening:** Non-review papers were excluded, resulting in a pool of 151 review articles.
2. **Title screening:** Titles were assessed to remove articles that were not related to NbS, were unclear in scope, or were overly specific to the point of limited relevance. This stage resulted in 141 articles.
3. **Abstract screening:** Abstracts were reviewed to identify the most relevant and promising articles for the gap analysis. Following this final screening step, 108 review articles were retained for the identification and analysis of knowledge gaps.

Grey Literature Review

Grey and institutional literature published between April 2024 and March 2026 (and some beyond) was also reviewed to identify knowledge gaps related to NbS. The search covered a broad range of European and international organisations, programmes, and knowledge platforms relevant to NbS research, innovation, policy, and implementation, including:

- European Union institutions, agencies, and programmes (e.g. NetworkNature, Biodiversa+, CORDIS, the Publications Office of the European Union, EEA, CINEA, REA, JRC, EU Missions);
- United Nations bodies and international organisations (e.g. UNDRR, UNEP-WCMC, UNECE, FAO);
- International research, policy, and conservation organisations (e.g. IISD, OECD, ICLEI, IPBES, IUCN, WWF, IIED, The Nature Conservancy, Wildlife Conservation Society, World Bank);
- Specialised NbS platforms and national sources (e.g. the Global Program on Nature-based Solutions for Climate Resilience Knowledge Hub, the Nature-based Solutions Initiative, and national agencies).

The review was complemented by targeted Google searches and direct contributions from NetworkNature partners.

Keywords

The same NbS-related keywords used in the Web of Science query were applied to search for relevant documents across the websites of the selected organisations. A total of 54 documents were identified (See [annex 1](#) for all keywords).

Screening process

A screening of the identified grey literature was then conducted based on document titles and, where necessary, a rapid review of the content. The aim was to exclude non-relevant publications and retain documents likely to contain explicit or implicit references to research needs, knowledge gaps, or areas requiring further investigation. Following this screening process, 36 documents were retained for the knowledge gap analysis.

Knowledge Gap Extraction

The final dataset consisted of 108 scientific review articles and 36 grey and institutional literature documents, representing a total of **144 publications**. Each publication was reviewed to identify explicit knowledge gaps related to NbS. Knowledge gaps were extracted as directly cited from the text.

This process resulted in the identification of **553 individual knowledge gap quotes**.

Aggregating gaps

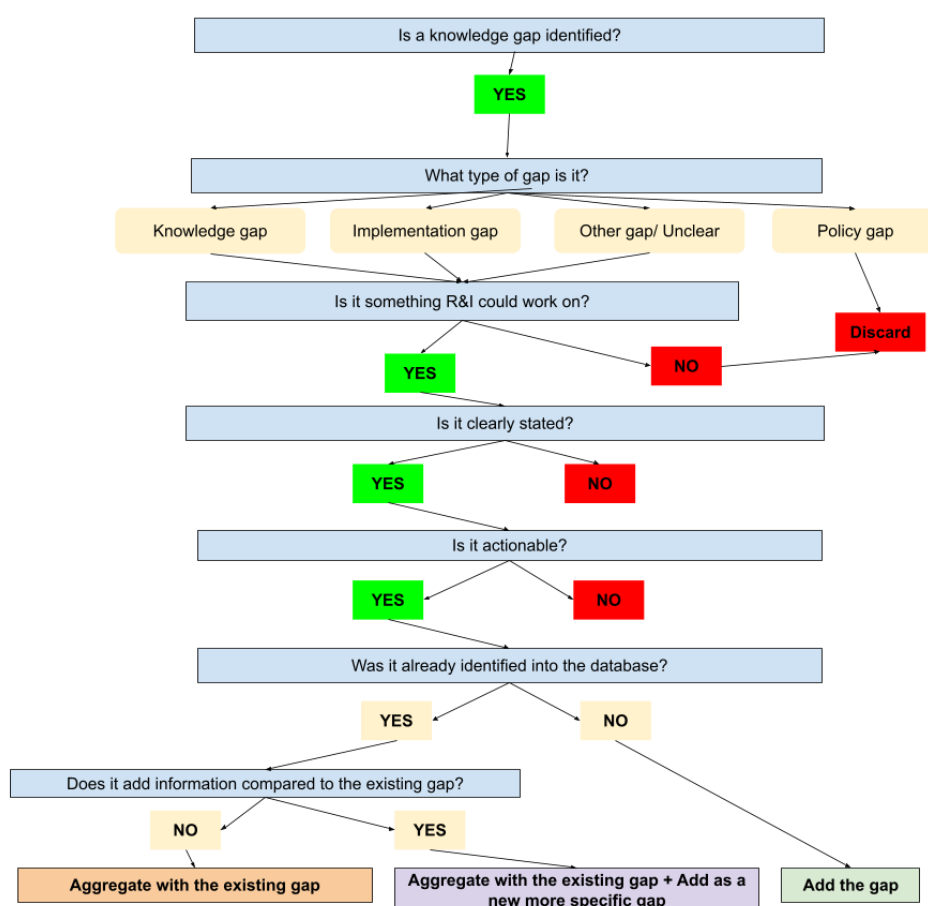
During the extraction process, many publications were found to describe similar knowledge gaps using different wording. To avoid redundancy and to capture the frequency with which particular gaps were identified across the literature, extracted knowledge gaps were aggregated when relevant.

As a result, **a single knowledge gap entry in the database may be supported by multiple publications and citations**. The number of associated references provides an indication of the extent to which a given gap has been recognised in the literature, as well as more context, details and perspective on the gap.

In some cases, a citation both corresponds to an existing aggregated gap while also providing a more specific focus. For example, a broad gap such as “NbS in underrepresented regions” may encompass a more specific gap such as “Research needs on NbS in the Arctic”. In these instances, the citation on the Arctic was both linked to the broader category and retained as a separate entry. This approach preserves the visibility of specific research needs while maintaining broader thematic groupings.

Decision Tree

The selection, addition and aggregation of gaps in the database followed the following decision tree :



Revisiting the old data

While new knowledge gaps were identified through the current desk study, the database already contained 619 knowledge gaps from previous updates. To ensure consistency across the entire dataset, the same decision tree and inclusion criteria were applied to these existing entries. Kept entries were then either aggregated with newly identified gaps where overlap existed or were retained as distinct entries.

