16 – 18 January 2023

Climate Adaptation and Resilience (CARE) for South Asia project

Regional Training and Dialogue on Nature-based Solution (NbS) for the Resilient Water Sector in South Asia

Caption: Tanguar Hoar @IUCN

TRAINING REPORT

Climate Adaptation and Resilience (CARE) for South Asia Project

Regional Training and Dialogue on Nature-based Solution (NbS) for the Resilient Water Sector in South Asia

adpc

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1. Background

The Asian Disaster Preparedness Center (ADPC) and the Regional Integrated Multi-Hazard Early Warning System (RIMES) are jointly implementing a five-year (2020-2025) regional project called 'Climate Adaptation and Resilience (CARE) for South Asia' with support from the World Bank. The overall objective of the project is to contribute to an enabling environment for climate resilience policies and investments in agriculture, transport, water, policy & planning, and finance sectors in South Asia. Initially, the national-level activities are being implemented in Bangladesh, Nepal and Pakistan. The project has two parallel but distinct components: RIMES is implementing the first component which focuses on promoting evidence-based climate smart decision-making; ADPC is implementing the second component which focuses on enhancing policies, standards, and capacities for climate-resilient development in South Asia. More detailed information on the project can be found at: https://www.adpc.net/igo/contents/adpcpage.asp?pid=1655&Dep=CARE

As part of selected regional interventions under Component 2 in the project, ADPC in collaboration with The International Union for Conservation of Nature's Asia Regional Office (IUCN) is currently developing a Regional Guideline on "Promoting Nature-based Solutions to Increase Climate Resilience in South Asia's Water Sector". As part of the collaborative venture The International Union for Conservation of Nature's Asia Regional Office (IUCN) and the Asian Disaster Preparedness Center (ADPC), Thailand jointly facilitated a three-day virtual regional training and dialogue on "Nature-based solutions (NbS) for the resilient water sector in South Asia" from 16-18 January 2023.

1.1 Rationale

The rationale behind conducting this training was to strengthen the understanding of the role of NbS in building climate resilience in the water sector for the participants from South Asia. The training will be followed up by further discussion with the participants and other stakeholders from relevant organization of South Asia to carry out a policy analysis and to have an improved understanding of opportunities and barriers to mainstreaming NbS in the water sector in South Asia. The analysis will be followed by development of a regional guideline for upscaling NbS in the water sector to strengthen long-term resilience to climate change

With an aim to achieve the Project PDO *"To contribute to an enabling environment for climate-resilient policies and investments in select sectors and countries in South Asia"* the training program assisted the officials from sectoral line ministries and provincial/local governments in developing their understanding and integration of resilience measures through introduction on NbS into sectoral policy-making, investment planning, design, and implementation. It is understood that the trained officials will facilitate the dissemination of information on NbS as a climate-resilience solutions and strategies to relevant stakeholders. The post training analysis showed that Trainees in water sectors were satisfied with training provided under the project based on the criteria of relevance, coherence, effectiveness, impact, and sustainability.

2. Training Objectives

The general objective of the training was to strengthen the understanding of the role of NbS in building climate resilience in the water sector for the participants from South Asia. The specific objectives of the training were:

- Introduce participants to Ecosystem Services, Nature-based Solutions, their background, definition, and examples at scale, including IUCN Global Standard for NbS;
- Understand climate projections for South Asia and NbS approaches for building resilience in specific water-dependent sectors;
- Discuss and identify opportunities and priority areas for mainstreaming NbS in policies;
- Strengthen participant's understanding of grey-green (or hybrid) infrastructure solutions;
- Discuss case studies and funding opportunities for financing large-scale NbS initiatives.

The content of the training draws from the existing training courses on NbS developed by the IUCN Academy, and modules developed by IUCN Asia to support training for governments and other stakeholders.

2.1 Training structure

The training was facilitated over three days, 3 hours each day. See Annex I for detailed agenda of the training.

On day 1, the training introduced participants to Ecosystem Services and discussed what are NbS, as well as, the tools for monitoring and verification of NbS initiatives and case studies from the region linked to the implementation of NbS at scale.

On day 2, the training discussed climate projections and examples of NbS approaches for promoting resilience in water-dependent sectors, and the status of NbS inclusion in policies and planning.

On day 3, the participants explored strategies linked to grey-green infrastructure solutions and potential funding sources for financing and upscaling of NbS initiatives

3. Participant Profile

The training was attended by more than 30 nominated mid-level policy makers from Bangladesh, India, Nepal, and Pakistan, from the ministries working on the management of water resources or having an influence on the water sector. See Annex IV for the list of participants.

From Bangladesh

- Ministry of Environment, Forest and Climate Change;
- Ministry of Water Resources, Water Development Board;
- Department of Agricultural Extension;
- Water Resources Planning Organization (WAPRO).
- From India
- Ministry of Agriculture & Farmers Welfare, CEPT Research, Development Foundation,
- Ministry of Environment Forest & Climate Change, Government of India,
- National Institute of Disaster Management.

From Nepal

- Water Resources Research and Development Centre,
- Department of Water Resources and Irrigation,
- Ministry of Energy, Water Resources and Irrigation,
- Ministry of Agriculture and Livestock Development,
- Ministry of Forest and Environment,
- Water and Energy Commission Secretariat.

From Pakistan

- Ministry of Planning, Development and Special Initiatives,
- Ministry of Climate Change,
- Ministry of Water Resources, Islamabad,
- Federal Water Management Cell,
- Ministry of National Food Security & Research,
- Pakistan Council of Research in Water Resources (PCRWR),
- Sindh Irrigation Department, Environment Climate Change & Coastal Development Department, Karachi,
- Irrigation Department, Balochistan and Punjab,
- Federal Flood Commission, Ministry of Water Resources.

