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Integrating Innovative Nature-based Solutions for Resilient Aquatic Ecosystems

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Project: 101237975

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Deliverable D3.1

Labour Market Analysis

Integrating Innovative Nature-based Solutions for Resilient Aquatic Ecosystems



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Integrating Innovative Nature-based Solutions for Resilient Aquatic Ecosystems

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1 Executive Summary

The current report presents the results of the stakeholder questionnaire conducted under Deliverable D3.1 of the INNAQUE project (ERASMUS-EDU-2025-CBHE). The survey aimed to assess the current state of governance, implementation, funding, monitoring systems, and educational needs related to Nature-based Solutions (NBS) in Egypt and South Africa. A total of 110 stakeholders participated in the questionnaire, representing public authorities, academic and research institutions, NGOs, private sector, and technical experts. The wide distribution of stakeholders ensured informed insights within policy, implementation, and educational fields. The results indicate that Nature-based Solutions, are becoming widely recognized within national and regional levels, although operational clarity is still limited. Supervisory procedures and stakeholder involvement frameworks are not yet consistently established, despite the fact that governance structures and responsible bodies are typically recognized.

Funding for Nature-based Solutions is reported as partially available, emphasizing on pilot projects, instead of long-term, systemic implementation. Despite the financial limitations, stakeholders show strong confidence in the environmental effectiveness of NBS. Institutional capacity is present but incomplete. In spite of technical material and training activities being available, staff sufficiency, informational exchange systems, and strategic coordination need to be strengthened. Additionally, monitoring mechanisms are present in several fields, yet measurable targets and clear timeline implementation are yet to be developed. Stakeholders expressed a strong need for interdisciplinary and applied educational programmes. Among the prioritized issues are water management, coastal protection, monitoring and impact assessment, governance integration, financing models, and community engagement.

The key findings of the questionnaire offer a scientific evidence-based foundation for the development of the INNAQUE project's educational modules. The project aims to contribute in strengthening long-term capacity for effective and sustainable NBS implementation in the partner countries, by identifying skills gaps and reinforcing institutional coherence.

2 Introduction

Nature-based Solutions (NBS), are becoming widely recognized as effective approaches to tackling environmental, socio-economic, and climate related issues through sustainable management and restoration of ecosystems. Throughout the years, Nature-based Solutions have gained the potential to provide mutual benefits for climate resilience, biodiversity, and human well-being. The INNAQUE project has implemented under the ERASMUS-EDU-2025-CBHE programme, aims to enhance the educational and institutional capacity among the partner countries of

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Egypt and South Africa. The main objective of Work Package 3 is the creation of educational modules that address the governance implementation, and skills gaps related to NBS.

Deliverable D3.1 consists the first analytical stage in this procedure. The stakeholder questionnaire presented in the current report was designed to map the current policy environment, governance structures, funding mechanisms, institutional capacity, and educational need regarding the Nature-based Solutions implementation in Egypt and South Africa. The questionnaire provides necessary external stakeholders' insights related to policy, research, implementation and community engagement fields. By gathering this data there can be a scientific evidence-based foundation for designing educational modules within the frameworks of the INNAQUE project. The results presented in the current report not only function as a strategic input for curriculum development and capacity building activities within the project, but also serve as a diagnostic tool to assess the current degree of NBS implementation in the partner countries.

3 Methodology

The methodological framework adopted for this study was designed to ensure systematic, transparent, and reproducibility collection and analysis of the results. This approach is based on established survey principles and was adapted to the specific requirements of the INNAQUE project's Work Package 3 objectives.

3.1 Design of the Questionnaire

The stakeholders' template was designed as a structural online questionnaire that targets to collect informed insights on 6 thematic pillars regarding governance, implementation, funding, monitoring and educational aspects of Nature-based Solutions (NBS) within the partner countries. For the purpose of mapping the current policy and implementation aspects and identify knowledge and capacity gaps essential for future curriculum development initiatives, this questionnaire was created in the frameworks of the INNAQUE project regarding Deliverable D3.1.

The questionnaire combined a series of close-ended and open-ended questions to enable quantitative mapping of patterns across respondents, and to allow stakeholders to elaborate on their experience with Nature-based Solutions, in order to identify skills and knowledge gaps. A short definition of Nature-based Solutions was provided at the beginning and participatory was anonymous. The questionnaire structure included,

Legal & Policy Frameworks: Questions evaluated stakeholders' perceptions regarding the existing legal frameworks supporting Nature-based Solutions, and the involvement of relevant stakeholder groups in planning and implementation activities.

Governance structures and stakeholder participation: Questions examined the inclusiveness of Nature-based Solutions decision-making process, and the degree to which local communities and indigenous knowledge holders are involved in NBS planning and implementation.

Funding availability and cost-effectiveness: This section explores the availability of dedicated funding mechanisms for NBS, perceptions of NBS cost-effectiveness related to traditional infrastructure, and awareness of innovative financing instruments.

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Institutional capacity and available resources: Questions addressed institutional capacity for Nature-based Solutions design and implementation, the availability of technical expertise, human resources, and organizational capacity among the respondents' organizations.

Monitoring systems and implementation targets: Questions assessed the existence and the degree of monitoring implementation and evaluation frameworks for NBS, the use of standardized indicators, and the alignment of NBS targets with national and international commitments.

Education, training needs and capacity gaps: This thematic pillar explored the perceived adequacy of current educational and training programmes in preparing professionals for NBS-related roles, identified specific competency gaps, and investigated preferences for future INNAQUE curriculum content and delivery methods.

3.2 Target Group

The target group for this survey included external stakeholders in the INNAQUE partner countries, in Egypt and South Africa. The primary focus was on stakeholders with direct or indirect involvement in Nature-based Solutions fields, such as environmental governance, water management, sustainable development, education or implementation of NBS. Specifically, the target group included,

Public authorities: National, regional, or local government bodies responsible for environmental policy, coastal zone management, marine spatial planning, and related regulatory functions.

Environmental and water-related agencies: Institutions involved in ecosystem management, restoration, and environmental monitoring.

NGOs and civil society organizations: Organizations active in environmental conservation, community engagement, biodiversity conservation, and organizations that support sustainable development initiatives.

Practitioners and technical experts: Professionals and technical experts working in fields directly related to Nature-based Solutions implementation, including ecological restoration, environmental engineering, coastal management, and environmental consultancy.

Academic and research institutions: Universities, research institutions conducting research and education in NBS-related thematics.

The questionnaire was disseminated within the networks of the project partners in the parent countries. This approach ensured that responses represented well-informed stakeholder insights, instead of internal project perspectives.

3.3 Data Acquisition

Data acquisition was conducted over a one-month period, from 27 of January to 24 of April 2026. The questionnaire link was distributed via email by the local project partners to their stakeholder networks. Reminder communications were sent in order to increase participation and ensure broader representation. Participation was voluntary and anonymous. There was no collection of personal identifiers and responses were analyzed in aggregated form.

A total of 110 completed responses were collected by the close of the survey period. All responses were treated anonymously in accordance with the General Data Protection Regulation (GDPR).

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Quantitative data from closed-ended and open-ended questions were analyzed using descriptive statistical methods, including frequency distributions, percentages, and measures of central tendency. Responses to open-ended questions were reviewed according to their thematic content to identify patterns, themes, and important observations.

4 Profile of Respondents

A total of 110 stakeholders completed the questionnaire, representing a diverse cross-section of institutions and professional backgrounds relevant to Nature-based Solutions. In this section the institutional and geographical profile of the participants is presented, providing the background information needed to interpret the results.

4.1 Type of Organization

Most respondents (50.9%) were affiliated with universities and research organizations, indicating a strong academic representation. “NGOs and civil society organizations” represent 23.6% of the respondents, highlighting a significant contribution from non-governmental sectors. “Public authorities” represented 13.6% of the responses, while 6.4% represented the private sector. Only a small proportion of the respondents originates from “Local/Regional authority” and other categories such as “Researchers”, “Regional Organizations”, “Military”, and “Intergovernmental Organizations”. The dominant presence of academic institutions reveals that stakeholder involvement in NBS is linked to research and educational environments. In addition, the involvement of NGOs and civil society organizations respondents indicates comparatively lower engagement from industry in the current survey.

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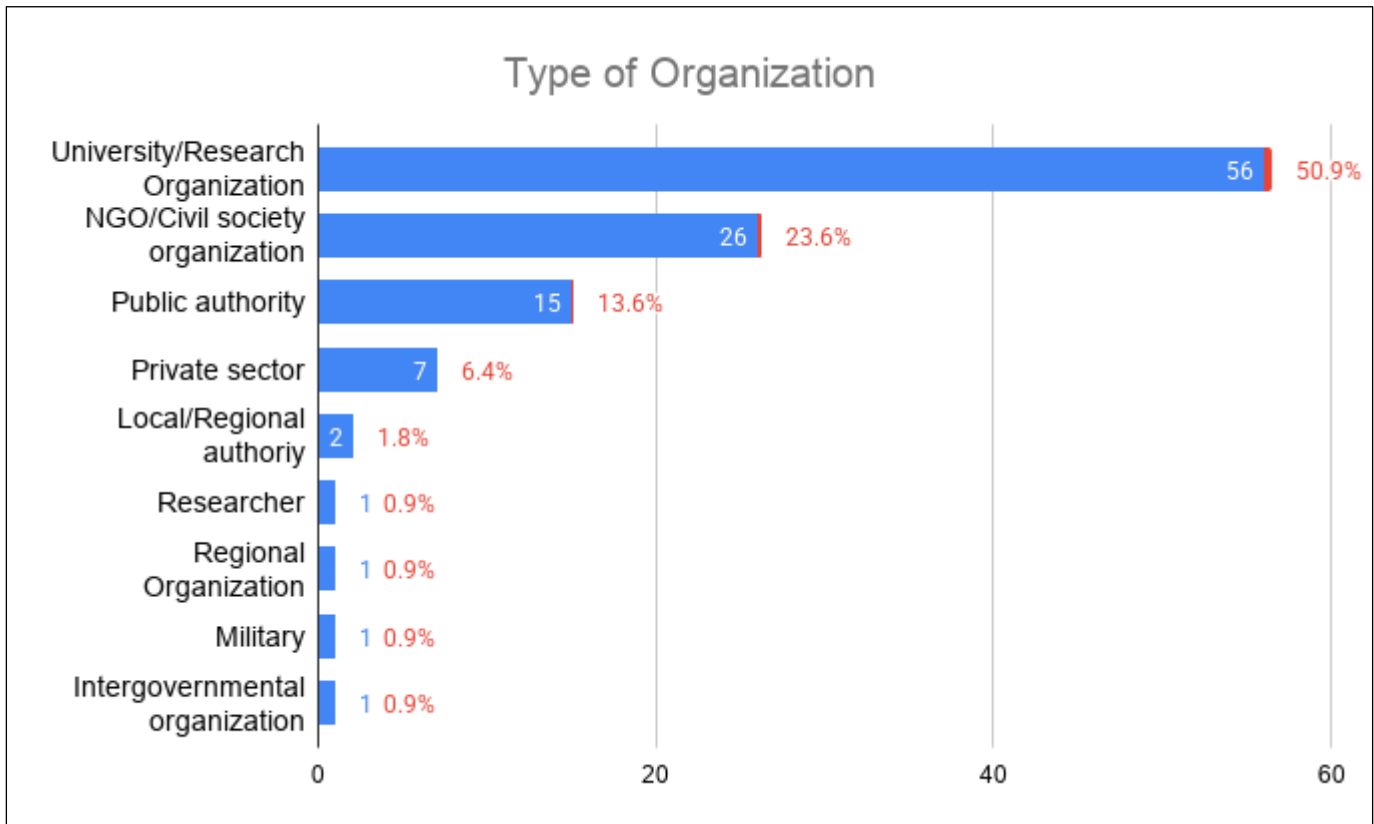


Figure 1 Distribution of respondents by type of organization.

4.2 Role in relation to Nature-based Solutions

Respondents indicated a variety of roles regarding Nature-based Solutions activities. “Education/Training” was the most frequent selection (57.3%), followed by “Implementation” (31.8%), “Monitoring/Evaluation” (25.5%), “Policy/Strategy development” (22.7%), and “Research” (3.6%). The high observed frequency in education and training fields represents the relevance of this study to the INNAQUE project’s curriculum development objectives. Additionally, the presence of participants engaged in policy development, implementation, and monitoring, reveals that the collected data offer insights across different aspects of the NBS principles. This finding confirms the interdisciplinary and cross-thematic nature of Nature-based Solutions activities in Egypt and South Africa.

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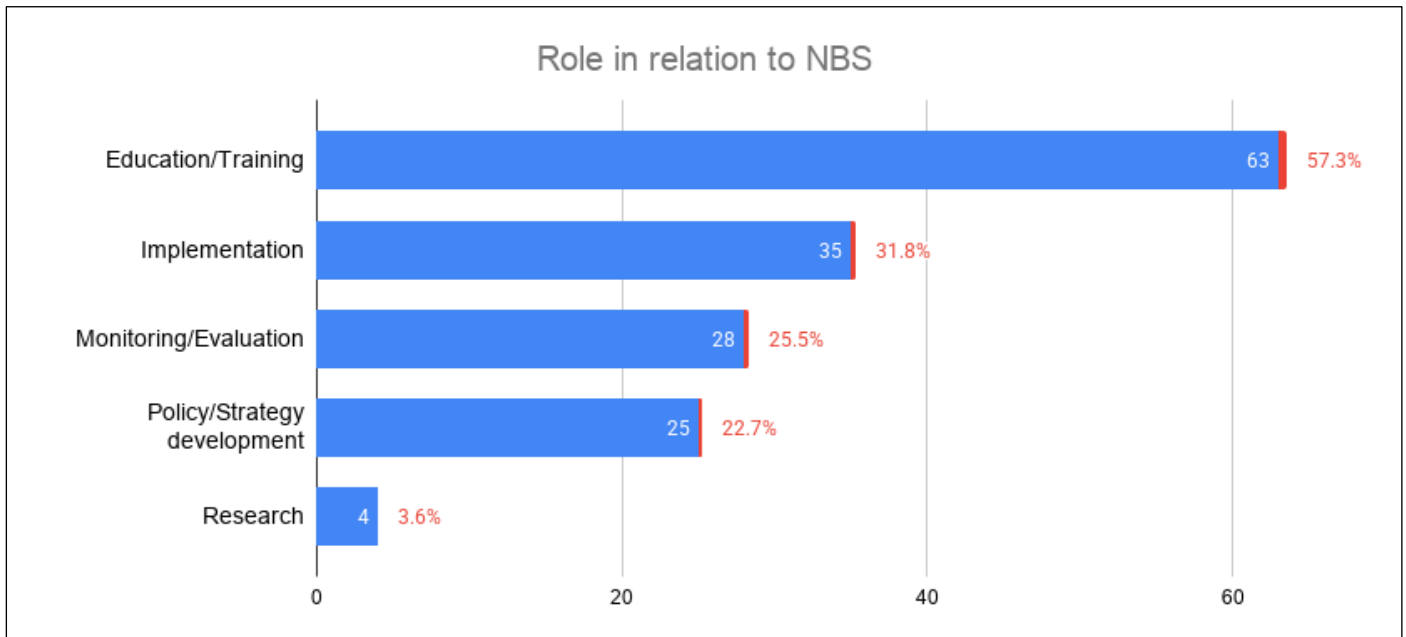


Figure 2 Distribution of respondents by stakeholder category.