This process resulted in a total of 443 knowledge gaps for a total of 946 unique citations.

Gap Categorisation

New categories

All validated knowledge gaps were categorised to facilitate navigation and search within the final database. Following user feedback, the categorisation framework was revised to improve usability, better reflect the diversity of NbS knowledge gaps, and align with other NetworkNature resources. The revised framework was developed in consultation with NetworkNature partners to ensure its relevance to the NbS community.

To ensure consistency across the database, knowledge gaps from previous updates were also reviewed and assigned to the revised categories. All gaps were then categorized:

- **By Keywords**

The 2024 version of the database used a categorisation system based on 32 broad knowledge gap topics and 11 types of approaches. As part of the broader effort to improve accessibility and usability of the database, and to align terminology across the NetworkNature platform, this system was substantially revised.

The previous categories were replaced by a **keyword-based classification system**, providing greater flexibility for searching, filtering, and exploring the database. This approach better reflects the diversity and complexity of

knowledge gaps by allowing individual gaps to be associated with multiple keywords. All the old categories are reflected in the new keywords.

The keyword framework was continuously refined throughout the update process, with new keywords added as new themes and knowledge gaps emerged from the literature review.

A complete list of keywords is provided in [Annex 2](#).

The special case of the Roadmap keywords

As the database is intended to support the update of the EU Research and Innovation Roadmap for Nature-based Solutions, all knowledge gaps were additionally tagged according to the Roadmap's four Action Areas:

- Action Area 1: Advancing NbS Knowledge and Data
Keyword: Roadmap NbS Data
- Action Area 2: Closing the NbS Research-Implementation Gap
Keyword: Roadmap NbS Implementation
- Action Area 3: Mainstreaming NbS in Policy
Keyword: Roadmap NbS Policy
- Action Area 4: Exchange, Capacity Building and Awareness
Keyword: Roadmap NbS Engagement

This categorisation enables direct alignment between identified knowledge gaps and the strategic priorities of the Roadmap. The same keywords are also used to tag resources across the NetworkNature platform, creating links between knowledge gaps, projects, publications, and other resources within an [integrated interface](#).

Further information on Roadmap-based resource tagging is available on the [NetworkNature website](#).

- **By Societal Challenges**

The Societal Challenges addressed by NbS can be consulted in detail in the [NetworkNature Walkthrough](#).

Societal Challenges
Climate Resilience
Water Management
Food Security
Social Justice and Social Cohesion
New Economic Opportunities and Green Jobs
Participatory Planning and Governance
Natural and Climate Hazards
Health, Well-being and Air-quality
Soil, Land and Sea Management and Planning
Place Regeneration
Knowledge, and Social Capacity Building for Sustainable Transformation
Biodiversity Enhancement
All
Not specified

“All” and “Not specified” were added for search purposes.

- **By Ecosystems**

Ecosystems for the knowledge gaps database
Coastal, shelf and open ocean
Marine inlets and transitional water
Rivers, lakes and ponds
Inland wetland
Subterranean
Forest and woodlands
Shrublands
Grassland
Deserts and semi-deserts
Polar/Alpine (cryogenic)
Sparsely vegetated land
Cropland
Urban ecosystems
Multiple
Non specific

The list of ecosystems used is adapted from the “Mapping and Assessment of Ecosystems and their Services (MAES)” European Commission 2020 report¹ and complemented with the IUCN [Global Ecosystems Typology](#). (see [Annex 3](#))

¹ Maes, J., Teller, A., Erhard, M., Condé, S., Vallecillo, S. et al., *Mapping and assessment of ecosystems and their services – An EU wide ecosystem assessment in support of the EU biodiversity strategy*, Publications Office of the European Union, 2020, <https://data.europa.eu/doi/10.2760/757183>

- **By Scale**

Scales are created according to the NetworkNature website.

Scales	
Global	National
Continental	Sub-national
Sub-Continental	Local

- **By NbS Type**

NbS types are derived from Eggermont et al (2015).²

NbS Types	
Type 1 - No intervention	Minimal or no intervention in ecosystems (protection and conservation of natural ecosystems)
Type 2 - Management or restoration	Management and restoration of ecosystems to enhance sustainability and multifunctionality
Type 3 - Intensive management or creation	Creation or intensive management of ecosystems, including the design of new ecosystems

² Eggermont, Hilde, Estelle Balian, José Manuel N. Azevedo, et al. « Nature-Based Solutions: New Influence for Environmental Management and Research in Europe ». *GAIA - Ecological Perspectives for Science and Society* 24, n° 4 (2015): 243-48.
<https://doi.org/10.14512/gaia.24.4.9>.

Additional Information on categories:

In addition to the categorisation framework described above, each knowledge gap entry includes a set of standard metadata fields:

- **Title:** each knowledge gap is assigned a title describing the identified research need or knowledge gap.
- **Sources and citations:** all supporting references are recorded in the database, including authors, year of publication, links, and DOI information where available.
- **Year:** each knowledge gap is associated with a publication year. For aggregated gaps supported by multiple sources, the year of the most recent reference is recorded.
- **Geographical scope:** where a knowledge gap is specific to a particular country or group of countries, the relevant UN country is indicated in the database.

Database interface update

Limitations of the Previous Version

Feedback from users highlighted several limitations in the previous version of the knowledge gap database, including difficulties in browsing and filtering content, limited search functionality, and challenges in understanding and navigating the available information.

Development of a New Interface

To address these issues, a redesigned database interface was developed. The new interface aims to provide a more intuitive and user-friendly experience, making it easier for users to discover, search, and explore knowledge gaps.

Key improvements include:

- An enhanced filtering system based on the updated categorisation framework and keywords;

- An improved search function to enable more effective retrieval of relevant knowledge gaps;
- Clearer presentation of information and associated metadata.
- A redesigned webpage following the overall architecture and design of the NetworkNature website

The updated interface is also intended to serve as a collaborative resource for the NbS community. Registered users of the NetworkNature website can contribute to the continued development of the database by submitting new knowledge gaps or commenting on existing entries.