A total of, 27 participants were granted the certificate of completion which included 9 female and 18 male participants (See Figure 1 for detailed country-specific information). The sectoral distribution of all certificated participants can be found in Figure 2.

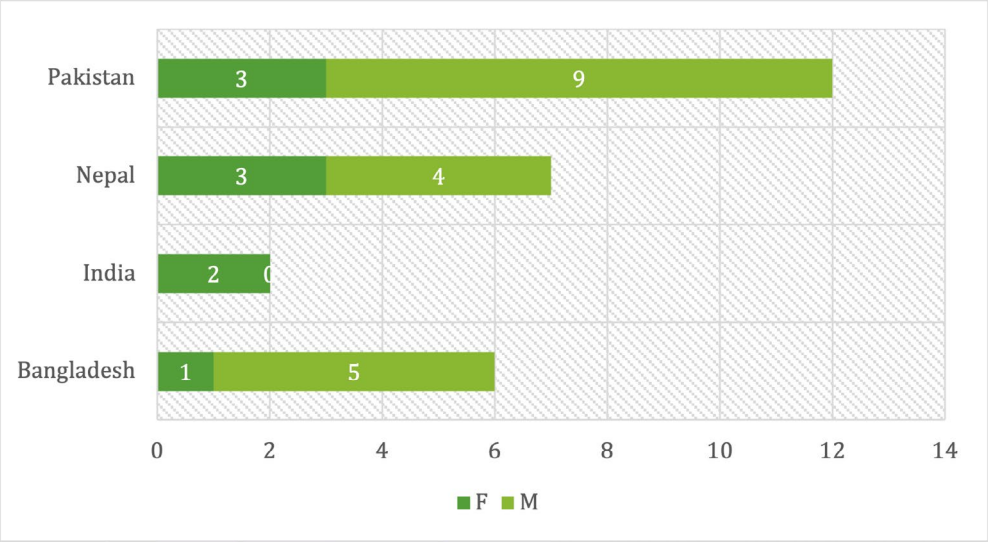


Figure 3 1 Country-specific statistics of Female/Male share in the certificated participants

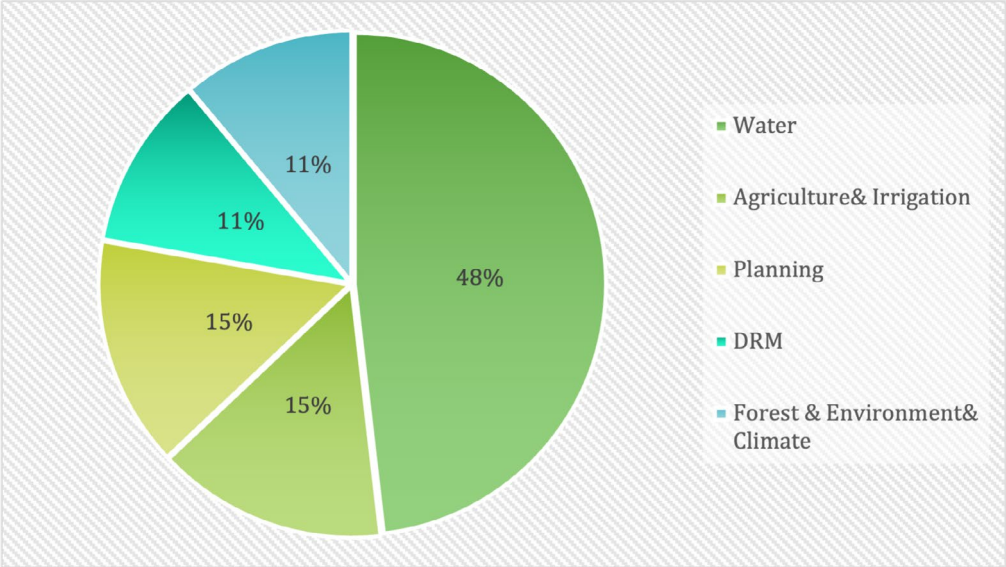


Figure 3 2 The sectoral distribution of certificated participants

4. Session Plan, Key discussion areas, Reflections

The training workshop was held for three hours a day for three consecutive days and was divided into six sessions targeting specific aspects of NbS.

Below is a summary of the key points discussed by resource persons in each session, summary of the main discussion points from plenary discussions, discussion points from the training, and inputs received through group work. The training agenda, participants list and participants' feedback, and main questions raised by participants, are included in the Annexes.

4.1 Session Plan and Key Discussion

Session 1 – Introduction to the Ecosystem Services (ES)

Ecosystem services are services that nature provides to humans. They are divided into four main categories: provisioning services, regulating services, cultural services, and supporting services.

Ecosystem services are critical for tackling seven societal challenges, i.e., climate change mitigation and adaptation, disaster risk reduction, economic and social development, human health, food security, water security, environmental degradation, and biodiversity loss.

Session 2 – Nature-based Solutions- background, definition, examples at scale

Nature-based Solutions are: "actions to protect, sustainably manage and restore natural or modified ecosystems, that address societal effectively and adaptively, simultaneously providing human well-being and biodiversity benefits."

Nature-based Solutions are considered an umbrella framework for ecosystem-based approaches that are used to address major societal challenges. Additional concepts falling under the NbS umbrella include Natural Solutions; Ecosystem-based Adaptation (EbA); Ecosystem-based Disaster Risk Reduction (Eco-DRR); Green Infrastructure (GI) and many others.