4.3 Country representation

Geographically, respondents were distributed across the two targeted countries, Egypt and South Africa, in line with the INNAQUE project's area of interest. Responses were received from both partner countries, after merging city-level entries, e.g. Alexandria under Egypt, the dataset represents participation from stakeholders involved in both national and regional levels. Fifty-six respondents originate from Egypt (50.9%) and fifty-one originate from South Africa (46.4%).

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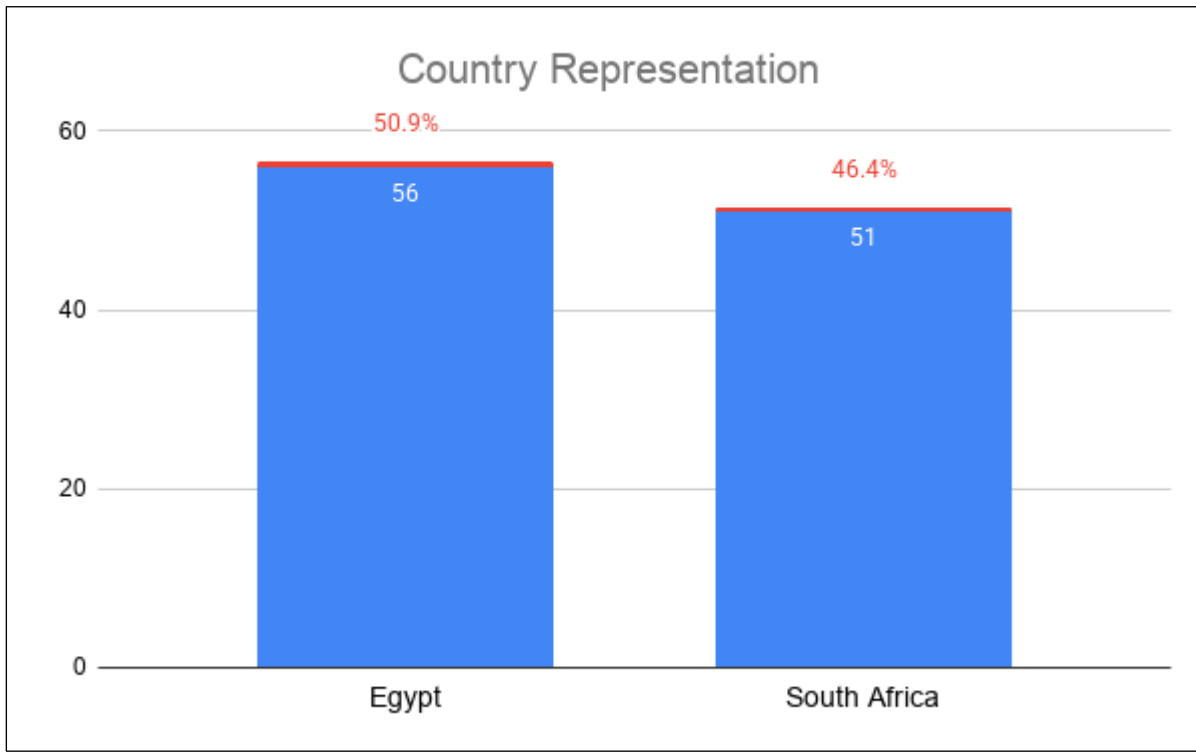


Figure 3 Geographical distribution of respondents.

4.4 Initial insights from stakeholder distribution

The profile of respondents reveals three significant aspects of the stakeholder analysis. Firstly, they are strongly academic and research-oriented in Nature-based Solutions involvement. Secondly, their active engagement in education and training fields highlights the importance of WP3 operations. Lastly, the participation from public authorities, NGOs, and implementation-related institutions, allow a comprehensive understanding of policy frameworks, funding mechanisms, and institutional capacity.

5 Results

This section presents the detailed findings of the stakeholder questionnaire, organized according to the 6 thematic pillars discussed in the methodology. Each section provides a combination of quantitative response patterns with their relevant visualization.

5.1 Legal and Policy framework

The results indicate that Nature-based Solutions are partially recognised among existing policy environments. However, the degree of clarity and integration varies greatly. Specifically, 31.8% of respondents suggested that NBS are supported at national level, whereas 13.6% recorded the existence of national level frameworks. A small proportion (7.3%) identified regional or local policy integration. The majority of respondents (39.1%) stated that they were not aware of a clear or strategic framework supportin Nature-based Solutions. This high percentage of uncertainty,

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indicates that either there was limited policy recognition or inadequate communication of existing frameworks to stakeholders. Nature-based Solutions appear to be developing in terms of institutional embedding and policy consistency, even though they seem to be present in strategic discussions.

The findings indicate that policy-level recognition exists, however, clarity, dissemination, and functional integration of NBS frameworks may be required in the partner countries.

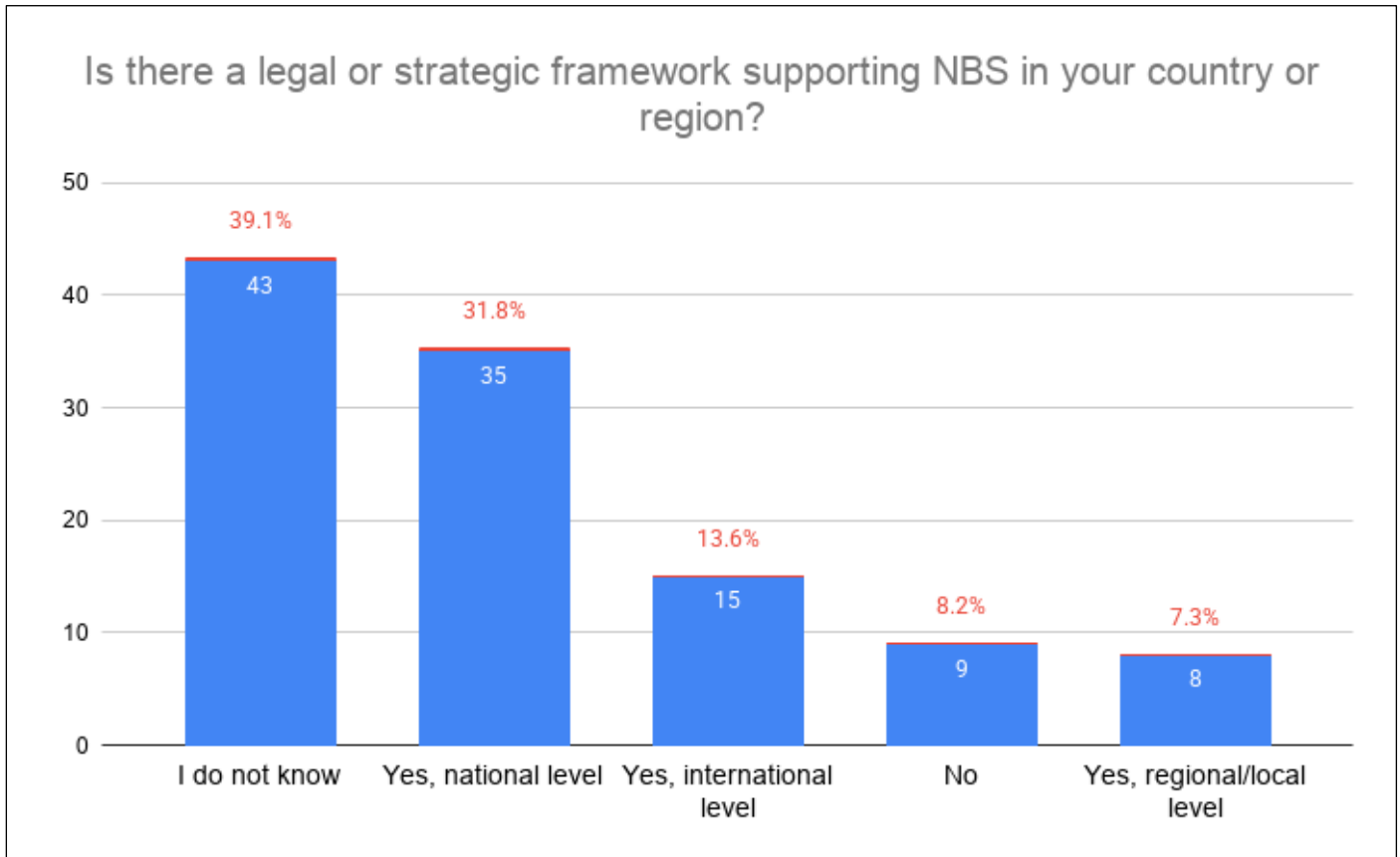


Figure 4 Perceived existence of legal or strategic frameworks supporting NBS at national, international, and regional levels.

5.2 Governance and Stakeholder Participation

Responses reveal a moderately structured governance environment for Nature-based Solutions implementation. Approximately, 40.6% of respondents stated that a clear defined body is only partially defined, whereas 37.7% confirmed that such a body exists. A notable share of respondents (21.7%) indicated that no clearly defined body currently exists.

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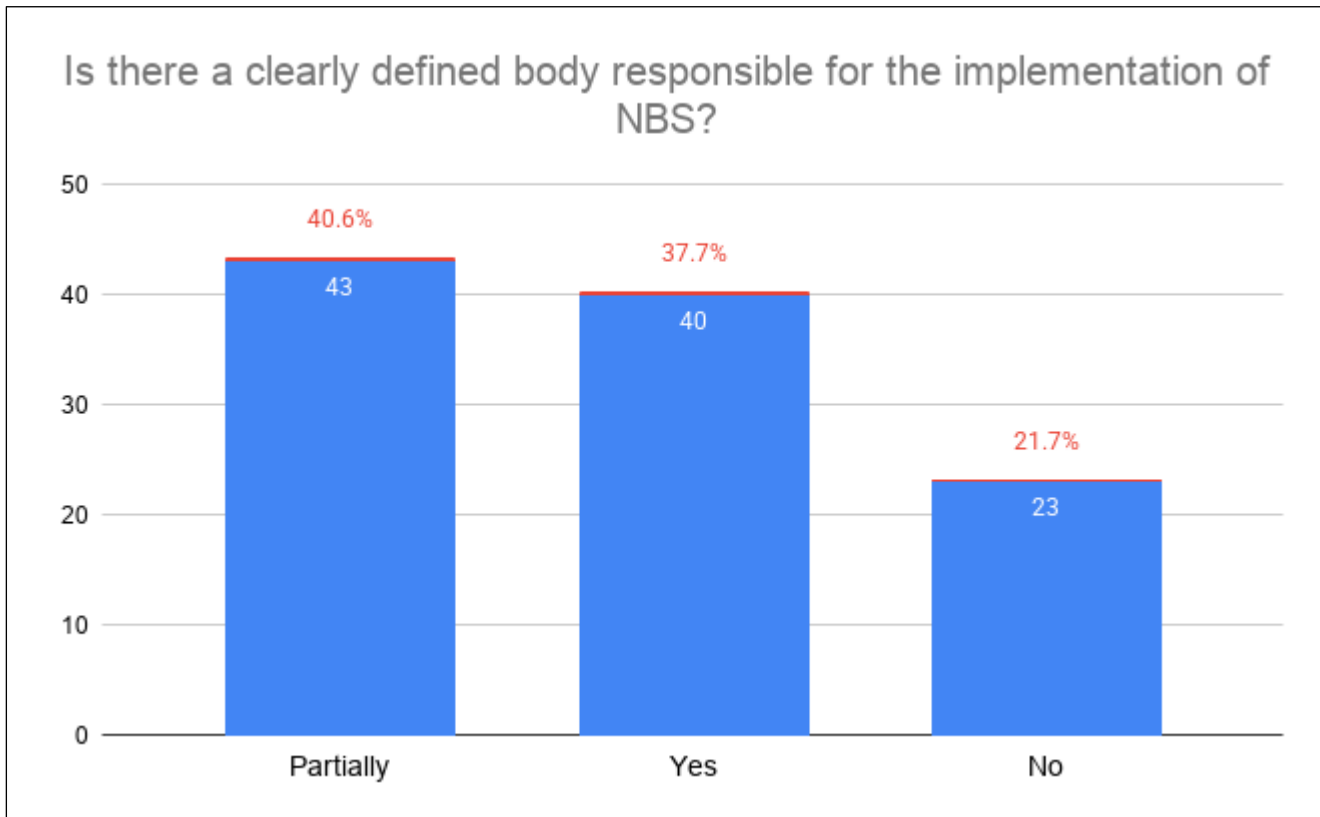


Figure 5 Respondents' perceptions regarding the existence of a responsible body for NBS implementation.

These findings suggest that institutional responsibility is formally recognized, although, in many cases governance structures are yet to be fully consolidated or functioning consistently across sectors and levels of administration.