Analysis and results

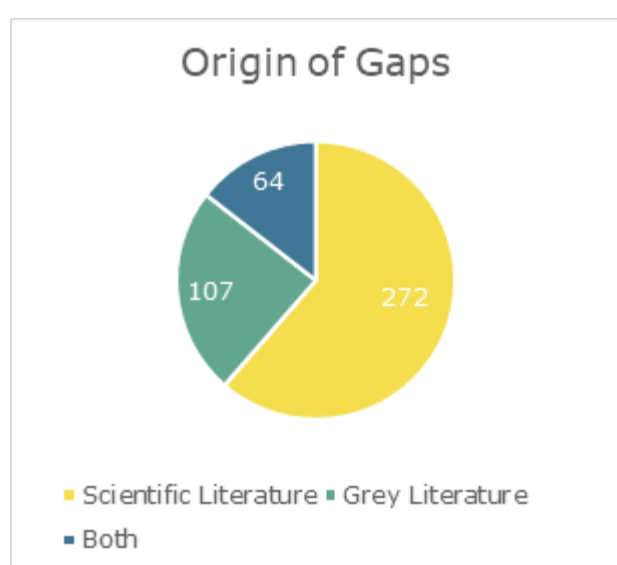
Disclaimer

As explained in the methodology, the database is aimed to be a live resource that is expected to evolve and grow as the NbS community uses and adds to it. **The analysis presented here is thus based on the data gathered in the scope of this update** (August 2026) only and may not reflect the latest version of the database. The analysis and categorisation of the identified gaps provide a more comprehensive overview of the current state of knowledge and areas requiring further data and research attention.

Global insights

The database comprises in August 2026 **443 knowledge gaps for a total of 946 unique citations**.

The database bridges the gap between academic research and grey literature:



- 61% (272 gaps) come only from scientific literature.
- 24% (107 gaps) come only from grey literature (like institutional reports).
- 14% (64 gaps) are co-identified in both types of literature

The substantial contribution of grey literature highlights the **importance of including institutional and practice-oriented sources when identifying NbS knowledge needs**. The fact that some gaps are identified only in grey literature may reflect research and

Figure 1 - Origin of knowledge gaps

implementation challenges that are not yet widely represented in academic publications.

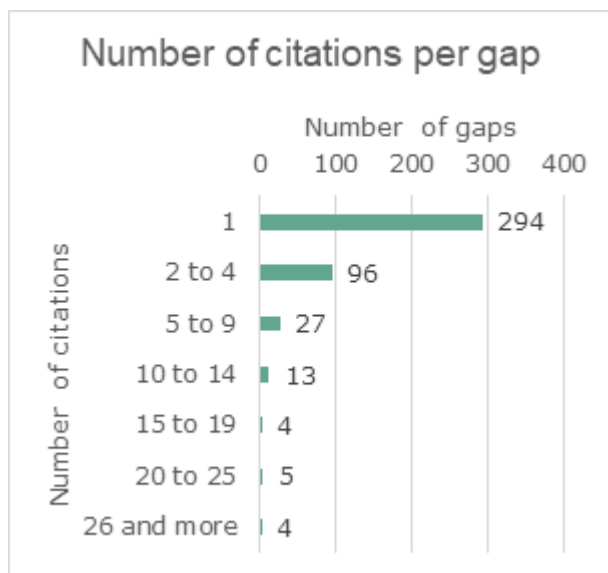


Figure 2 - Number of citations per knowledge gap

66% (294 gaps) are associated with a single citation, indicating **newly emerging or specialized research needs**, while 22% (96 gaps) have 2 to 4 citations, 6% (27 gaps) have 5 to 9 citations, and 6% (26 gaps) are backed by 10 or more citations. **A higher number of citations may indicate broader recognition of a research need or that the knowledge gap occurs across a variety of contexts.**

The gap with the highest number of citations is “**Long-Term Monitoring and Performance Evaluation**”, with **41 citations** (see [Annex 4](#) for the ten most cited knowledge gaps.) The most frequently cited gaps show a **strong concentration around monitoring, evaluation, standardisation, scaling and effectiveness**. Together, these findings suggest that a key challenge for NbS research is not only generating new knowledge, but also **developing consistent approaches to assess, compare and monitor NbS outcomes across different contexts and over time**.

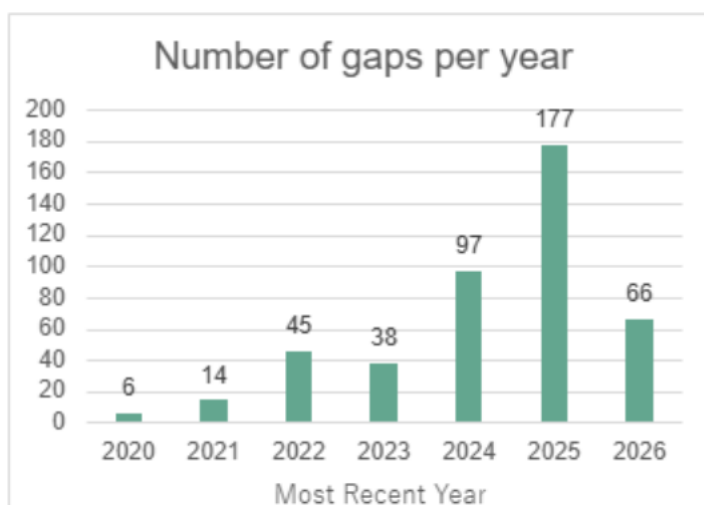


Figure 4 - Number of knowledge gaps identified per year

Taking into account the most recent year the gap was identified (in the case of multiple citations), 40% (177 gaps) of gaps are from 2025 literature, 21% (97) from 2024 and 15% (66) from early 2026 (representing literature analysed up to March 2026, the end of the desk study timeframe). The literature on NbS is thus increasing with the years, identifying more knowledge gaps.