NbS is not always a stand-alone strategy but can be part of an integrated approach, building on complementarities with grey infrastructure through hybrid solutions.

There is a need to upscale NbS and move from site-based projects to landscape or national strategies and mainstreaming within policies.

Session 3 – Introduction to the IUCN Global Standards for Nature-based Solutions

The IUCN Global Standard for Nature-based Solutions provides a user-friendly framework for the verification, design, and scaling up of NbS.

The NbS Global Standard consists of eight criteria (see Table 1) and 28 indicators linked to the ecological, social, and economic dimensions of NbS.

S#	Criteria
1.	NbS effectively address societal challenges
2.	The design of NbS is informed by scale
3.	NbS result in a net gain to biodiversity and ecosystem integrity
4.	NbS are economically viable
5.	NbS is based on inclusive, transparent, and empowering governance processes
6.	NbS equitably balances trade-offs between the achievement of its primary goal(s) and the continued provision of multiple benefits

S#	Criteria
7.	NbS have managed adaptively, based on evidence
8.	NbS are sustainable and mainstreamed within an appropriate jurisdictional context

Session 4 – NbS for resilience – examples and planning cycle

NbS for resilience is the restoration, conservation, and management of ecosystems to enhance ecosystem services to tackle climate-induced threats and provide adaptation benefits while providing biodiversity benefits.

The NbS for the resilience planning process has eight key steps (see Figure 3), which aim to ensure that measures are based on the best available data and include local stakeholders throughout the entire process.

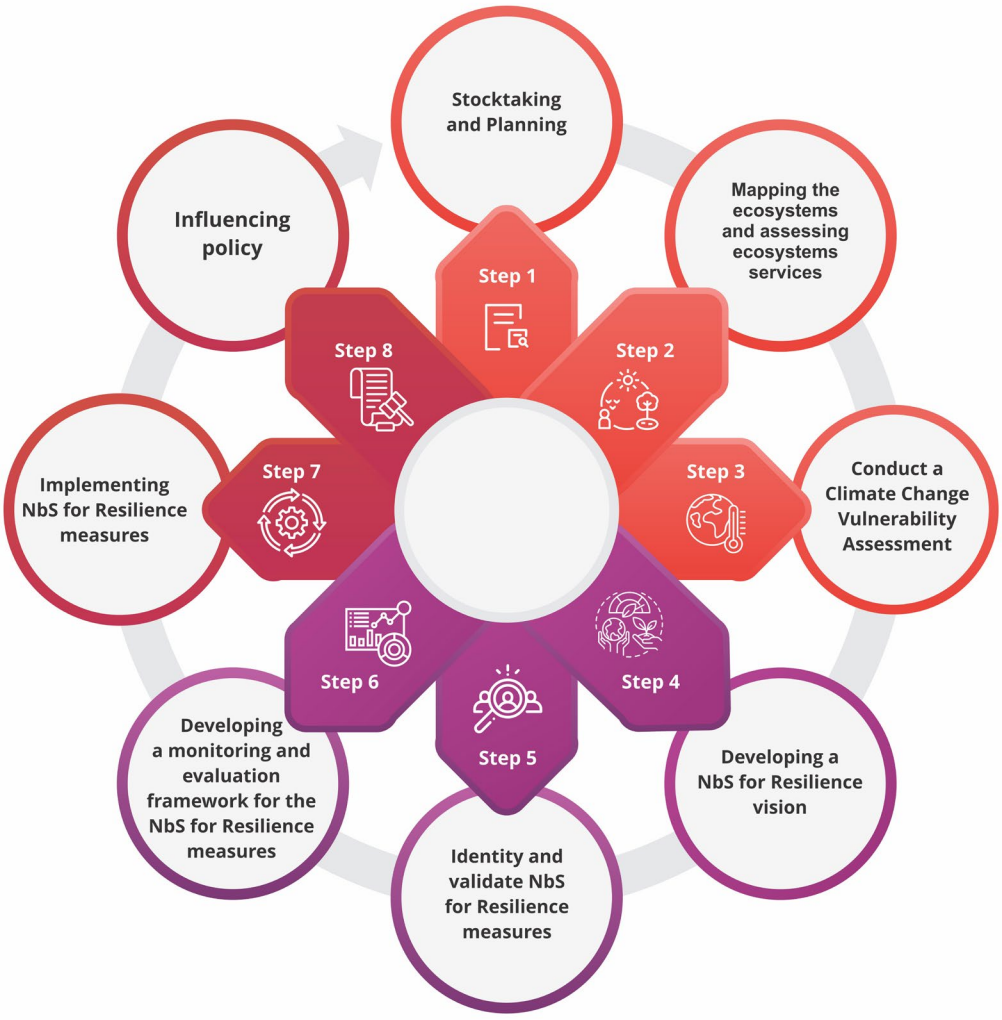


Figure 4 1The NbS for resilience planning process

Climate Change Impact and Vulnerability Assessment (Mr. Susantha Jayasinghe, Senior Climate Data Specialist, ADPC)

Global Climate Models (GCMs) are important tools for improving our understanding of climate behavior on different time scales. To better understand impacts at the regional level, GCMs can be downscaled.

The key impacts of climate change in South Asia include temperature increase, high variability of precipitation, and sea level rise, which could lead to frequent and extreme floods, droughts, landslides, forest fires, typhoons, coastal erosion, and more.