Results in supervisory and control mechanisms, show a predominance of mixed governance structures. A total of 44.8% stated that there are mixed public-private governance structures responsible for supervision, whereas 25.7% indicated public authority leadership. However, 26.7% identified supervisory responsibility as not clearly defined. A smaller proportion (2.9%) as "Other" referring to research institutions (in experimental stages), NGOs and local communities, as well as individual responsibility. These responses highlight the presence of emerging or informal governance structures in NBS implementation.

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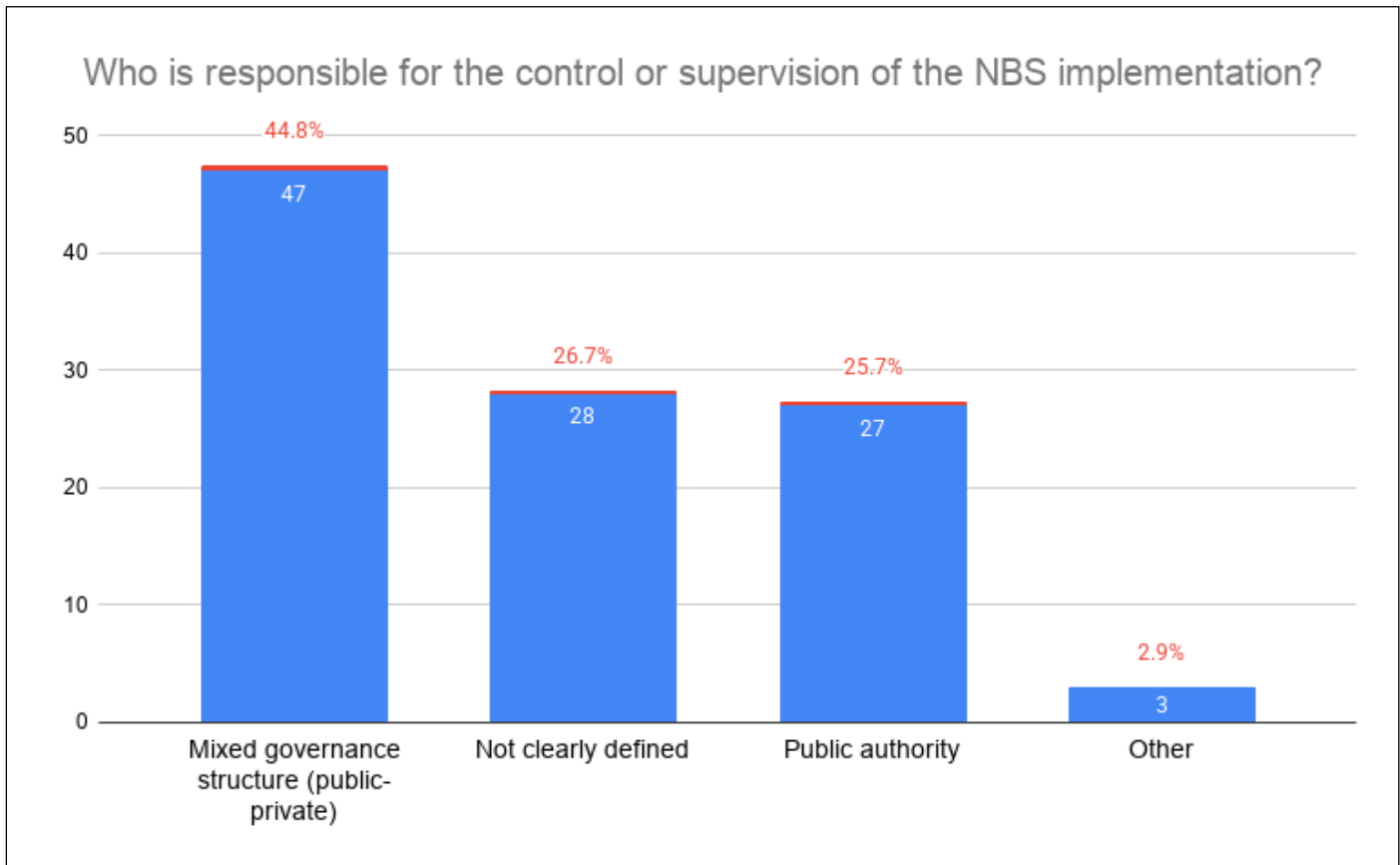


Figure 6 Perceived responsibility for NBS implementation.

The distribution of governance structures reflects on the cross-sectoral nature of Nature-based Solutions that often require collaboration between public institutions, private sectors, and technical stakeholders. Additionally, the relatively high proportion of respondents stating “Not clearly defined” supervisory structures, highlights the need for greater transparency and coordination in governance alignment regarding Nature-based Solutions.

Regarding stakeholder participation, the majority of respondents (47.2%) stated they were not aware of such structures, while 37% confirmed the existence of a formal framework for stakeholder participation in NBS planning and implementation. A smaller share (15.7%) reported that no formal participation framework exists.

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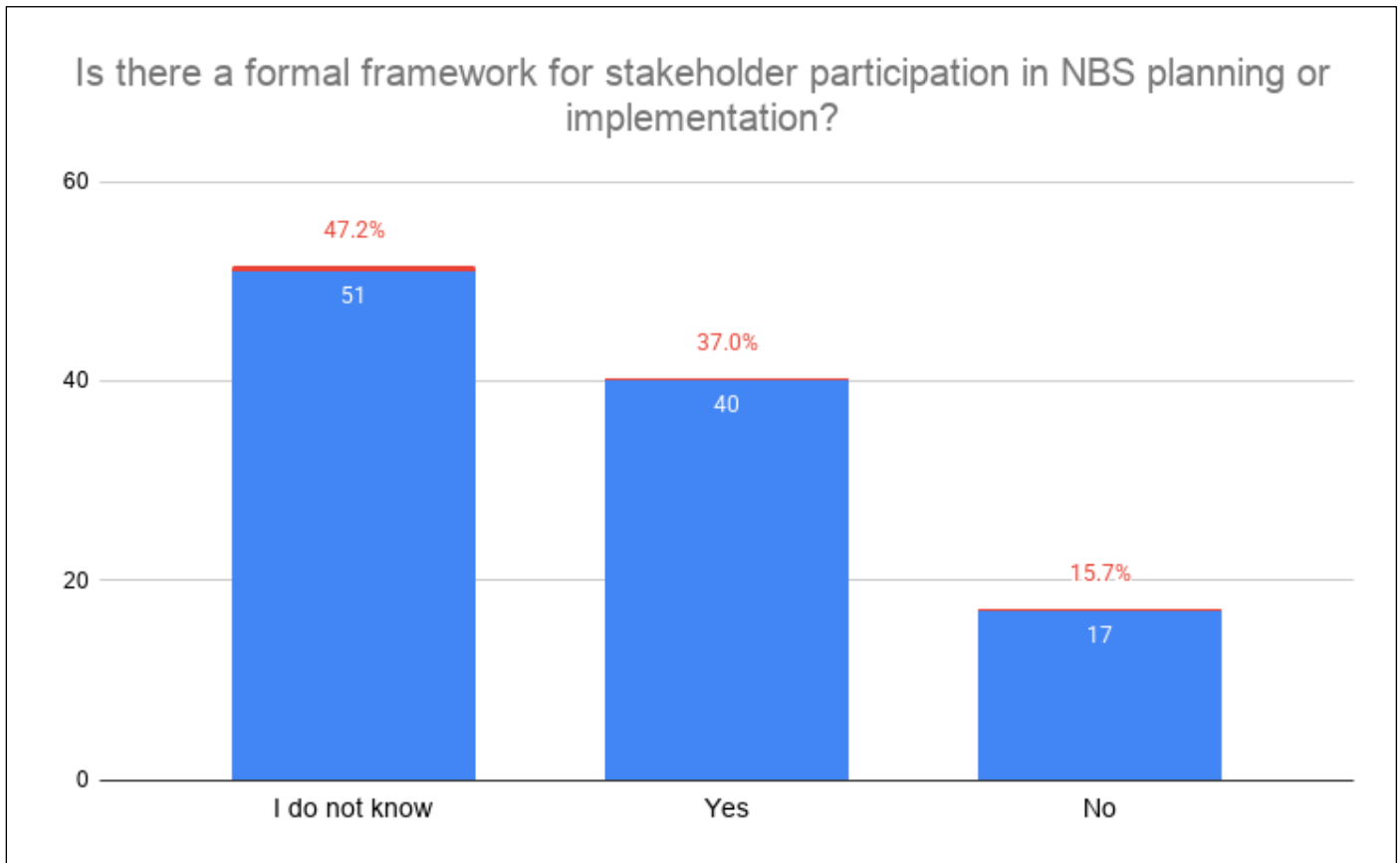


Figure 7 Perceived existence of a formal stakeholder framework in NBS planning or implementation.

The two highest in frequency selections, “Yes” and “I do not know” between confirmation and uncertainty indicates that participatory processes may be unevenly institutionalized or insufficiently communicated to stakeholders.

Lastly, respondents identified the type of stakeholders most frequently involved in NBS processes. “Scientific and technical expert” was the most frequent selection (63.6%), followed by “Local authorities” (56.1%), “NGOs” (50.5%), and “Local communities” (49.5%), whereas the “Private sector” showed comparatively lower engagement (36.4%).

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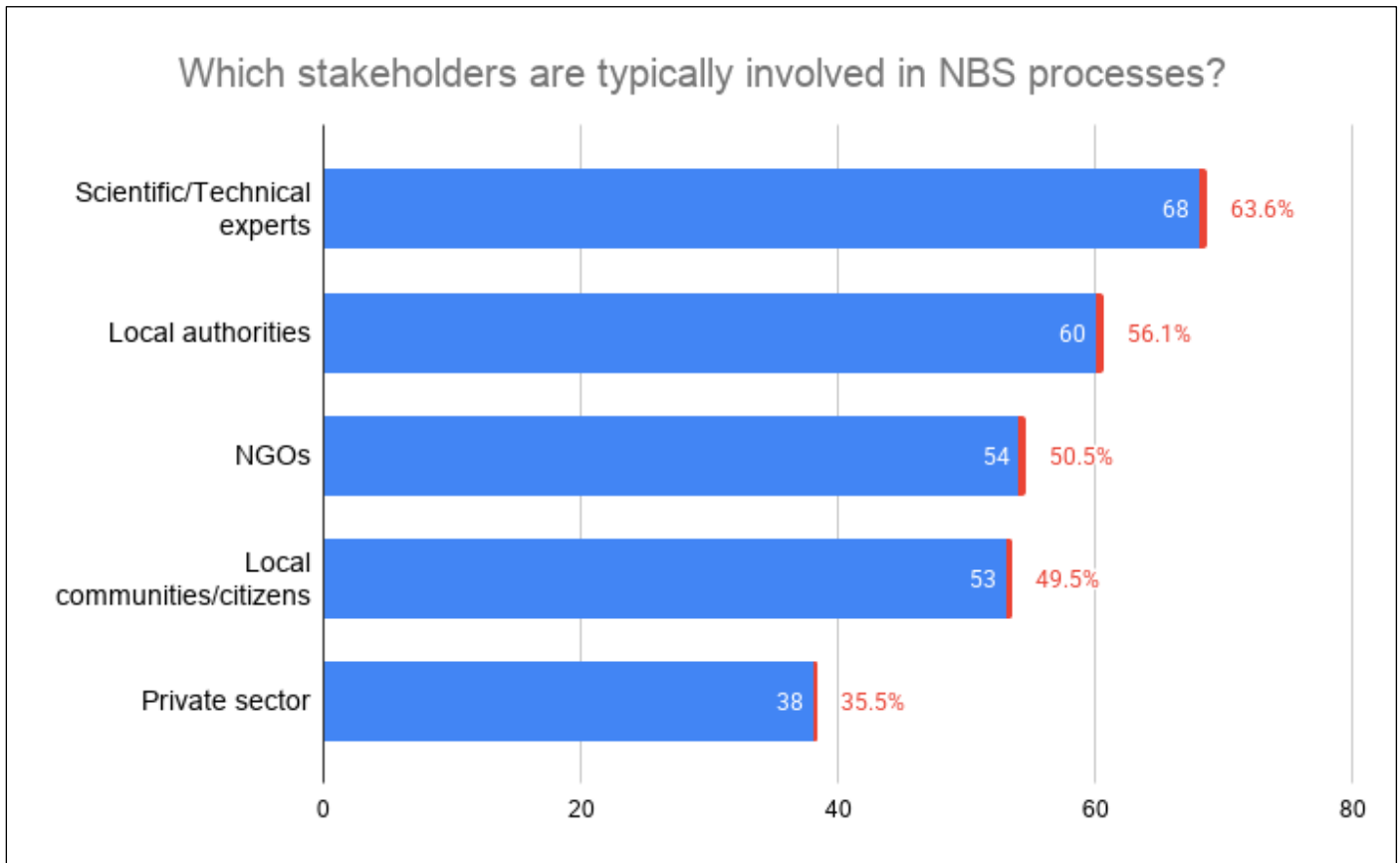


Figure 8 Stakeholders involved in NBS processes.

The predominant presence of scientific and technical expertise confirms that NBS initiatives consists of high-knowledge stakeholders in the partner countries. Additionally, the comparatively lower participation of the private sector stakeholders, suggests that there may be potential for strengthening inclusive and multiple sector governance approaches.

Concluding, the governance structure that emerged from these findings represents that a transitional stage of institutional environment exists, but could be reinforced by enhancing clarity, coordination, and more inclusive stakeholder engagement.

5.3 Funding and Cost-effectiveness

Funding for Nature-based Solutions is critical for the successful implementations. The results reveal a mixed outcome regarding financial support emchanisms. A total of 23.1% of respondents stated that funding for NBS is available, while 55.6% indicated that funding is only partially available. No funding available was recorded at 21.3% of respondents.