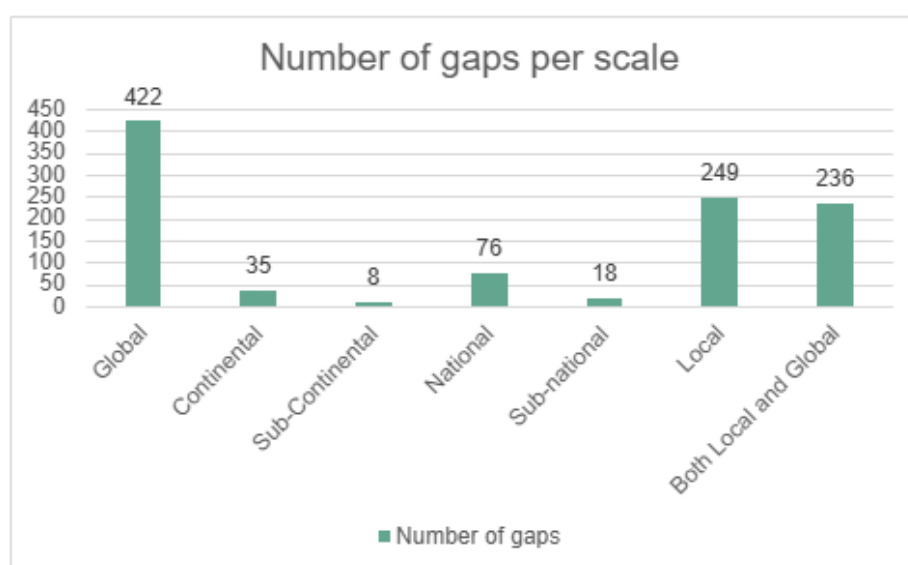
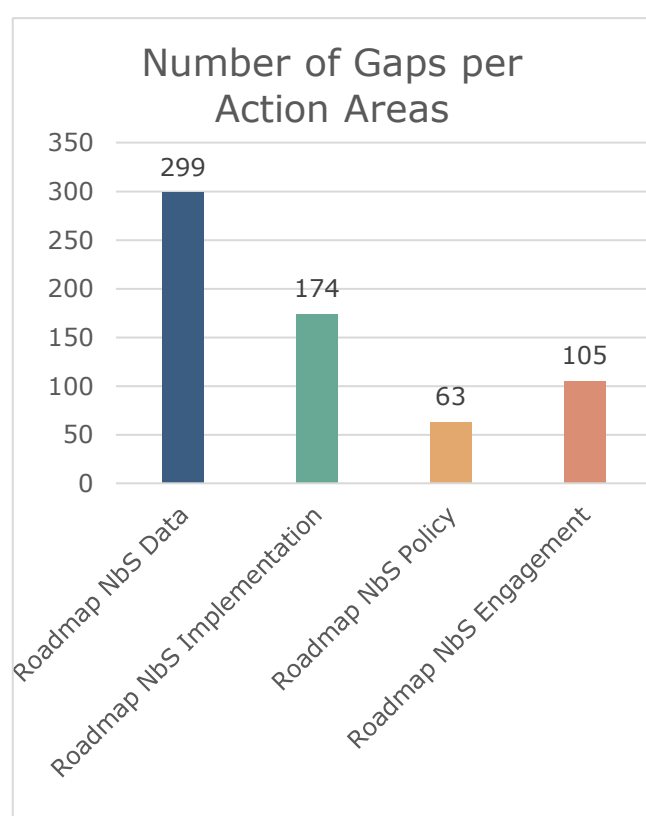


Figure 3 - Number of knowledge gaps per scale

Most entries (422 gaps) are classified as global because they address scientific, technical or methodological challenges that apply across multiple contexts. At the same time, local is the second most prominent scale (249 gaps) because practical NbS implementation depends heavily on specific local climates, ecosystems, and community contexts. Many gaps (236) are identified as both global and local.

Insights from the Roadmap Action Areas

All knowledge gaps in the database are tagged according to the four strategic Action Areas of the EU Research and Innovation Roadmap on NbS to 2030. Because individual research needs are often complex, gaps can be tagged with multiple Action Area keywords. In total, the distribution of gaps across the four Action Areas is as follows:



Action Area 1: Advancing NbS
Knowledge and Data

Keyword: Roadmap NbS Data : 299 gaps

Action Area 2: Closing the NbS
Research-Implementation Gap

**Keyword: Roadmap NbS
Implementation** : 174 gaps

Action Area 3: Mainstreaming NbS in
Policy

Keyword: Roadmap NbS Policy : 63 gaps

Action Area 4: Exchange, Capacity
Building and Awareness

**Keyword: Roadmap NbS
Engagement**: 105 gaps

Figure 5 - Number of knowledge gaps per Roadmap Action Areas

Because this database only collects knowledge gaps that can be solved by R&I (and explicitly excludes non-R&I policy gaps), having a lower number for policy-related gaps is expected.