Case studies from South Asia (Dr. Heera Lal, IAS, India, and Dr. M. Mokhlesur Rahman, CNRS, Bangladesh)

Inclusive governance and stakeholder engagement are key factors in rejuvenating water sources and benefiting the population of the region. NbS have managed adaptively, based on evidence.

Experiences from the Banda region, Uttar Pradesh, India have indicated that targeted governance and engagement of stakeholders is necessary for any NbS intervention. The project used creative campaigning, motivation, and integrated gender sensitivity in the implementation of the action plan for increasing the groundwater table increasing the water availability and agriculture productivity from the region.

The case study of Restoring wetlands in the Hail Haor region of Bangladesh shared on restoring degraded wetlands, creating wildlife sanctuaries, riparian vegetation restoration, contour farming of hilltops, and reintroduction of locally lost or rare species. The project focused on adaptive management.

Session 5 – Mainstreaming of NbS in Policies and Governance

Pakistan: Policy spaces for NbS exist but clarity and an implementation roadmap are needed.

Nepal: NbS policies are ambiguous and there is room for multiple interpretations by local departments.

India: Policy spaces for NbS exist but clarity and an implementation roadmap are needed. Local agencies can be misguided and mainstreaming is needed.

Bangladesh: NbS is in the process of being mainstreamed, however the strengthening of finance and monitoring is needed.

Session 6 – Green-grey infrastructure solutions and cost-benefit analysis of NbS

Grey infrastructure in the water sector refers to structures such as dams, embankments, seawalls, roads, pipes, or water treatment plants. Green infrastructure can include forests, floodplains, wetlands, and soils that provide additional benefits for human well-being, such as flood protection and climate regulation.

In a number of cases, grey and NbS infrastructure can be merged to develop complementary hybrid solutions.

Case study presentations (Dr. Andrew Wyatt, IUCN Viet Nam and Anu Adhikari, IUCN Nepal)

Flood-based cropping systems are recommended as a financially viable, low-risk alternative to triple rice cropping (the dominant agricultural practice) in the Mekong Delta. The intervention implemented an NbS approach based on three alternatives to the triple rice crop: floating rice systems, lotus farming systems, and rice aquaculture systems, as well as dykes and floodplain modifications to adapt to flood and drought risk. The hybrid model helps enhance economic and climate resilience and conserve and restore the biodiversity found in Mekong Delta freshwater wetlands/floodplains.

Cost-benefit analysis: a single monetary framework with multiple indicators, e.g., benefit-cost ratio (BCR), net present value (NPV), and internal rate of return (IRR).

Investing in “eco-safe roads” is a cost-effective investment in DRR and it is imperative that eco-safe roads (roadside soil bio-engineering), proper drainage and design, and post-monsoon clean-up for conventional “grey” unplanned rural roads become standard practices. However, NbS interventions are long-term and may not produce or improve the targeted ecosystem services immediately.

Session 7 – Sustainable financing for scaling up NbS

Half of the world's total GDP (approx. USD 50 trillion) is dependent on nature and every dollar invested in the restoration of nature creates up to 30 dollars in economic benefits. Despite the benefits of natural capital, there is significant underfunding in the areas of NbS, particularly from the private sector.

Governments and DFIs (Development Finance Institutions) can provide catalytic capital via blended finance to help the private sector mobilize required funds in NbS.

An extensive NbS transaction database would be helpful in benchmarking deals. Such a database can help attract the private sector by providing important information on pricing and returns of long-term investment in NbS.

Potential funding opportunities for NbS include multilateral funding mechanisms and country-led thematic initiatives, such as the Global Environment Facility (GEF), the Green Climate Fund (GCF), the International Climate Initiative (IKI), and the Global EbA Fund, among others.

4.2 Reflections (Plenary Discussions)

Below are the main questions and issues raised by the participants including the summary of responses.

How to use the IUCN Standard?

The IUCN Global Standard for Nature-based Solutions can be used in the design, scaling-up, and verification of NbS. It was designed as a simple, yet robust, self-assessment that reinforces best practices, addressing and correcting shortfalls and enabling interventions to align with internationally accepted NbS principles. Each of the eight NbS criteria has equal weight. Regardless of the overall percentage match, if an intervention scores an 'insufficient' rating against any criterion, then it does not adhere to the IUCN Global Standard for NbS.

Balancing trade-offs

Trade-offs are an inherent feature of natural resource management and arise when a particular ecosystem service or stakeholder preference (e.g. clean drinking water) is favored at the expense of another (e.g. agricultural output). Criterion 6 addresses the practicalities of navigating and balancing the trade-offs including reconciling long-term and short-term needs. It highlights that NbS should equally balance trade-offs between the achievement of their primary goals and the provision of multiple benefits.

Inclusive stakeholder involvement

Governance of an NbS intervention involves opportunities for stakeholder involvement in the identification, decision-making, monitoring and feedback, and grievance processes for all stakeholders. Criterion 5 requires that stakeholders who are directly and indirectly affected by the NbS need to be identified and involved in all processes of the NbS intervention.

Limitations of NbS

Knowledge gaps: how the cost-effectiveness of NbS compares to alternatives;

Timeframes: NbS generally take longer to provide benefits, whereas grey infrastructure can be implemented with relative certainty about the type and timescale of benefits;

Landscape-scale: NbS interventions addressing a range of ecosystem processes, and conservation objectives usually cover a large spatial scale, because ecosystems are affected by and have effects

on the larger land and seascape in which they are embedded and cannot be managed in isolation, thus requiring landscape-level design.