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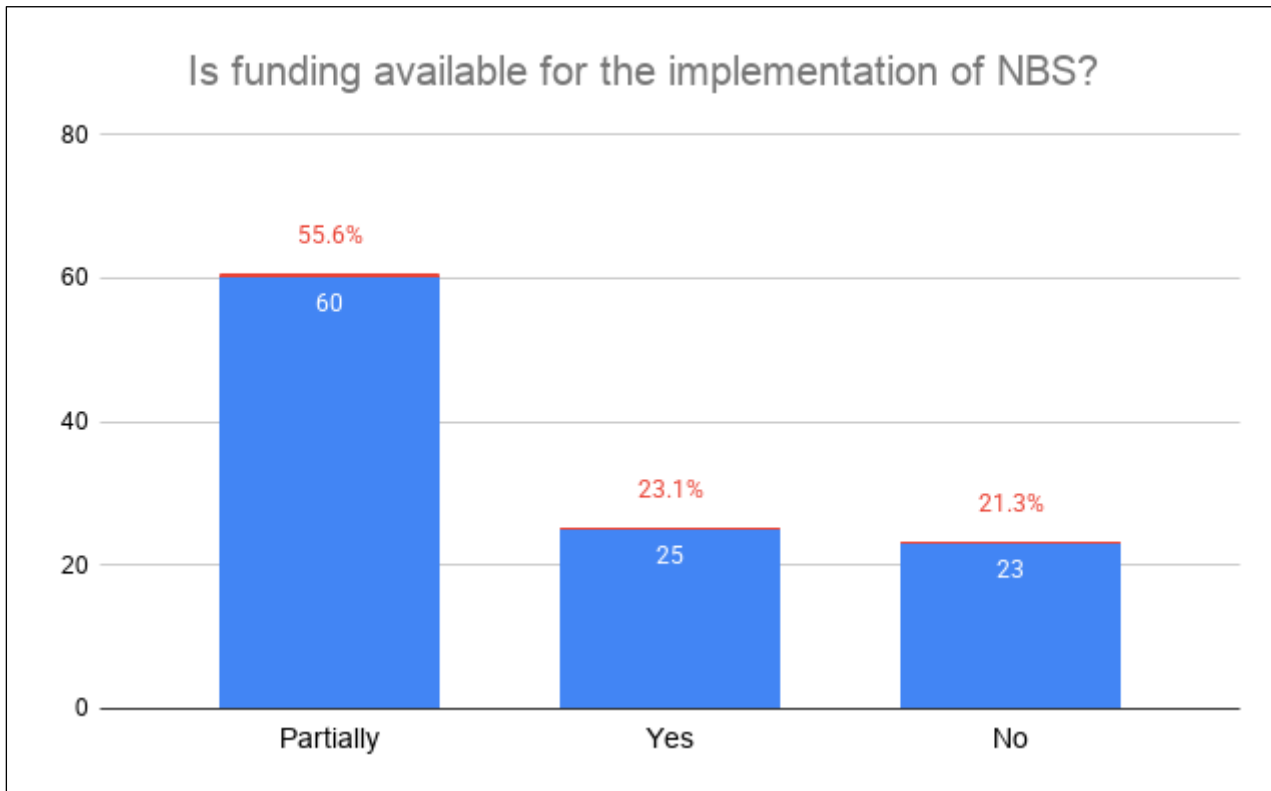


Figure 9 Funding availability for the implementation of NBS.

The predominance of “Partially” available funding regarding Nature-based Solutions, indicates that while financial structures may exist, they might be limited, project-based, or not systematically accessible to every relevant sector. This highlights the need for a more stable and long-term funding implementation structures to support the effective implementation of Nature-based Solutions.

The distribution of funding types related to Nature-based Solutions, indicates that there might be a short-term tendency to financing, instead of systemically implemented models. There is an observed emphasis on pilot projects that may represent an exploratory stage in NBS development in the partner countries.

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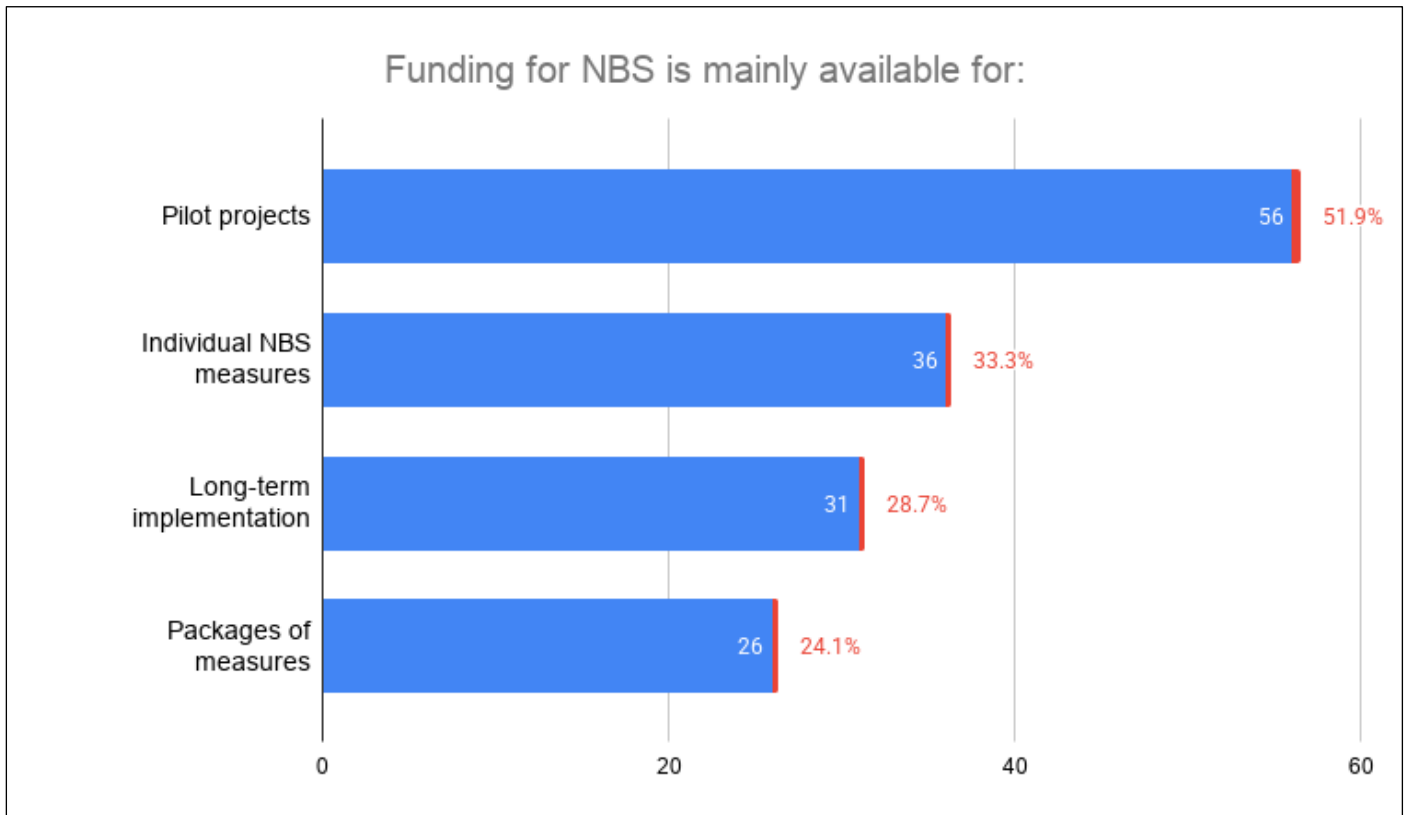


Figure 10 Type of funding most commonly available for NBS.

Regarding perceived effectiveness, stakeholders showed strong confidence in the capacity of Nature-based Solutions to tackle environmental issues. The majority of respondents rated NBS as moderately effective (37%) or very effective (35.2%), whereas a smaller percentage considered them slightly effective (15.7%) or not effective (2.8%). A limited share of respondents indicated uncertainty (9.3%).

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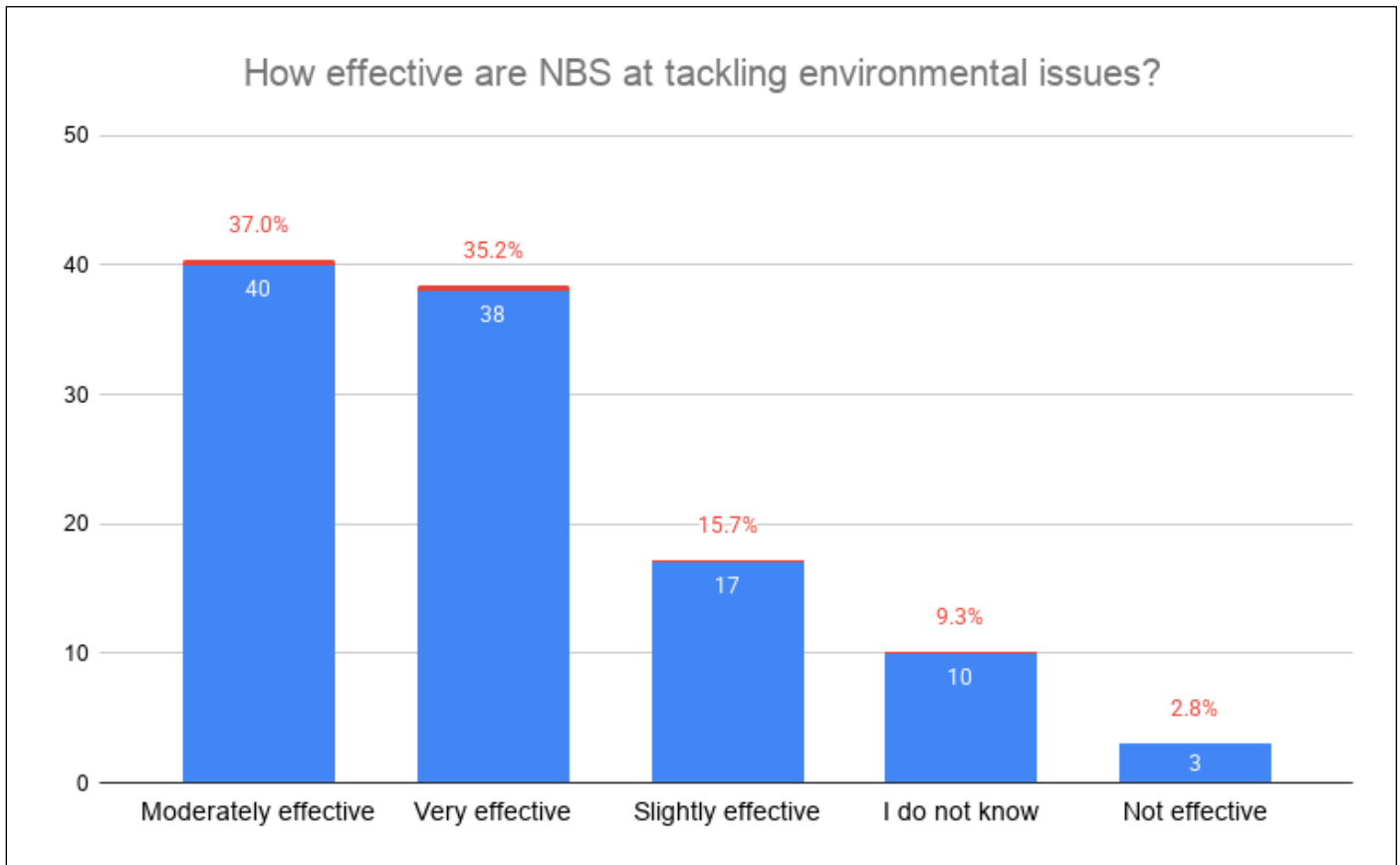


Figure 11 Perceived effectiveness of NBS in addressing environmental issues.

The results of perceived effectiveness indicate a high level of confidence in NBS tackling environmental issues, therefore reinforcing their strategic relevance in sustainability and resilience policies.

Respondents' perspective of cost-effectiveness revealed to be more refined. The majority (50.5%) considers Nature-based Solutions to be more cost-effective than traditional conventional solutions, followed by 44.9% of respondents considering cost-effectiveness to be relying on specific context. Only 4.7% of respondents consider NBS solutions not effective.

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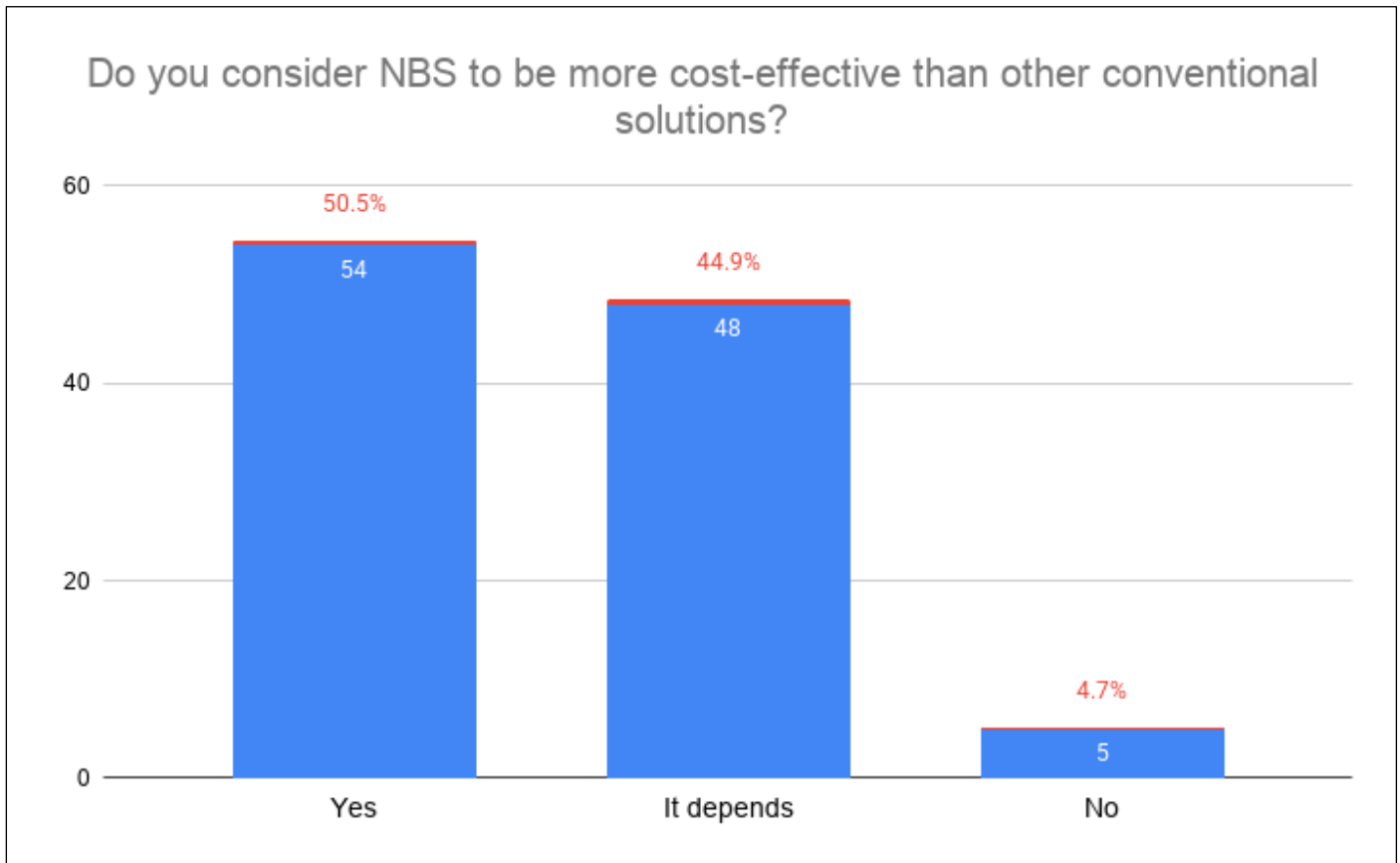


Figure 12 Perceived cost-effectiveness of NBS versus conventional solutions.