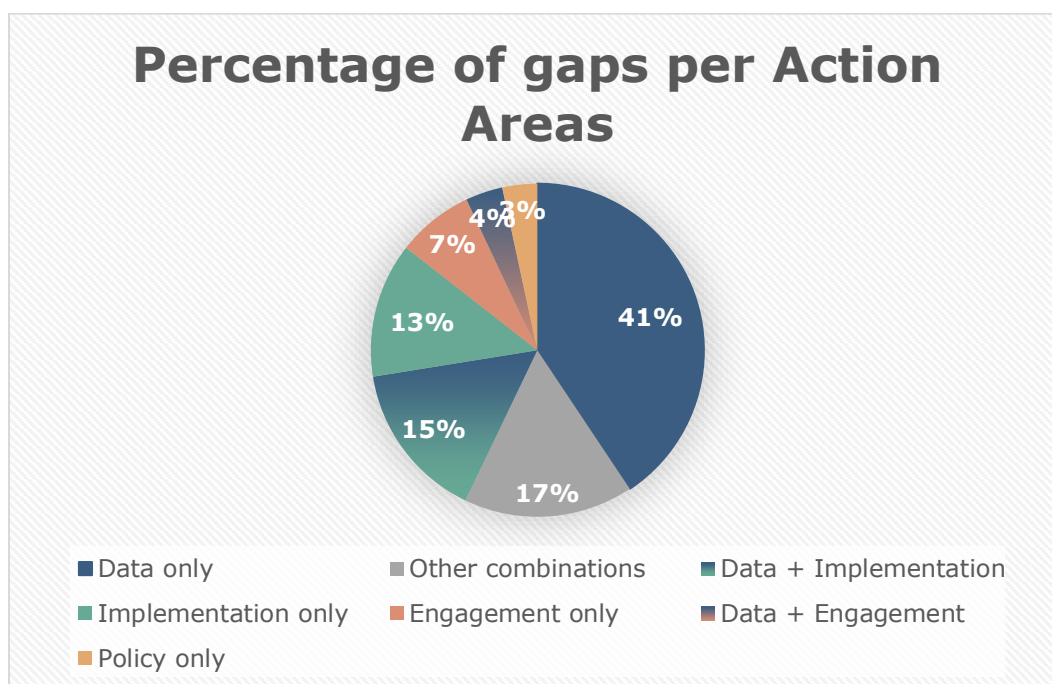


Figure 6 - Percentages of knowledge gaps per Roadmap Action Areas

The combination of Action Area tags shows where NbS research priorities are concentrated:

- The majority of entries are about "Data only" (41%, 180 entries), showing that **fundamental knowledge is still the largest missing piece in NbS R&I**.
- Gaps combining "Data + Implementation" account for 15% (68 entries), reflecting a **strong need for scientific data that can be applied in real-world settings, bridging science and implementation**.
- Gaps focusing solely on "Implementation only" represent 13% (58 entries) of the database.
- Knowledge needs focusing on "Engagement" (either alone or combined with data) make up 11% of the database, **highlighting barriers in exchange, capacity building and awareness**.
- Gaps tagged strictly as "Policy only" represent just 3% of the database.
- All other combinations of keywords (for example 'Data +Policy' or 'Data +Policy+Implemetation+Engagement'...) represent 17% of the database.

Insights from the keyword classification

To better analyse the database, the 127 individual keywords assigned to the gaps were grouped into **13 overarching thematic categories**. Individual gaps can have multiple keywords and therefore span several themes (see [Annex 2](#) for details, along with the number of gaps for each keyword). The broad distribution of gaps across these keyword categories is as follows:

Keywords themes	Number of gaps with at least one keyword in this category	% of total knowledge gaps
Governance & Management	238	54%
Application Sectors	236	53%
Performance, Impacts & Resilience	212	48%
Knowledge, Methods & Assessment	198	45%
Ecosystems, Biodiversity & Environment	153	35%
Social Justice, Equity & Society	139	31%
Economics, Finance & Business	109	25%
Climate Change & Risk Reduction	106	24%
Stakeholder Engagement, Communication & Education	84	19%
Design, Implementation & Scaling	76	17%
Knowledge Systems & Capacity Building	72	16%
Geographic Regions & Contexts	36	8%
Others	19	4%

Figure 7 - Categories and number of knowledge gaps with at least one keyword in the category

The main themes that knowledge gaps are identified in are thus:

- **“Governance & Management”** (54% of gaps / 238 gaps): This theme focuses on how NbS are planned, structured, regulated, and managed. It contains keywords related to administrative, temporal, and spatial frameworks. The most common keywords in this category are “Scales” (81 gaps), “Time” (45 gaps), “Space” (45 gaps), “Management” (41 gaps), “Planning” (38 gaps), and “Frameworks” (38 gaps).
- **“Application Sectors”** (53% of gaps / 236 gaps): This category groups keywords by the specific physical domain, industry, or environmental sector where NbS are implemented. The most heavily researched sectors include “Blue & Green Infrastructure” (73 gaps), “Urban” (62

gaps), “Water” (46 gaps), “Infrastructure” (33 gaps), “Agriculture” (26 gaps), and “Agroforestry” (24 gaps).

- **“Performance, Impacts & Resilience”** (48% of gaps / 212 gaps): This theme is all about real-world outcomes, performance, and environmental feedback of NbS. It is dominated by “Effectiveness” (112 gaps), also the single most common keyword in the entire database, followed by “Risks” (43 gaps), “Ecosystem Services” (42 gaps), and “Impact” (30 gaps).
- **“Knowledge, Methods & Assessment”** (45% of gaps / 198 gaps): This category captures the scientific tools, research designs, and analytical methods used to study and verify NbS. Key keywords include “Evaluation” (57 gaps), “Assessment” (47 gaps), “Monitoring” (47 gaps), and “Modelling” (40 gaps).

Looking at the individual keywords reveals the specific areas where research is most lacking. The ten most common keywords in the database are:

Keywords	Number of gaps
Effectiveness	112
Scales	81
Blue & Green Infrastructure	73
Climate Change	64
Urban	62
Society	61
Economy	59
Evaluation	57
Ecology	53
Stakeholder Engagement	48

“Effectiveness” is by far the most present keyword in the database (not counting Roadmap keywords), indicating a large gap in the effectiveness of NbS as a whole that needs to be filled. This suggests that **demonstrating the real-world effectiveness of NbS remains a major priority for the NbS community.**

Figure 8 - First ten keywords with the highest number of gaps

Insights from the Societal Challenges

In the database, knowledge gaps are also classified by the Societal Challenges they address. Because NbS are multifunctional and can address several challenges simultaneously, individual gaps may be tagged with multiple societal challenges.