Adaptive management: Ecosystems are dynamic by nature, and even more so under changing climates. There is a need to continuously monitor, evaluate and adapt NbS interventions to ensure that they are achieving their goals.

Thus, instead of framing NbS as an alternative to engineered approaches, we should focus on finding synergies among different solutions.

Cost-effectiveness of NbS

Nature underpins our economy and society by providing benefits to people, both directly (e.g. food, timber, and fiber) and indirectly (e.g. nutrient cycling, soil formation, pollination). While some of these benefits are transacted and priced through markets, many benefits from nature are non-market goods and services, including some available seemingly for free. When evaluating NbS, a key challenge is to incorporate its multiple benefits into a common economic evaluation framework. As a result, the economic benefits of NbS, in particular over the long term, are usually underestimated. Besides, the spatial dimension of effects is another challenge for the cost-effectiveness analysis of NbS. Benefits such as food and water security beyond the immediate implementation area are rarely accounted for.

4.3 Highlights Country Group Work

4.3.1 What role can local institutions play in mainstreaming NbS?

Country	Roles
Bangladesh	Coordination with the local community;
Nepal	Problem/solution identification on the ground; Coordination with local community and governments; Incorporation of NbS in project implementation, M&E at the local level; Local-level plan and policy formulation.
Pakistan	Inter-provincial and cross-institution coordination; Bottom-up approach for policy formulation;
India	District management to be the focal point for implementation. Linkage with Central government schemes and fund fluidity to be maintained. Local participation and stakeholder consultation are to be integrated with decision-making.

4.3.2 Identifying priority policy and Sectors for NbS Integration

Country	Policy	Sector
Bangladesh	Bangladesh Delta Plan 2100; National Agriculture/Water Policy and Acts	Ministry of Agriculture, Water Resources, Planning
Nepal	Climate Change Policy 2019; Water Resources Policy 2020; Environment Act; Land Management Policy 2015; National DRRM Policy; Water-Induced Disaster Management Policy; Irrigation Policy	Agriculture; Forestry; Water Resources; Local roads/ transportation; Urban settlements; Watershed Management.
Pakistan	National Climate Change, Water, and Agriculture policies	Ministry of Agriculture, Water Resources

Country	Policy	Sector
India	Environment Protection Act Wildlife Protection Act Water Act Air Act National Policy on Disaster Management (NPDM) National Action Plan on Climate Change National Food Security Act National Agriculture Policy National River Conservation Plan (NRCP)	Ministry of Environment, Forest and Climate Change National Disaster Management Authority Ministry of Consumer Affairs, Food, and Public Distribution Central Pollution Control Board

4.3.3 Gaps and Opportunities for enhancing resilience through NbS

Country	Gaps	Opportunities
Bangladesh	Lack of inter-agency interactions; Technical knowledge gap of NbS (criteria framework and guidelines);	Ecosystem service (ES) assessments; Inventory Database of ES;
Nepal	Well-defined policy and government system (Three-tier government system); Policy coherence; Awareness of NbS;	Rich in biodiversity and ecosystem diversity; Traditional practices, e.g., community forest management practices and farmer-managed irrigation systems; Local government authority - local municipalities; Abundant water resources availability
Pakistan	Community capacity building on flood management; Lack of synergies among policies;	Calls for a master plan based on watershed health; Using wastelands as sanctuaries; Water recharge programme;
India	Private sector engagement at the local level Understanding of the comprehensive NbS approach to the District management and block-level Officials of Government. Lack of Synergies between the policy implementation. Identification of the case studies for replication.	Prime Minister 10 Points agenda Capacity building at the local level to attain local solutions for local problems Success stories like Dr. Lal's from Bhagalpur can be replicated Spring shed development can be targeted

4.3.4 Existing green grey infrastructure in different landscapes (mountain, grasslands, coastal, flood plains).

Country	Green-Grey infrastructure
Bangladesh	Geocell; Coastal afforestation with native species; Fish sanctuaries in Magura Districts; Rainwater harvesting in some areas like Barind Tract; Aquifer recharge in the Barind region;

Country	Green-Grey infrastructure
Nepal	Agriculture land reclamation; Constructed wetlands for greywater treatment, irrigation, and eco-tourism; Green roads; Rainwater harvesting pond and green roofs; Dams, irrigation canals, and diversion canals; Community forest management; Water mills
Pakistan	Water harvesting for groundwater recharge; Dug wells and small dams for water recharge; Constructed wetlands for wastewater treatment; Flood infrastructure with stone pitching and plantation/vegetative cover; Rehabilitation of Karez in Balochistan; Small islands in Indus, stone pitching and plantation to curb sea intrusion (dykes/ walls);
India	Kullu District (Himachal Pradesh)- Upstream plantation with bottom bunds; Pond Farming- Assam and West Bengal, Multiple cropping alongside pisciculture; Cyclone shelter- Grey infrastructure supported by green belts; Vetiver grass- Reducing the tidal flows; Majuli wetlands- Assam (medicinal plants)

4.3.5 What are the priorities, and hindrances to the development and implementation of hybrid infrastructure solutions?

Country	Priorities	Hindrances
Bangladesh	Preserving nature with an afforestation programme; Capacity development on NbS; Water Ministry has been developing NbS guideline	Lack of inter-agency/multi-agency cooperation
Nepal	Priority on eco-friendly green road development; Multiple uses of water; Promotion of bio-engineering along with civil engineering structures;	Conflict of interests among users (irrigation vs power generation vs drinking); Conflicts between rapid development and sustainable development; long-term vs short-term benefits; Unhealthy competition; Three tiers of government: governance conflict on NR ownership, management responsibility
Pakistan	Build water storage (dams) with green infrastructure to protect and enhance dams' life; Develop and disseminate guidelines for NbS and hybrid structure; Cost-benefit research on the hybrid options; Promote awareness and inclusion of Bio-engineering structures; Policy mainstreaming of hybrid approaches.	Departments work solo and lack stakeholder engagement in the planning process; Lack of awareness of the hybrid option among practitioners and policymakers; Regulatory pathways are limiting; Limited financial resources to showcase or scale up.