The most dominant and frequent selection “It depends”, suggests that stakeholders understand how scale, ecosystem type, maintenance requirements, and long-term benefit valuation, influence the contextual nature economic performance. The results underscore the requirement for improved economic assessment tools and cost-benefit methodologies specifically designed for NBS implementation.

Summarizing, the funding structure emerging from the questionnaire, suggests that Nature-based Solutions are widely perceived as effective and cost-efficient, although financial mechanisms remain frequently restricted or limited to pilot-level projects. Reinforcing sustainable financing mechanisms and long-term investment strategies are critical for the development of NBS implementation.

5.4 Capacity and Resources

The effective implementation of Nature-base Solutions is strongly dependent of institutional capacity, human resources, and access to technical support systems. Respondents were asked whether responsible authorities have adequate capacity and resources to implement NBS. A total of 21.7% answered positively, while 53.8% indicated that capacity is only partially sufficient. Additionally, 24.5% stated that capacity is insufficient.

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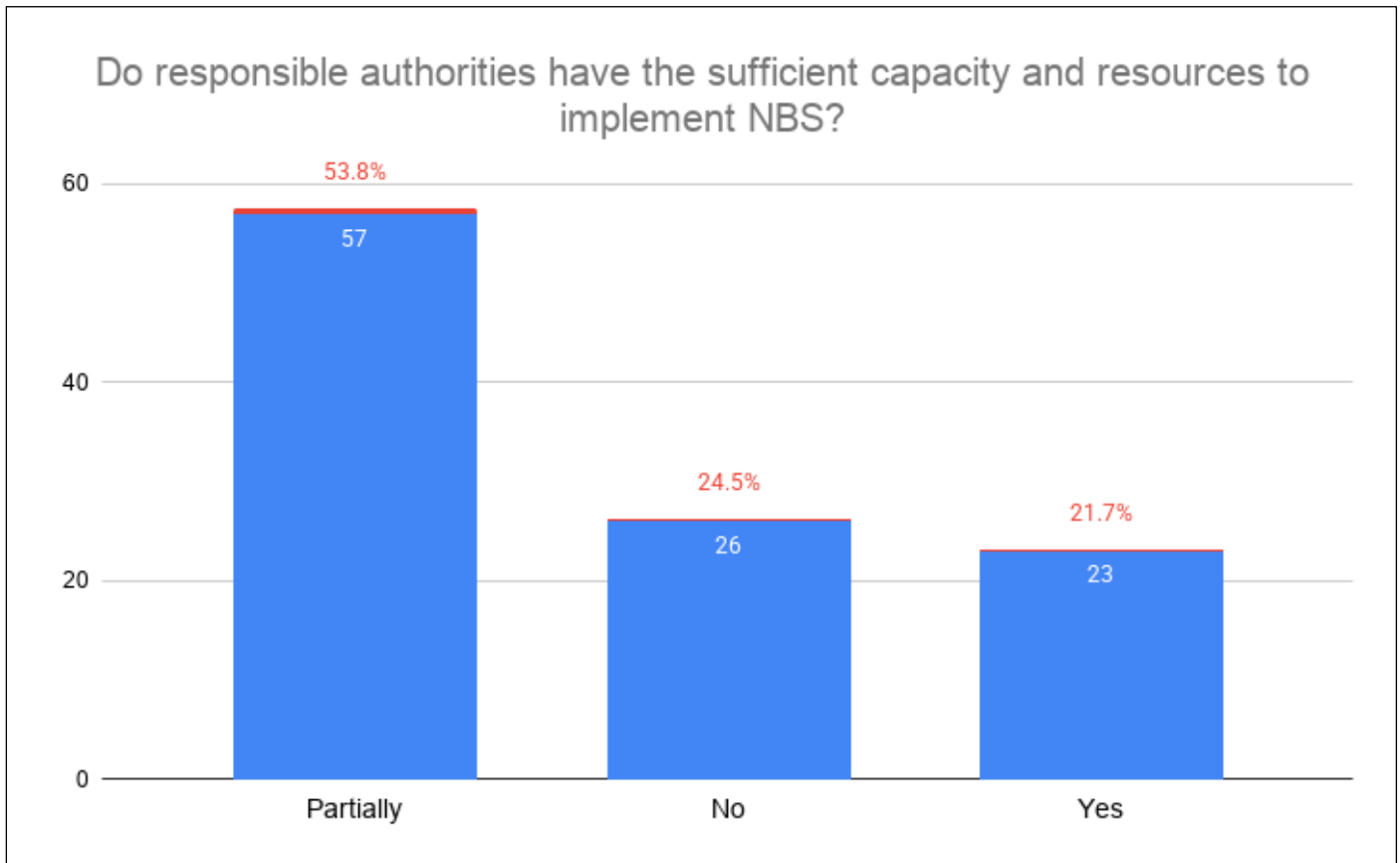


Figure 13 Perceived institutional capacity to implement NBS.

The predominance of “Partially” response, indicates that foundational structures exist, but remain incomplete. This suggests that although institutions are partially prepared, there are still significant limitations. Limitations to capacity may be related to technical expertise, administrative coordination, financial structures, or long-term strategic integration.

There is a similar pattern observed regarding staff availability. The majority 39.6% of respondents, stated that there is insufficient staff available to support Nature-based Solutions implementation, whereas 22.6% confirmed that sufficient staff exists. Additionally, a substantial share of respondents (37.7%) indicated uncertainty.

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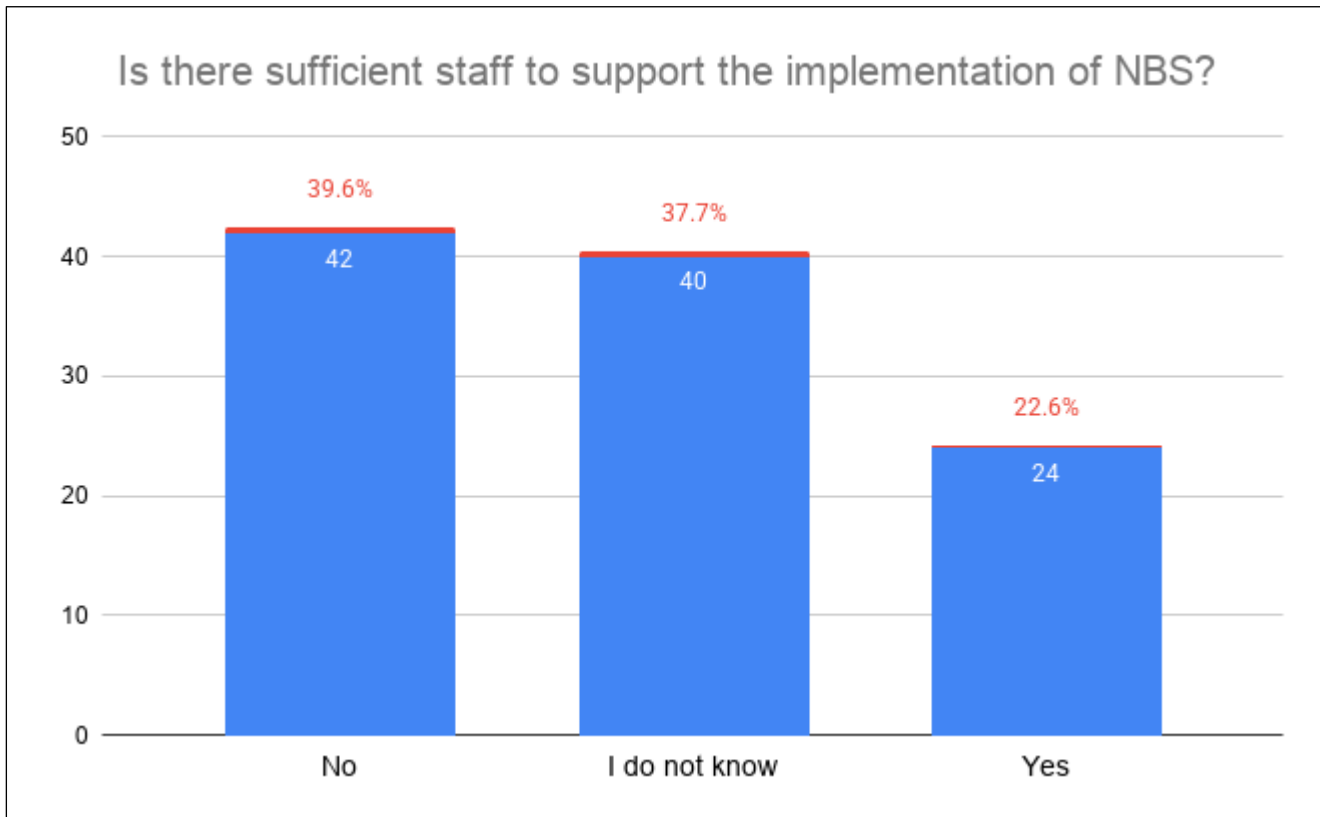


Figure 14 Availability of sufficient staff for NBS implementation.

The relatively high proportion of uncertainty responses, indicates that institutional responsibilities and staffing for NBS may not often be clearly defined or effectively communicated within institutions. Concluding, these findings highlight limitations in human resource capacity as a substantial constraint to the consistent and effective implementation of NBS.

In contrast to staff capacity, information exchange mechanisms are essential for coordination and for disseminating knowledge. The majority of respondents (50.5%) stated that they are not aware of one, whereas 19.6% responded that such system does not exist. Only 29.9% confirmed the existence of a structured system for informational exchange related to Nature-based Solutions.

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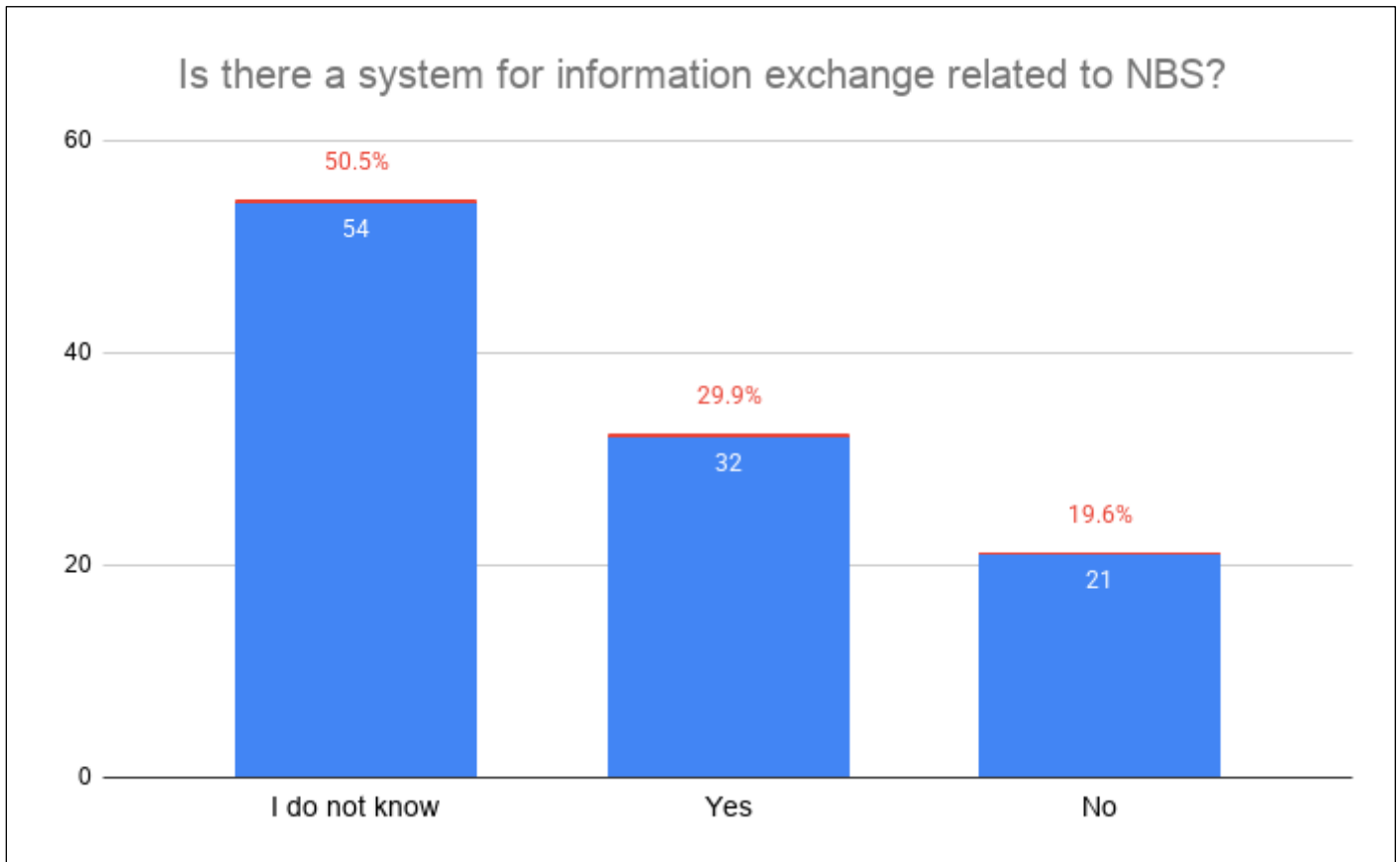


Figure 15 Existence of informational exchange systems related to NBS.