Here is how the gaps are distributed across the challenges, from most common to least common:

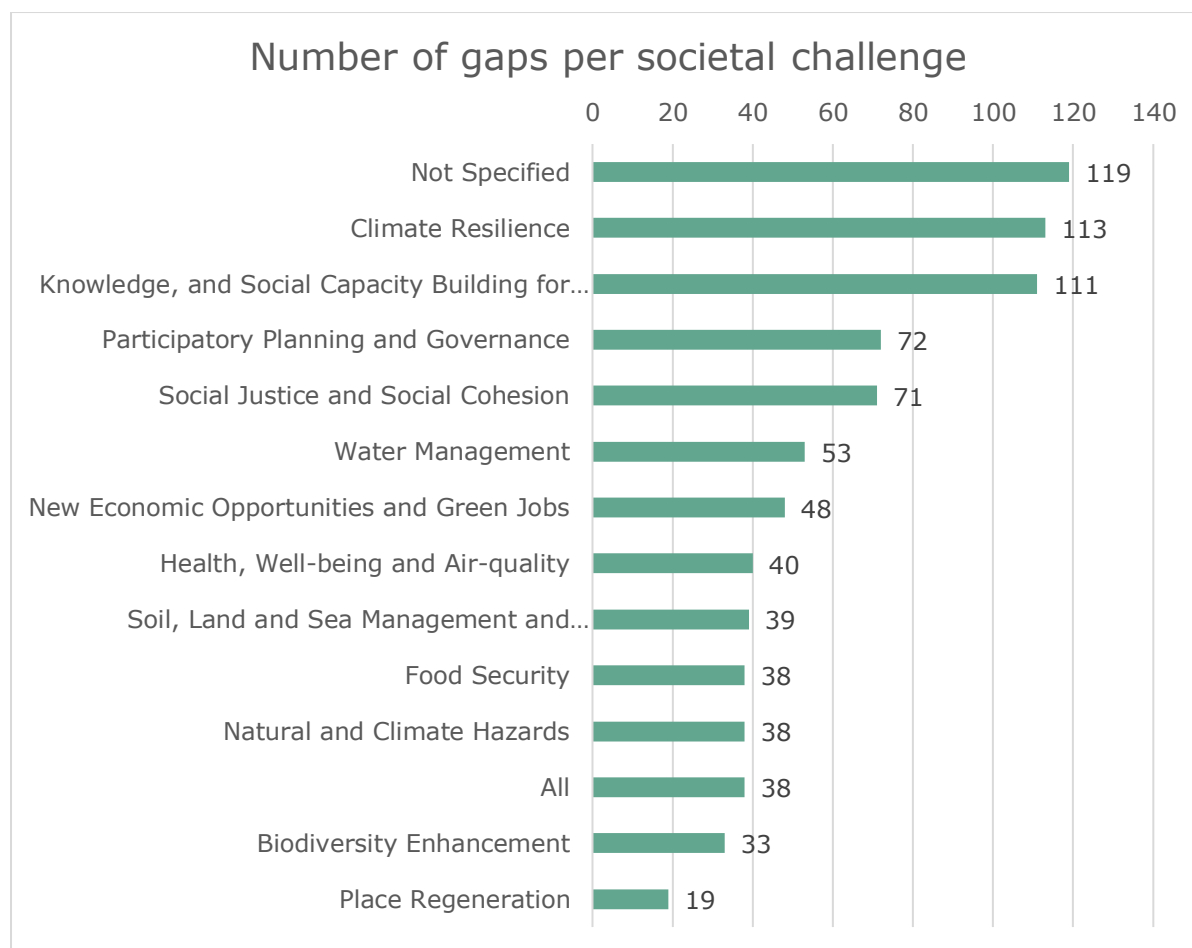


Figure 9 - Number of gaps per societal challenges

“Climate Resilience” (113 gaps) and “Knowledge and Social Capacity Building” (111 gaps) heavily dominate the database, showing that **adapting to climate change and building community capacity are the most widely recognised research needs**. In contrast, “Place Regeneration” (19 gaps) and “Biodiversity Enhancement” (33 gaps) are the least explicitly tagged challenges, though the latter is treated as a foundational prerequisite for all NbS.

Insights from the Ecosystems

The distribution of the 443 knowledge gaps shows a strong focus on certain ecosystems, while others are less represented. Because individual research needs can apply to more than one environment, gaps can be assigned to multiple ecosystems. The distribution of gaps per ecosystem is:

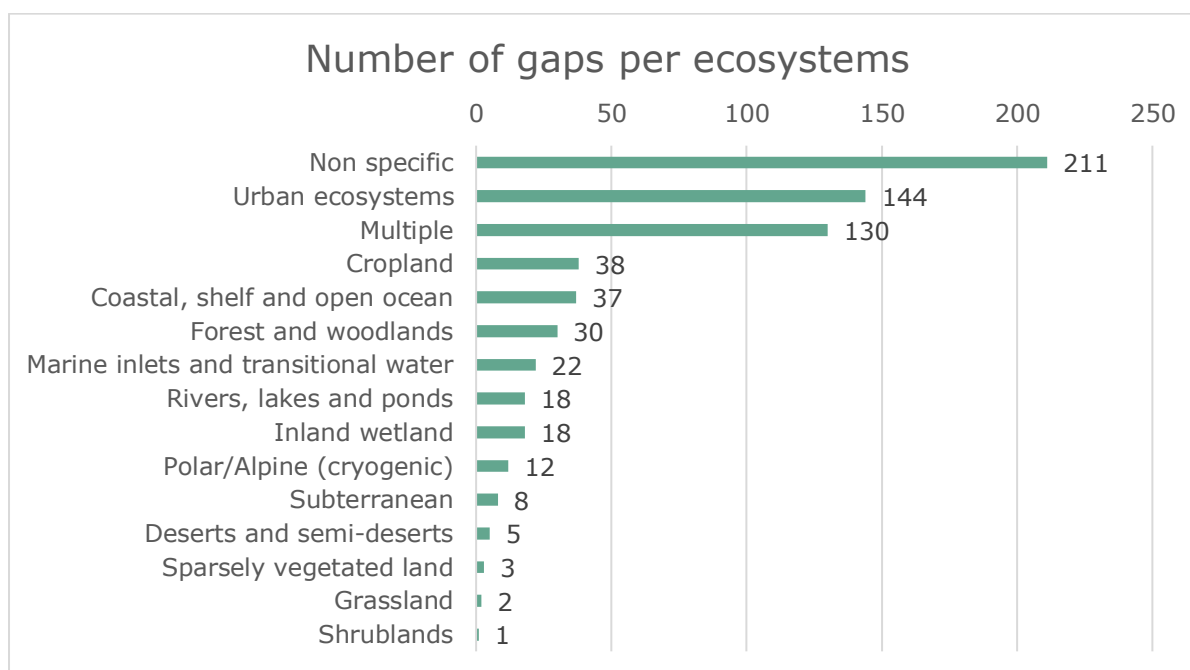


Figure 10 - Number of gaps per ecosystem

48% of knowledge gaps are not specifically tied to an ecosystem, and 29% are referring to multiple ecosystems. Among specific environments, **urban ecosystems are by far the most represented**, accounting for 32% of all entries (144 gaps). This strong urban focus is consistent with “Blue & Green Infrastructure” and “Urban” being among the most common keywords in the database.