Country	Priorities	Hindrances
India	Study on future scenarios; Promoting eco-tourism with successful case stories; Understanding the priorities of local communities and providing sustainable livelihood options; Scale up state-level interventions.	Habitat development increases relocation issues; Resettlement is not economically viable; Lack of synchronization with different stakeholders; Lack of national-level guidelines.

5. verview of Course Evaluation

This section provides a quick snapshot of the results from the pre-test and post-test that were carried out. The evaluation results are provided below. The Annex 4, provides detailed results from evaluation forms, including qualitative information from the participants who took the pre and post-tests.

5.1 Pre-test

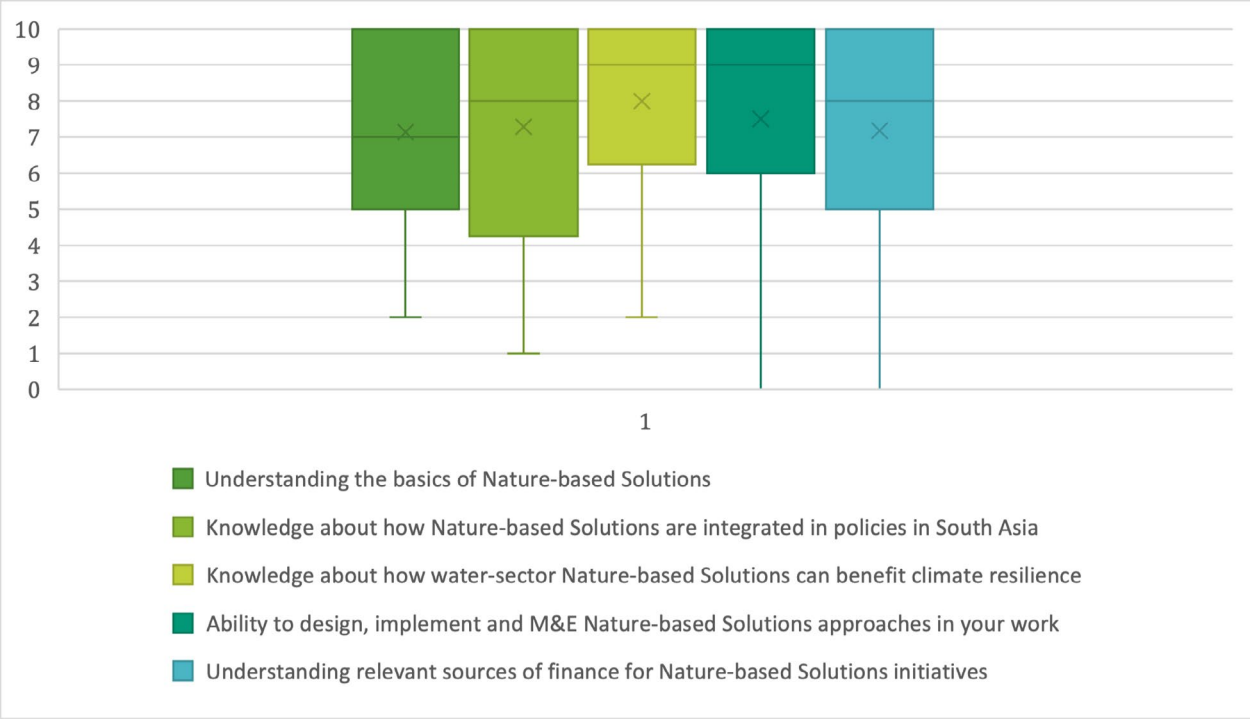


Figure 5 1 Learning Priorities

5.2 Post-test

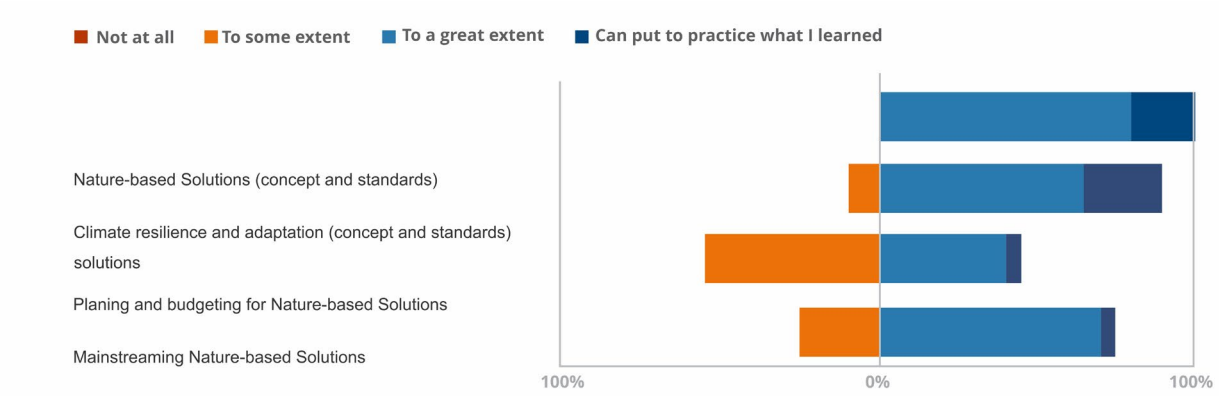


Figure 5-2 How well the training contributed to deepening the understanding of specific issues

6. Recommendations

The participant's recommendations can be classified into two categories as mentioned below for enhancing the course.