The majority of respondents being uncertain, indicates that there is a significant communication and coordination gap. Even though there is technical expertise, the absence of a well-structured informational exchange platform could limit cross-sectoral learning, scaling and replication.

Regarding the type of support material available for Nature-based Solutions implementation, the most frequent response referred to “Workshops” (65.3%), followed by “Manuals/Guidelines” at 51.5%, “Training materials” (43.6%), and “Methodological tools” at 40.6%.

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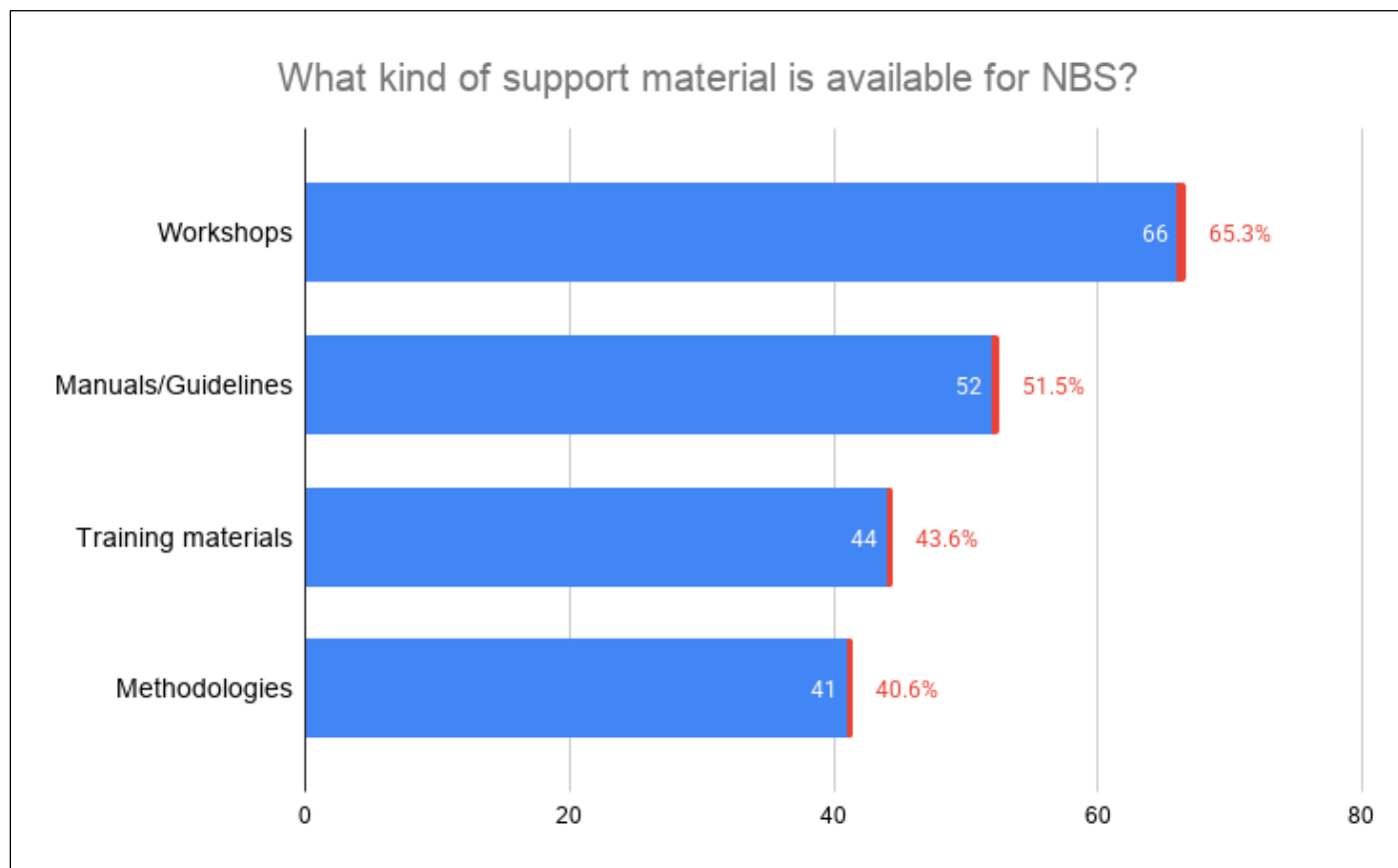


Figure 16 Type of support materials available for NBS.

The results suggest that technical guidance and knowledge resources are relatively accessible. However, as previously discussed in staff capacity and coordination responses, their presence is not translated into effective institutional development or systematic use.

Concluding, the institutional environment emerging from the questionnaire, represents partial operational capacity. While technical materials and knowledge resources exist, systemic challenges are still in staffing, coordination, and structured informational exchange. Reinforcing institutional coherence and operational integration is essential for developing NBS implementation across the partner countries.

5.5 Monitoring and Targets

The existence of measurable targets, clear timelines, and structured monitoring systems, are critical for the effectiveness and sustainability of Nature-based Solutions. The majority of respondents (43.9%), stated that there are general and non-measurable target. A smaller proportion of respondents (22.4%) that reported the existence of clear and measurable targets. Additionally, 23.4% of respondents were not aware of existing targets, while 10.3% of them stated that no targets are defined.

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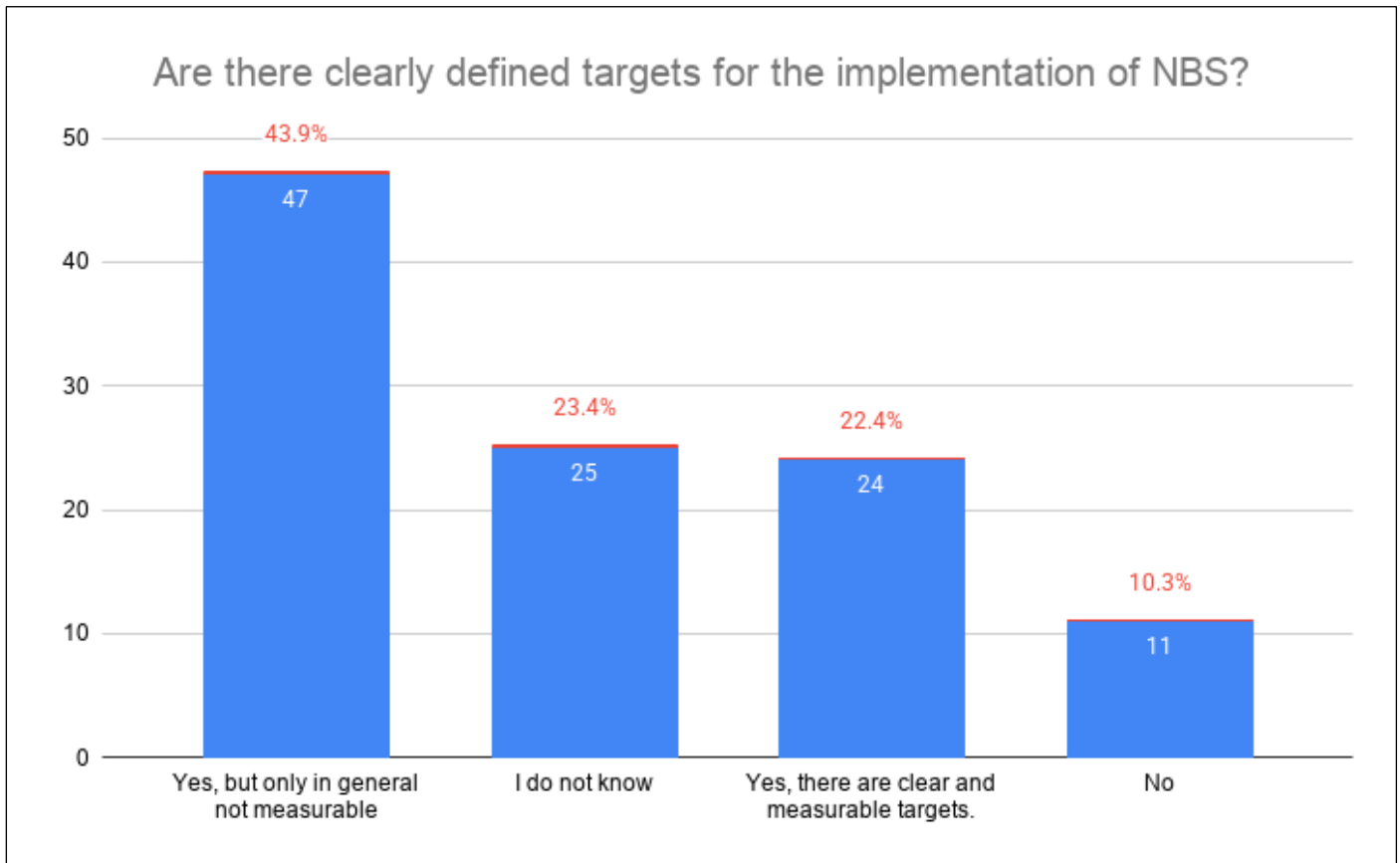


Figure 17 Existence and clarity of NBS implementation targets.

The predominance of non-measurable target, indicate that NBS may be recognized in strategic planning, although there are constrictions regarding their functionality in specific performance indicators. This gap reveals challenges in translating policy-level intentions into structured monitoring and evaluation mechanisms.

This observed pattern is further represented in responses referring to planning timelines. The majority of respondents at 37.4% reported partial planning frameworks, whereas 31.8% indicated that they were not aware of any timeline. A smaller proportion at 16.8% confirmed the existence of a clear timeline for achieving NBS targets, while 14% reported the absence of a timeline.

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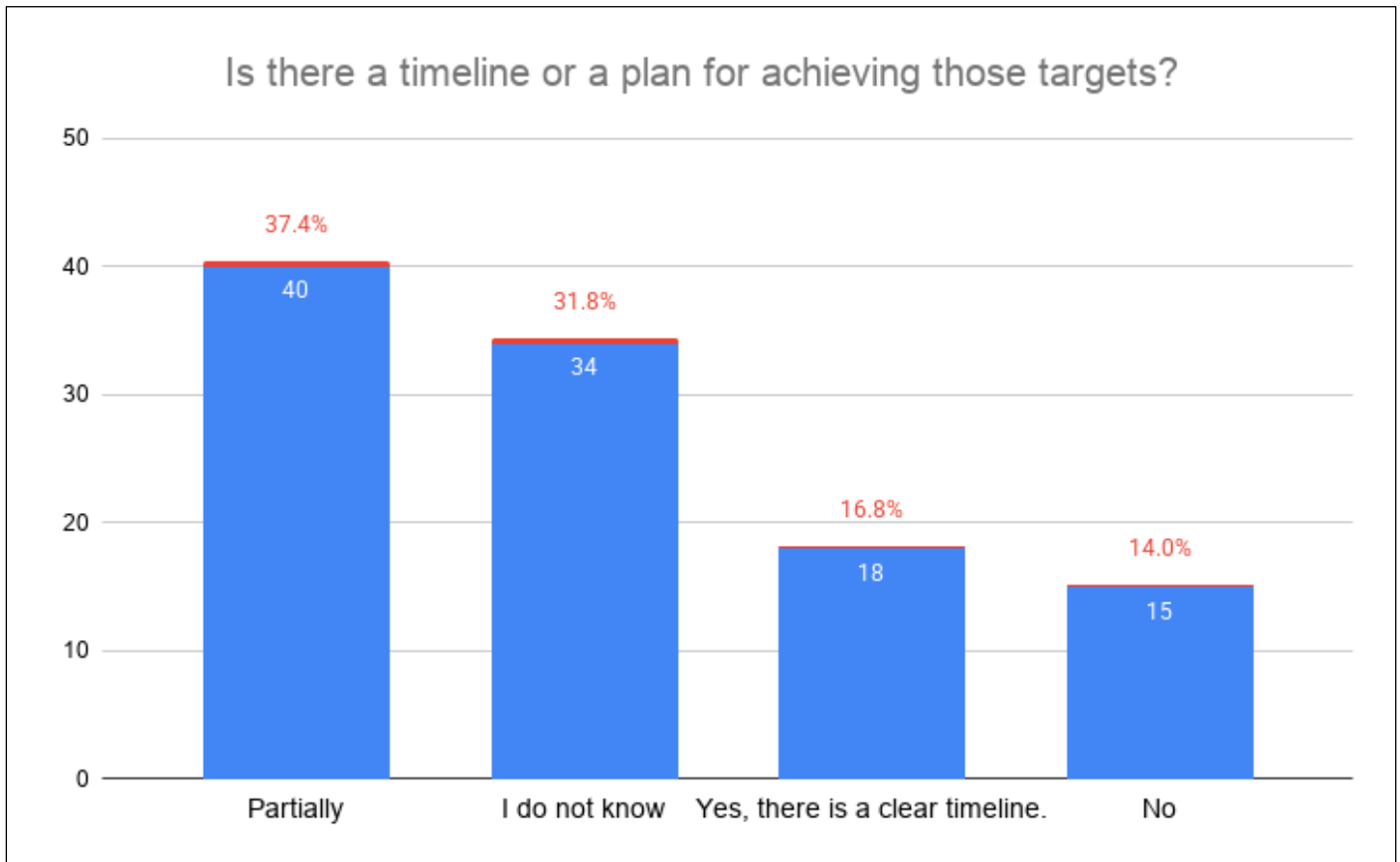


Figure 18 Existence of a timeline or plan for achieving NBS targets.