However, this also shows that **other ecosystems might generally be less studied**. Some understudied environments, such as mountain ecosystems, are explicitly flagged in the database as suffering from data scarcity. For ecosystems with few documented gaps, such as grasslands and shrublands, the low numbers may indicate either a lack of formally identified research gaps or limited research attention.

Discussion

The analysis and categorisation of the identified knowledge gaps provide an overview of the current state of NbS research and innovation and the areas requiring further attention. Rather than representing a static list of missing knowledge, the **database can serve as a tool to help researchers, practitioners and funders identify recurring research needs and emerging priorities.**

The results highlight the **continued importance of fundamental knowledge and data in the NbS research landscape.** The largest number of gaps is associated with the Roadmap Action Area "Advancing NbS Knowledge and Data", while a substantial number of gaps also relate to implementation. This suggests that, alongside the need to generate new knowledge, an important challenge remains to **translate existing and emerging knowledge into effective NbS implementation.**

The prominence of themes related to effectiveness, evaluation, assessment and monitoring further reflects the **need to better understand how NbS perform across different contexts and over time.**

The distribution of gaps across societal challenges and ecosystems also illustrates the **diversity and cross-cutting nature of NbS research needs.** Climate resilience and knowledge and social capacity building are among the most frequently represented societal challenges, while urban ecosystems are strongly represented in the database. However, the **uneven distribution of documented gaps should be interpreted cautiously.** A high number of gaps does not necessarily indicate that a topic is more important than others, while a low number may reflect either a more mature evidence base or limited research and documentation.

The updated categorisation framework also makes it possible to **examine knowledge gaps from multiple perspectives.** Because individual gaps can be associated with several keywords, societal challenges, ecosystems and scales, the results should not be interpreted as mutually exclusive categories.

Instead, the database highlights the **interconnected nature of NbS research needs**.

It would also be valuable to examine how knowledge gaps have evolved since the last database update. However, differences in literature search methods, inclusion criteria, gap aggregation and categorisation mean that the 2024 and 2026 datasets are not directly comparable. Nevertheless, several themes identified in 2024 remain prominent. **Key gaps related to the NbS knowledge base, evaluation methodologies and tools, technical guidance, impact assessment, implementation and governance continue to be reflected in the 2026 findings**, particularly through themes on knowledge and data, effectiveness, assessment, monitoring, governance and implementation.

While this update significantly improves the database, several limitations should be considered when interpreting the results. First, to manage the growing volume of scientific literature, the desk study focused exclusively on scoping and synthesis studies. As a result, some highly localised or specialised research gaps may not be captured. Second, the search strategy relied on selected terminology and may therefore have excluded relevant studies using alternative terms for NbS. Finally, the categorisation of knowledge gaps involves subjective choices, particularly because many gaps span multiple themes, scales and ecosystems.

These limitations reinforce the value of **maintaining the database as a living and collaborative resource**. The new interface allows users to contribute additional knowledge gaps and comment on existing entries, creating opportunities for the database to evolve as new research needs emerge and as the NbS evidence base develops.

Overall, the findings provide a structured basis for identifying where further research and innovation may be needed. They can support the continued development of the NbS knowledge base and contribute to discussions on future research priorities, including the update of the European Research and Innovation Roadmap on NbS.

Conclusion

The 2026 update of the NetworkNature knowledge gaps database provides an updated overview of research and innovation needs surrounding Nature-based Solutions (NbS). Building on previous iterations, the update consolidates evidence from scientific and grey literature into 443 knowledge gaps supported by 946 unique citations.

The results show that important gaps remain in fundamental knowledge, data, implementation, effectiveness and long-term monitoring. Climate resilience, capacity building and urban ecosystems are among the most prominent areas, while the low number of documented gaps in some ecosystems may indicate persistent research blind spots.

The updated database and its improved categorisation and interface strengthen its role as a tool for guiding future research and innovation. As a living and collaborative resource, it can continue to evolve as new knowledge gaps emerge, helping researchers, funders and practitioners identify priorities and support the effective, equitable and scalable implementation of Nature-based Solutions.

Annexes

Annex 1 - List of keywords searched for the desk study

These keywords were used in the search query in Web of Science, as well as in Google Scholar, Google and all websites searched for grey literature.

Keywords used in the search
Agroecological / Agroecology
Agroforestry
Ecological engineering
Ecological Restoration
Ecosystem-based adaptation
Ecosystem-based disaster risk reduction
Ecosystem-based management
Ecosystem based mitigation
Green Infrastructure
Blue Infrastructure
Nature-based solutions
Nature based solutions
NbS
Protected areas

Knowledge gaps
Knowledge needs
Research gaps
Research needs
Overlooked
Understudied
Lack of knowledge

Annex 2 – List of keywords in the database

Keywords themes	Keywords	Number of gaps with this keyword
Roadmap keywords	Roadmap NbS Data	299
	Roadmap NbS Implementation	174
	Roadmap NbS Policy	63
	Roadmap NbS Engagement	105
Governance & Management	Scales	81
	Time	45
	Space	45
	Management	41
	Planning	38
	Frameworks	38
	Governance	33
	Standard	19
	Barriers	13
	Legal	9
	Transformative Change	5
Application Sectors	Collaboration Enablers	5
	Blue & Green Infrastructure	1
	Urban	73
	Water	62
		46