1. Technical Assessment: The biggest learning from the training, included:

- Clear concepts of NbS;
- Steps for applying NbS;
- Hybrid model (green-grey infrastructure);
- Financing tools, especially private financing;
- Cross-sectoral measures;
- Adaptation and mitigation measures

Regarding further support needed for NbS implementation, participants expressed needs on:

- Financing;
- Designing green-grey infrastructure;
- Cost-benefit analysis;
- Climate and ecosystem service evaluation;
- Case studies

2. Suggestions

- The training would be more effective physically. Network and technical issues made it difficult to interact.
- A follow-up training session may be arranged to further enhance the understanding and practical aspects of NbS implementation.

Annex 1. List of Participants

S#	Title	Name	Designation	Organization	Gender
Bangladesh					
1	Mr.	A.K.M. Saifuddin	Superintending Engineer (Civil) Office of the Chief Engineer (Civil)Planning	Bangladesh Water Development Board Chief Engineer (Civil), Office of Planning	M
2	Ms.	Atika Sultana	Agriculture Extension Officer (LR), Administration & Finance Wing	Training Wing, Department of Agricultural Extension	F
3	Dr.	Md. Aminul Haque	Principal Scentific Officer (Water Resources)	Resources Planning Organization (WAPRO), MoWR	M
4	Dr.	Md. Hatem Ali	Deputy Secretary	Ministry of Agriculture	M
5	Mr.	S M Sarwar Kamal	Deputy Secretary	Ministry of Water Resources	M
6	Mr.	Md. Samsul Islam	Deputy Chief	Planning Commission	M
India					
7	**Ms.**	Riya Mallick	Reserarcher, Centre of Urban Planning and Policy (CUPP)	CEPT Research and Development Foundation	F
8	Dr.	S. K. Shoora	DD/ Sci- C	Climate Change Division, Ministry of Environment Forest & Climate Change	M
9	Dr.	Sushma Guleria	Asst Professor, Biological Water	National Institute of Disaster Management	F
Nepal					
10	**Ms.**	Grishma Acharya	Engineer	WRRDC	F
11	Mr.	Dinesh Bhatta	Project Director	DoWRI	M
12	Ms.	Yojana Neupane	Project Director	MOWRI	F
13	Mr.	Hari Narayan Balbase	Project Director	NPC	M
14	Mr.	Bishnu Hari Devkota	Senior Ag Extension Officer	Ministry of Agriculture and Livestock Development	M
15	Mr.	Hari Prasad Sharma	Under Secretary	Ministry of Forest and Environment	M
16	Ms.	Gayatri Joshi	Engineer	WECS	F
Pakistan					
17	Mr.	Yasir Gul Khan	Assistant Chief	Ministry of Planning, Development and Special Initiatives, Islamabad, MoPDSI	M
18	Mr.	Muhammad Azeem Khoso	Director Urban Affairs	Ministry of Climate Change, Islamabad	M
19	Mr.	Zain Ijaz	Section Officer Water	Ministry of Water Resources, Islamabad	M

S#	Title	Name	Designation	Organization	Gender
20	Mr.	Sarfraz Ali Memon	Senior Agriculture Engineer	Federal Water Management Cell, Ministry of National Food Security & Research, Islamabad	M
21		Engr. Muhammad Hamza	Assistant Director (Hydrology)	Pakistan Council of Research in Water Resources (PCRWR), Islamabad	M
22		Breerah Fatima	Deputy Director	Pakistan Council of Research in Water Resources (PCRWR), Islamabad	F
23		Mufeeza Ahsan	Research Officer (Hydrology)	Pakistan Council of Research in Water Resources (PCRWR), Islamabad	F
24	Dr.	Asghar Ali Mahesar	Deputy Director Environment	Sindh Irrigation Department, Karachi	M
25	Mr.	Mr. Waris Ali Gabol	Director Technical EPA	Environment Climate Change & Coastal Development Department. Karachi	M
26	Dr.	Ejaz Tanveer	Superintending Engineer (Floods-I)	Federal Flood Commission, Ministry of Water Resources	M
27	Mr.	Zafar Iqbal	Superintending Engineer (Floods-II)	Federal Flood Commission, Ministry of Water Resources	M
28	Ms.	Samina Mengal	Not available	Balochistan Water Resources Development Sector Project	F
29		Umaira Jamal	Not available	Not available	F
30	Mr.	Awais Khan	Not available	Not available	M
31	Mr.	Engineer Sufyan Durrani	Project Director	Irrigation Department, Balochistan	M
32	Mr.	Shahid Habib	Deputy Director Environment and Social Safeguards	Punjab Irrigation Department, Lahore	M
33	Mr.	Engr. M. Dilshad Arshad	Deputy Director (Hydrology)	Pakistan Council of Research in Water Resources (PCRWR), Islamabad	M
34	Mr.	Abu Bakr Baloch	Not available	Not available	M