There is a limited presence of structured timelines which therefore reinforces the interpretation that Nature-based Solutions planning may be in an exploratory stage in the partner countries. These findings reveal a gap between strategic objectives and time-bound implementation frameworks.

Monitoring systems appear to be moderately developed, despite these gaps in awareness and institutional integration. A total of 37% confirmed the existence of a monitoring system for NBS, whereas an equal proportion reported uncertainty. Additionally, 25.9% of respondents stated that no monitoring system exists.

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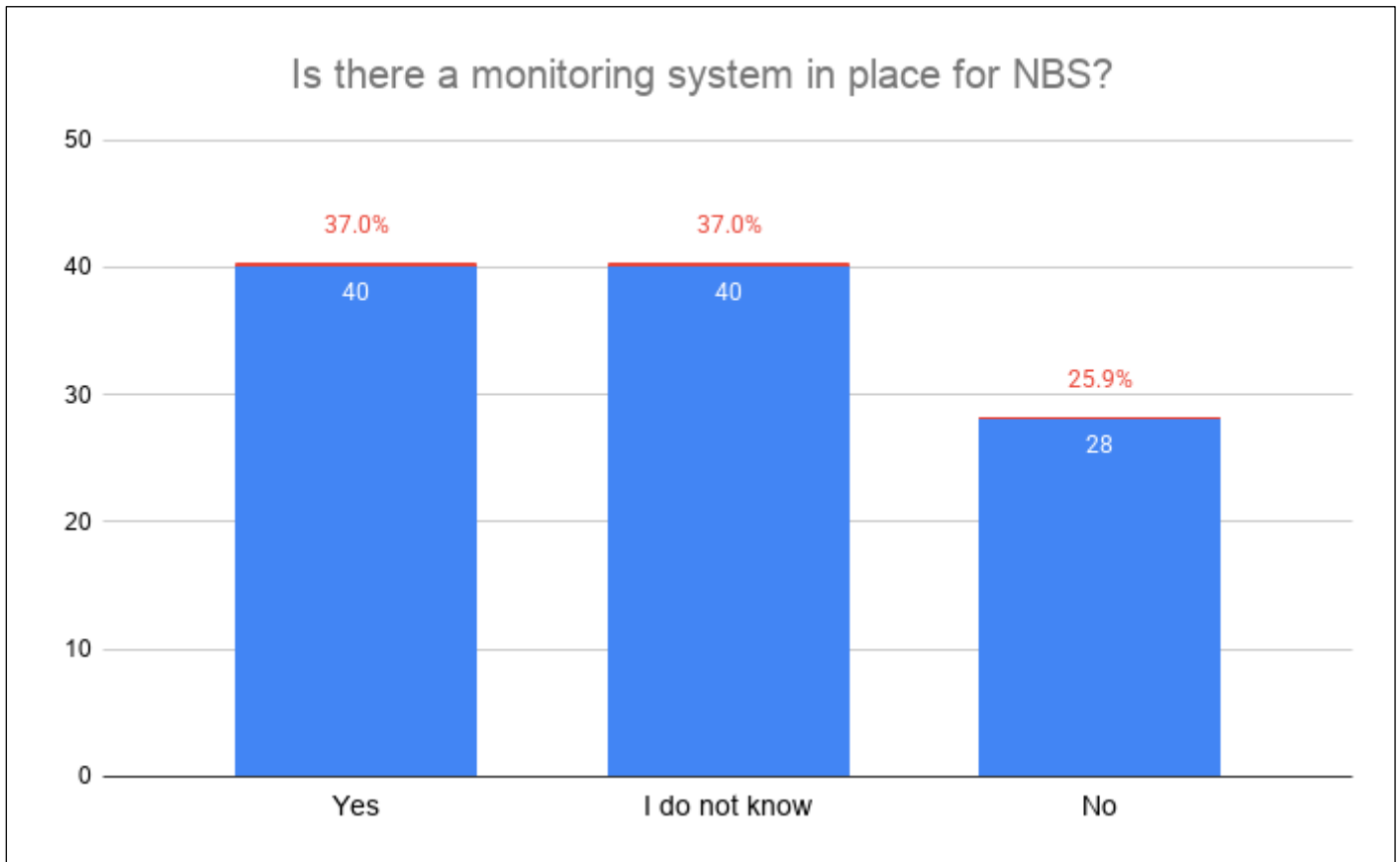


Figure 19 Existence of monitoring system for NBS.

The findings suggest that monitoring systems may be present in some sectors, although their application is not consistently institutionalized or clearly communicated across stakeholders.

Regarding the use of monitoring data in Nature-based Solutions implementation, the majority the respondents (61.6%) selected “Reporting” use of monitoring data, followed by 53.5% for “Indicators” use. This is followed by “Progress tracking” (47.5%), while a smaller percentage (36.4%) indicated that monitoring data is used for “Revision of objectives and measures”.

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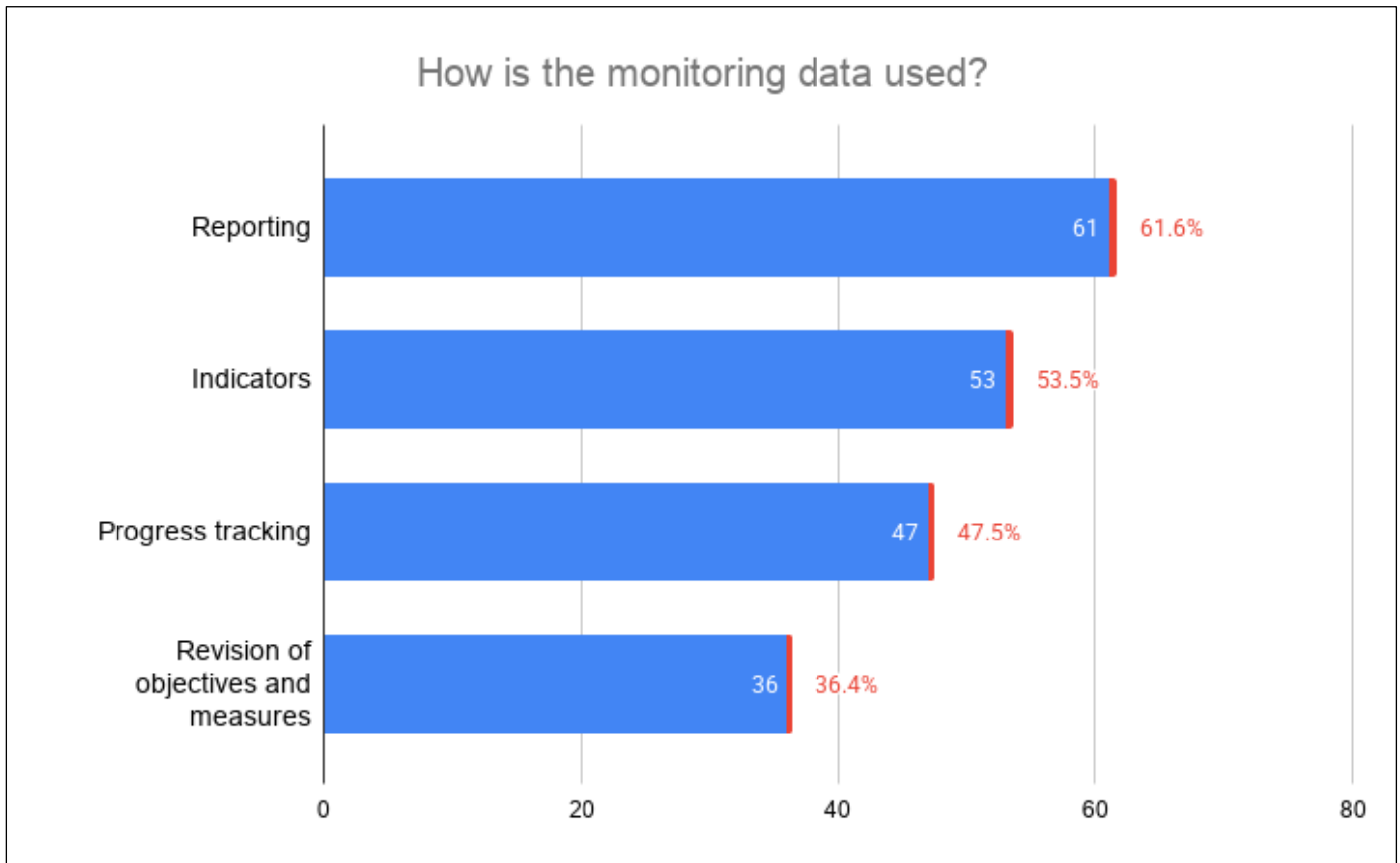


Figure 20 Use of monitoring data in NBS implementation.

There is a contrast between the relatively structured use of monitoring data and the previously discussed absence of measurable targets and clear timelines. This suggests that while technical monitoring structures exist, their integration into strategic planning frameworks and adaptive management processes remains limited.

To summarize, the results reveal a governance environment in which Nature-based Solutions monitoring tools are developing, although strategic alignment through measurable targets and defined implementation timelines requires further integration. Reinforcing performance-based planning and monitoring data links to policy adjustments may significantly improve long-term impact of NBS initiatives.

5.6 Education and Skills Gaps

5.6.1 Priority Areas for Capacity Strengthening

The stakeholder questionnaire was strongly focused on the need for enhanced education and capacity building initiatives regarding Nature-based Solution fields. Respondents when asked in which areas NBS capacity should be strengthened, the majority identified “Education and training” by 65.7% as well as, “Water Management” as priority fields. Followed by “Community engagement” at 62.9%, “Monitoring and evaluation” by 58.1%, “Governance and

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policy” by 53.3%, and “Coastal protection” by 52.4%. Comparatively lower emphasis was given to “Urban planning” by 32.4%.

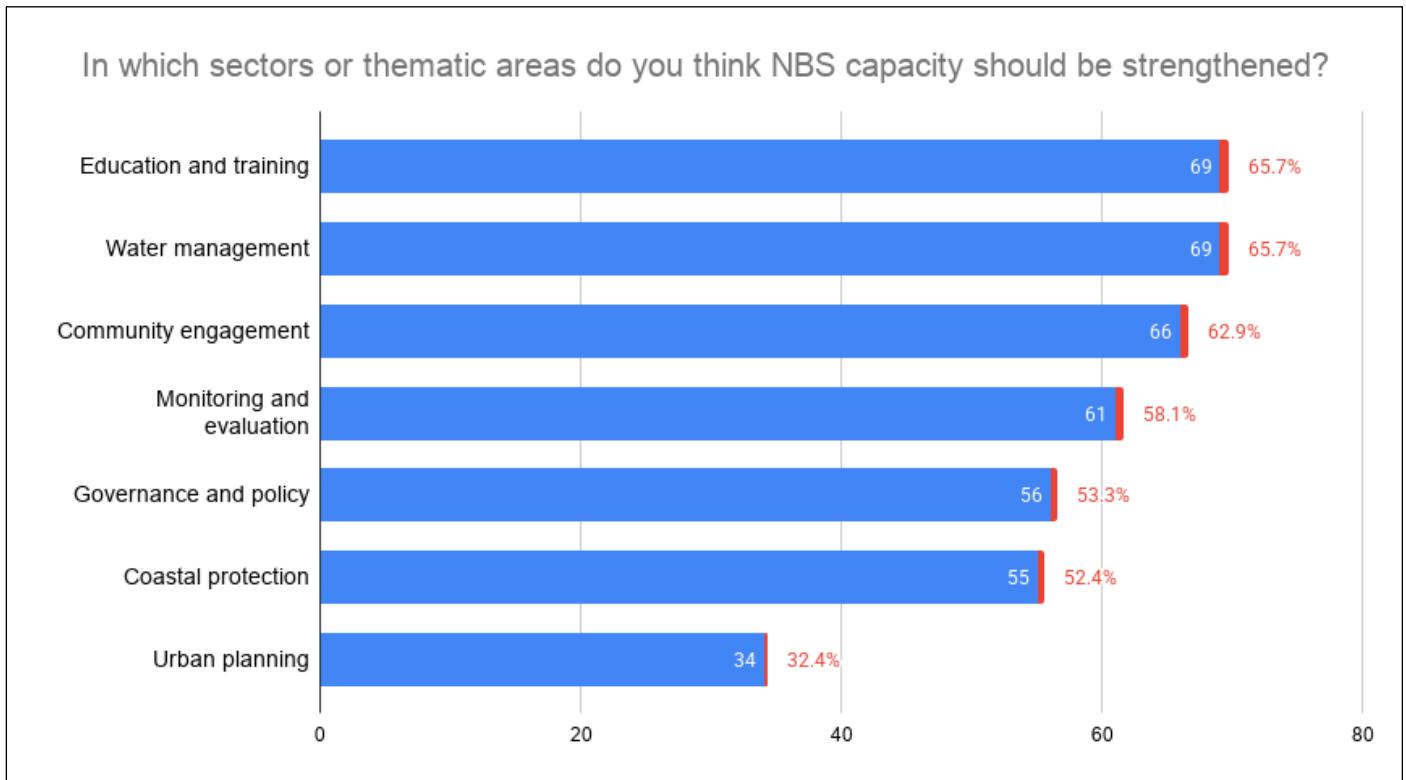


Figure 21 Areas in which NBS capacity are to be strengthened.

The distribution of responses reveals that stakeholders recognize both the technical and institutional aspects required for the effective NBS implementation. The strong emphasis on education and training confirms the need for capacity building initiatives. Additionally, it supports the relevance of the INNAQUE project’s curriculum development objectives. The prioritization of water management, as well as coastal protection represents the environmental and geographical priorities of the partner countries. The high ranking of community engagement reveals a growing awareness of the need for participatory approaches and inclusive governance in NBS implementation. These findings further align with gaps identified in coordination and stakeholder engagement, suggesting that, strengthening participatory mechanisms is essential for improving implementation results.