	Infrastructure	33
	Agriculture	26
	Agroforestry	24
	Health	22
	Marine	20
	Agroecology	15
	Forestry	12
	Coastal	9
	Energy	3
	Tourism	2
	Groundwater	1
	Fisheries	1
	Transport	1
Performance, Impacts & Resilience	Effectiveness	112
	Risks	43
	Ecosystem Services	42
	Impact	30
	Co-Benefits	27
	Synergies	25
	Resilience	22
	Negative Impact	13
	Trade-Offs	13
	Positive Impact	10
	Hazard	10
Knowledge, Methods & Assessment	Safety	1
	Evaluation	57
	Assessment	47
	Monitoring	47
	Modelling	40
	Methodology	35
	Tools	35
	Metrics	17
	Case Studies	17
	Indicators	15
	Scenario	13
	Grey Literature	2
Ecosystems, Biodiversity & Environment	Ecology	53
	Biodiversity	38
	Protected Areas	24
	Restoration	24
	Plant	21
	Nature	19
	Landscape	13
	Diversity	12
	Pollution	9
	Soil	8
	Air	6

	Crops	2
	Microplastics	2
Social Justice, Equity & Society	Society	61
	Relationship	47
	Culture	42
	Justice	18
	Equity	13
	Gender	9
	Inclusion	8
	Conflict	2
	Gentrification	2
Economics, Finance & Business	Economy	59
	Cost-Benefit Analysis	33
	Finance	27
	Funding	25
	Business	21
	Carbon	11
	Costs	7
	Private Sector	6
	Accounting	4
	Insurance	2
	Marketing	1
Climate Change & Disaster Risk Reduction	Climate Change	64
	Disaster Risk Reduction	25
	Mitigation	24
	Adaptation	22
	Extreme Events	14
	Flood	14
	Temperature	13
	Threshold	3
	Fire	1
Stakeholder Engagement, Communication & Education	Stakeholder Engagement	48
	Awareness	31
	Education	20
	Language	9
	Citizen Engagement	8
	Communication	7
	Citizen Science	4
	Art	2
Design, Implementation & Scaling	Design	29
	Technology	21
	Grey Solutions	9
	Upscaling	8
	Engineering	6

Hybrid Solutions		6
Maintenance		6
Knowledge Systems & Capacity Building	Interdisciplinarity	30
	Perspective	26
	Skills	10
	Informal & Ancestral Practice	8
	Indigenous Knowledge	5
	Innovation	2
Geographic Regions & Contexts	Global South	17
	EU	12
	Asia	11
	Africa	10
	South America	6
	Global North	3
	Caribbean	3
	North America	2
	Island	2
	Mountain	2
Others	Characteristic	15
	Sustainable Development Goals	4

Annex 3 – Ecosystems correspondence

IUCN Global Ecosystem Typology		Ecosystems used in the knowledge gaps database	Mapping and Assessment of Ecosystems and their Services (MAES) - European Commission 2020
Marine	Marine shelf	Coastal, shelf and open ocean	Coastal, shelf and open ocean
	Pelagic ocean waters		
	Deep sea floors		
	Anthropogenic marine biome		

Marine-Terrestrial	Shoreline	Marine inlets and transitional water	Marine inlets and transitional water
	Supralittoral coastal		
	Anthropogenic shorelines		
Freshwater-Marine	Semi-confined transitional waters		
Marine-Freshwater-Terrestrial	Brackish tidal	Rivers, lakes and ponds	Rivers and lakes
Subterranean-Marine	Subterranean tidal		
Freshwater	Rivers and streams		
	Lakes	Inland wetland	Inland wetlands
	Artificial wetlands		
Terrestrial-Freshwater	Palustrine wetlands	Subterranean	N/A
Subterranean-Freshwater	Subterranean-Freshwater		
	Anthropogenic Subterranean-Freshwater		
Subterranean	Subterranean lithic		

	Anthropogenic subterranean voids		
Terrestrial	Tropical-subtropical forests	Forest and woodlands	Forests
	Temperate-boreal forests and woodlands		
	Shrublands and shrubby woodlands	Shrublands	Heathland and shrub
	Savannas and grasslands	Grassland	Grassland
	Deserts and semi-deserts	Deserts and semi-deserts	Sparsely vegetated land
	Polar/Alpine (cryogenic)	Polar/Alpine (cryogenic)	
		Sparsely vegetated land	
	Intensive land-use	Cropland	Cropland
		Urban ecosystems	Urban ecosystems

Annex 4 – Gaps with 10 or more citations

Number of citations	Gap Title
41	Long-Term Monitoring and Performance Evaluation
33	NbS at a Range of Spatial Scale
30	Research Gaps in NbS under Future Climate Conditions and Climate Change
27	Standardization of Research Frameworks and Methodologies
25	NbS Synergies and Trade-Offs
24	NbS in Underrepresented Regions
22	Lack of Evidence Showcasing the Cost-Effectiveness of NbS
20	Need for Interdisciplinary Research for NbS
20	NbS and Social Equity
18	Development of Standardized Metrics and Indicators
16	Effectiveness and Benefits Between Natural (NbS) and Engineered (Grey) Solutions
15	Stakeholder Engagement, Participatory and Inclusive Approaches
15	Need of Monitoring Data to Identify Co-Benefits
14	NbS and Justice
14	Scaling, Comparability, and Replicability
13	Holistic Insights for Sustainable Urban Development
13	Quantitative Cost-Benefits Analysis Capturing the Multiple Values of Solutions
13	Poor Integration of Ecological and Socioeconomic Outcomes in Agroforestry
12	Lack of Studies in Certain Regions in Agroforestry
12	Lack of Standardized Design and Implementation Methodologies Fitting Broad and Individual NbS
12	Causal Links of NbS and Green Areas to Specific Health Outcomes
11	Inclusion of Indigenous and Traditional Knowledge
11	Biases in the Evidence Base on NbS towards Certain Ecosystems
10	Valuation of Cultural Ecosystem Services by NbS
10	Socio-Ecological Approach, Culture and Worldview
10	NbS at Landscape Scale and Multifunctionality



NetworkNature is a resource for the Nature-based Solutions (NbS) community, creating opportunities for local, regional and international cooperation to maximise the impact and spread of Nature-based Solutions. It maintains and adds to a diverse and science-based repository of evidence on NbS, strengthen partnerships and foster new relationships around a clear, strategic framework for action.



Funded by
the European Union

This project has received funding from the European Union's Research Executive agency under grant No. 101082213. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.



UK Research
and Innovation

This work is also funded by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee [grant number 10064784]