5.6.2 Prioritization of Skills and Capacity Needs

To prioritize the identified skills and capacity needs, the analysis combined the frequency of responses from the closed-ended capacity-building question with the thematic recurrence of the open-ended responses. Areas selected by a high percentage of respondents were considered priority thematic fields, whereas recurring themes in the open-ended answers were used to identify the corresponding skills gaps. This approach allowed the questionnaire findings to be

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translated into a practical prioritization of curriculum needs, linking stakeholder demand with the future development of INNAQUE educational modules.

Table 1 Priority areas based on stakeholders perspectives

Priority Area	Evidence from questionnaire responses	Curriculum Implication
Education and training	Highest priority area in Q26 and strongly represented in open-ended responses	Develop applied NBS training modules
Water management	Highest priority area in Q26 and repeatedly mentioned in Q25	Include water-related NBS case studies and applications
Community engagement	Strong priority in Q26 and frequently mentioned in Q25	Integrate cooperative design, stakeholder involvement and local knowledge
Monitoring and evaluation	High priority in Q26 recurring skills gap in Q25	Include indicators, data systems, and impact assessment
Governance and policy	Frequently selected in Q26 and repeatedly mentioned in Q25	Include policy integration, institutional planning, and regulatory frameworks
Coastal protection	Frequently selected in Q26 and contextually relevant to partner countries	Include coastal ecosystem restoration and risk reduction approaches

5.6.3 Thematic Analysis of Open-ended Responses

The open-ended responses regarding educational demands provide useful insights to stakeholder expectations. A thematic review of the responses revealed repeated priority fields,

Practical implementation skills: A recurring thematic was the need to move from theory to practice. Respondents focused on practical training in Nature-based Solutions design, implementation, maintenance and field application. They requested practical workshops, laboratory methodologies, project management skills, and functional guidance regarding wetlands systems, coastal protection measures, water treatment applications, agricultural applications, and nature-based restoration.

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Monitoring, impact assessment and data analysis: Stakeholders highlighted the significance of reinforcing competencies in environmental monitoring, indicator development, environmental risk assessment, pollutant analysis, and the evaluation of environmental, social, and economic impacts. As discussed previously, the need for measurable performance frameworks is aligned with finding regarding the limited clarity of the implementation of targets.

Water and coastal ecosystem management: Several respondents referred specifically to water management, coastal protection, aquaculture sustainability, wetland management, mangrove restoration, dune stabilization, coral reef restoration, and wastewater treatment soil and water conservation, biodiversity conservation, and invasive alien plant management. This thematic field strengthens the regional relevance of aquatic, coastal, and ecosystem-based NBS applications.

Governance, policy integration and financing: There was specific interest in understanding how Nature-based solutions can be integrated into policy frameworks, strategic planning processes, and urban or territorial planning. The need for economic literacy and technical competence was indicated by references to climate finance, resource mobilization, funding access, business models, and sponsors.

Community engagement: Multiple respondents referred to raising awareness, stakeholder participation, co-creation methodology, community-based solutions, local social networks, participatory monitoring, and indigenous or traditional knowledge. These findings are aligned with previous observation that participatory frameworks may not be integrated consistently to institutions, while also confirming the significance of local acceptance and community engagement for long-term NBS sustainability.

Interdisciplinary and innovation-related skills: A small proportion of the respondents highlighted interdisciplinary collaboration, technological applications including AI, biotechnology, smart technologies, environmental chemistry, data analysis, and blue biotechnology. The responses point to the need for educational content that connects ecological science, technology, policy, socio-economic aspects and labour market needs.

In conclusion, stakeholders demand for practice-related, interdisciplinary, and educational programmes that provide applied competencies for effective design, implementation, monitoring, evaluation, and long-term sustainability of Nature-based Solutions. Future INNAQUE modules should integrate technical skills, monitoring methods, governance frameworks, and participatory approaches, and innovation-related content, with great emphasis on water, coastal ecosystems, and ecosystem-based applications.

5.6.4 Link with Labour Market Needs

The identified skills gaps are directly connected to emerging labour market needs in the field of Nature-based Solutions. Stakeholders emphasized the need for professionals who are able not only to understand NBS concepts, but also to design, implement, monitor, and evaluate NBS in real environment and socio-economic aspects. The results indicate demand for graduates with applied and interdisciplinary competencies, combining environmental science, water and coastal management, governance, financing, stakeholder engagement and data-based assessment skills.

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These competencies are relevant across several professional fields, including public authorities, environmental agencies, NGOs, research institutions, consultancy, water management, coastal protection, and sustainability-related sectors. The findings also suggest that labour market needs are not limited to technical expertise. Cross-cutting professional skills, such as project management, policy integration, cooperative design with local communities, resource mobilization, and the ability to translate scientific knowledge into practical solutions are equally important. Therefore, future INNAQUE educational modules should strengthen both sector-specific knowledge and transferable employability skills.

6 Key Findings and Implications for INNAQUE

The stakeholder questionnaire provided a structure overview of the current state of Nature-based Solutions governance and implementation in Egypt and South Africa. This overview highlights both strengths and systemic gaps.

6.1 Summary of Key Findings

The open-ended responses regarding educational needs Several key findings reveal,

Policy recognition and functional clarity: While NBS are recognized among legal and strategic frameworks, a substantial proportion of respondents indicated uncertainty regarding policy integration, measurable targets, and implementation timelines. The findings reveal that NBS targets are often general rather than measurable, whereas implementation timelines are partially defined. This indicates that NBS are identified at policy level, they are yet to be fully integrated into institutional planning and performance-based planning frameworks.

Fragmented governance and coordination structures: Responsibility for NBS implementation is identified in general. Although, supervisory structures and participation frameworks are not consistently defined or communicated. There is a common finding among mixed public and private governance planning, representing the cross-sectoral nature of NBS. At the same time, the relatively high uncertainty regarding supervisory and participatory structures, indicates that coordination mechanisms remain fragmented and require further clarification.

Partial and pilot-oriented funding: Financial support for NBS is partially available in most cases, emphasizing on pilot projects, instead of long-term systemic implementation. Although stakeholders are confident in the effectiveness of NBS, sustainable financing structures are still underdeveloped.

Partial institutional capacity and resource limitations: Workshops, manuals/guidelines, methodological tools, and teaching materials seem to be available. However, limitations regarding staffing, information exchange systems, and coordination processes are reported. An important proportion of respondents indicated uncertainty regarding internal structured and coordination processes. The availability of support materials is not linked to full institutional capability for NBS implementation.

Monitoring mechanisms with limited strategic integration: Monitoring mechanisms are reported in several fields and data is used for reporting and indicator development. However, the absence of measurable targets and clear timelines limits their strategic impact. This finding highlights the gap between technical monitoring and policy-related performance management.

Strong demand for applied and interdisciplinary education: Stakeholders have demanded practical NBS implementation, monitoring and impact assessment, water and coastal ecosystem management expertise,

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governance integration, financing literacy, community engagement methodologies, and innovation-oriented approaches.

The open-ended responses reveal a strong preference for practical, interdisciplinary, and locally relevant training that connects scientific knowledge with real-world implementation needs.

6.2 Implications for the INNAQUE Project

The INNAQUE project is directly informed by the questionnaire results regarding the design of educational modules under Work Package 3. Future curriculum development should consider identified gaps by prioritizing practical training methodologies, applied NBS design and implementation, monitoring and impact assessment skills, governance and policy integration, as well as financing capacity along with technical and ecological content. Additionally, regionally relevant challenges, especially in water management, coastal protection, and community-based implementation. Additionally, the curriculum should be promote interdisciplinary collaboration, stakeholder engagement, and the integration of local knowledge with scientific and technological innovation.

Concluding, the stakeholder insights confirm the strategic relevance of the INNAQUE project in overcoming constrictions between policy recognition and functional implementations of Nature-base Solutions. The project can reinforce long-term capacity for NBS integration in the partner countries by emphasizing on measurable skills, applied knowledge, and institutional integration.

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7 Annex

Stakeholder Questionnaire on Nature-based Solutions (NBS)

This questionnaire is conducted in the framework of the INNAQUE project (Grant Agreement No. 101237975) supporting Deliverable D3.1 under the ERASMUS-EDU-2025-CBHE programme.

Dear Participants

Thank you for taking the time to participate in this stakeholder questionnaire conducted within the framework of the INNAQUE project. The aim of the project is to improve governance, implementation capacity, and skill development in order to support the efficient and sustainable application of Nature-based Solutions (NBS).

The purpose of this questionnaire is to gather stakeholder insights and feedback on the legal, governance, funding, implementation, monitoring and capacity aspects of NBS.

Consent: This questionnaire is anonymous, and we kindly ask you to participate in order to support this important initiative. All responses are submitted anonymously, contain no personally identifiable information, will remain confidential, and will be used solely for the purposes of the present research.

The completion of the questionnaire will take approximately 10 minutes of your time, and participatory may be terminated at any time. Any processing of personal data is carried out in compliance with the requirements of the General Data Protection Regulation (EU) 2016/679 of the European Parliament and the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data.

Definition: For the purposes of this questionnaire, Nature-based Solutions refer to actions to protect, sustainably manage, and restore natural or modified ecosystems, which address environmental, social and economic challenges effectively and adaptively, while providing benefits for biodiversity and human well-being.

Section A: Participant Information

1. Type of organization

(Select one option)

- ☐ Public authority
- ☐ Local/Regional authority
- ☐ University/Research Organization
- ☐ NGO/Civil society organization
- ☐ Private sector
- ☐ Other:

2. Role in relation to Nature-Based Solutions (NBS)

(Multiple responses allowed)

- ☐ Policy/Strategy development

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- ☐ Implementation
- ☐ Monitoring/Evaluation
- ☐ Education/Training
- ☐ Other:

3. Country/Region

(Open-ended question)

.....

Section B: Legal and Policy Framework for NBS

4. Is there a legal or strategic framework supporting NBS in your country or region?

(Select one option)

- ☐ Yes, international level
- ☐ Yes, national level
- ☐ Yes, regional/local level
- ☐ No
- ☐ I do not know

Section C: Geographical Range and Implementation Areas

5. At which geographical scale are NBS mostly implemented in your context?

(Select one option)

- ☐ Local
- ☐ Regional
- ☐ National
- ☐ Cross-border

6. In which areas are NBS most commonly applied?

(Multiple responses allowed)

- ☐ Coastal/marine areas
- ☐ Rivers and watersheds
- ☐ Urban environments
- ☐ Agricultural environments
- ☐ Other:

Section D: Governance and Stakeholder Participation

7. Is there a clearly defined body responsible for the implementation of NBS?

(Select one option)

- ☐ Yes
- ☐ No
- ☐ Partially

8. Who is responsible for the control or supervision of the NBS implementation?

(Select one option)

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- Public authority
- Mixed governance structure (public-private)
- Not clearly defined
- Other:

9. Is there a formal framework for stakeholder participation in NBS planning or implementation?

(Select one option)

- Yes
- No
- I do not know

10. Which stakeholders are typically involved in NBS processes?

(Multiple responses allowed)

- ☐ Local authorities
- ☐ Local communities – citizens
- ☐ Scientific/Technical experts
- ☐ NGOs
- ☐ Private sector

11. Please briefly describe your experience or involvement with NBS, if any.

(Open-ended question)

.....

Section E: Funding and Cost-Effectiveness

12. Is funding available for the implementation of NBS?

(Select one option)

- Yes
- No
- Partially

13. Funding for NBS is mainly available for:

(Multiple responses allowed)

- ☐ Individual NBS measures
- ☐ Packages of measures
- ☐ Pilot projects
- ☐ Long-term implementation

14. How effective are NBS at tackling environmental issues?

(Select one option)

- Very effective
- Moderately effective
- Slightly effective
- Not effective
- I do not know

15. Do you consider NBS to be more cost-effective than other conventional solutions?

(Select one option)

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- ☐ Yes
- ☐ No
- ☐ It depends

Section F: Information, Tools, and Institutional Capacity

16. Is there a system for information exchange related to NBS?

(Select one option)

- ☐ Yes
- ☐ No
- ☐ I do not know

17. What kind of support material is available for NBS?

(Multiple responses allowed)

- ☐ Manuals/Guidelines
- ☐ Workshops
- ☐ Methodologies
- ☐ Training materials
- ☐ Other:

18. Do responsible authorities have the sufficient capacity and resources to implement NBS?

(Select one option)

- ☐ Yes
- ☐ No
- ☐ Partially

19. Is there sufficient staff to support the implementation of NBS?

(Select one option)

- ☐ Yes
- ☐ No
- ☐ I do not know

Section G: Existing Measures, Targets, and Monitoring

20. Are NBS currently implemented at national or regional level in your context?

(Select one option)

- ☐ Yes
- ☐ No

21. Are there clearly defined targets for the implementation of NBS?

(Select one option)

- ☐ Yes, there are clear and measurable targets.
- ☐ Yes, but only in general not measurable
- ☐ No
- ☐ I do not know

22. Is there a timeline or a plan for achieving those targets?

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(Select one option)

- ☐ Yes, there is a clear timeline.
- ☐ Partially
- ☐ No
- ☐ I do not know

23. Is there a monitoring system in place for NBS?

(Select one option)

- ☐ Yes
- ☐ No
- ☐ I do not know

24. How is the monitoring data used?

(Multiple responses allowed)

- ☐ Progress tracking
- ☐ Indicators
- ☐ Reporting
- ☐ Revision of objectives and measures

Section H: Education, Training, and Skills Development

25. The INNAQUE project will develop educational courses related to NBS. What knowledge or skills gaps should these courses address, in your opinion?

(open-ended question)

.....

26. In which sectors or thematic areas do you think NBS capacity should be strengthened?

(Multiple responses allowed)

- ☐ Water management
- ☐ Urban planning
- ☐ Coastal protection
- ☐ Governance and policy
- ☐ Monitoring and evaluation
- ☐ Education and training
- ☐ Community engagement
- ☐ Other:

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