Annex 2. Agenda

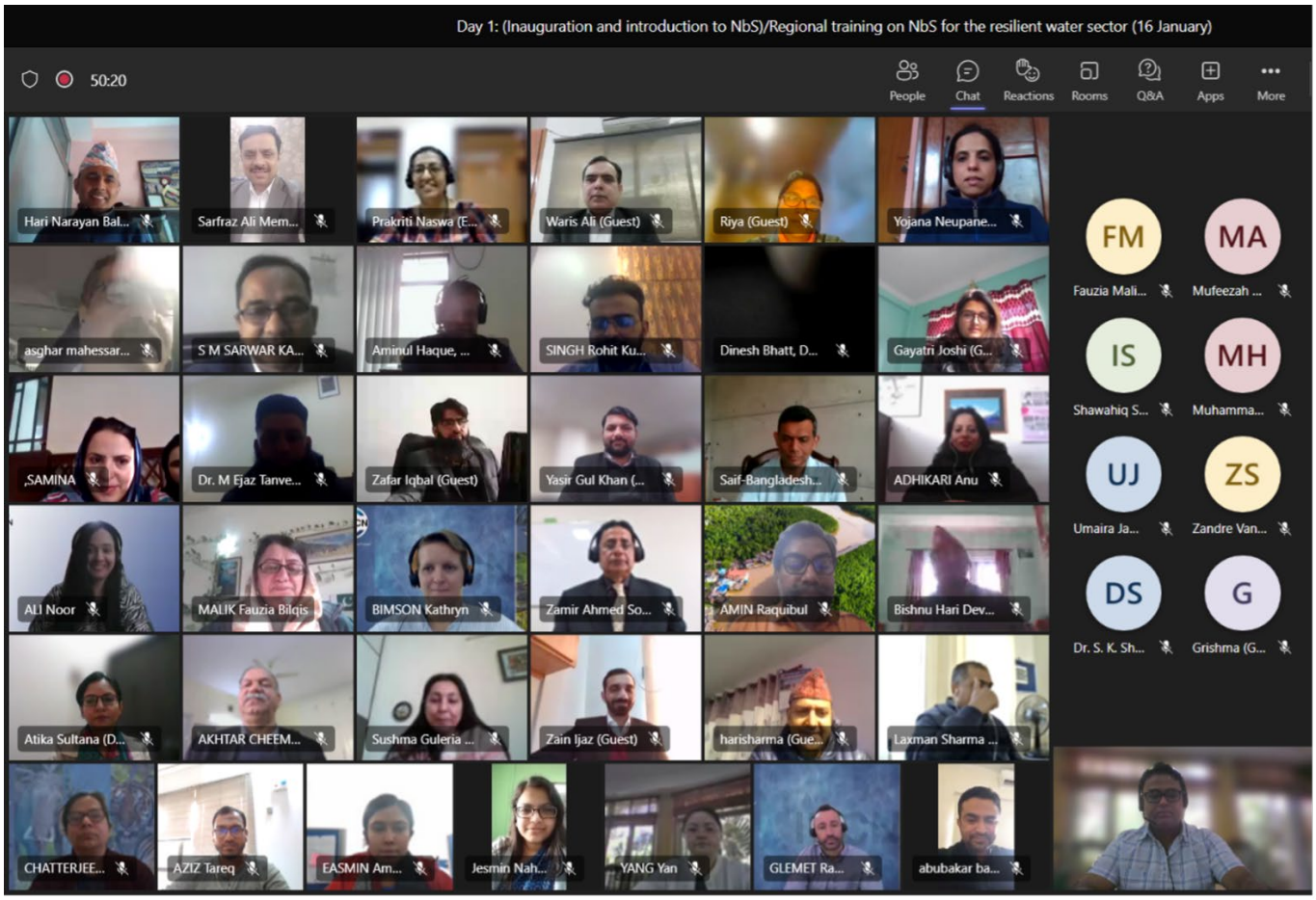
Time (Pakistan Time)	Sessions	Learning Outcome
Day 1: Inauguration and introduction to NbS **Facilitator: Vishwa Ranjan Sinha, Programme Officer, Water and Wetlands, South Asia, IUCN Thailand**		
09:30 – 10:00	Participants welcome, housekeeping and introduction to the training module and its objectives **Ms. Fauzia Mallik,** *Programme Coordinator, IUCN Pakistan* ***Mentimeter interaction with the participants*** • Which sector do you represent? • Confidence in defining, designing, implementing, and M&E for NbS. • What are the key opportunities for NbS in your work?	All participants are aware of the purpose and objectives of training. Participants' introduction through the Chatbox.
10:00-10:30	**Session 1 – Introduction to the Ecosystem Services (ES)** Introduction to the variety of ES and its linkages to the water sector. **Ms. Kathryn Bimson,** *Programme Officer, Water and Wetlands and NbS, Asia, IUCN Thailand* Interactive exercise to gauge participants' understanding of different types of ES.	Understand different types of ES and the linkages among them.
10:30 - 11:15	**Session 2: Nature-based Solutions- background, definition, examples at scale** NbS background, definition, and examples at scale (35 mins, presentation by IUCN) **Mr. Raphaël Glémet,** *Senior Programme Officer, Water and Wetlands, Asia, IUCN Thailand* Mentimeter exercise - is it NbS or not? (10 mins) *Facilitated by* **Ms. Yang Yan,** *Programme Officer, IUCN Thailand*	Improved participant's understanding of NbS definition and application at scale.
11:15 - 11:30	**Coffee break**	

Time (Pakistan Time)	Sessions	Learning Outcome
11:30 – 12:30	**Session 3 - Introduction to the IUCN Global Standards for NbS** Presentation on Global Standards for NbS **Mr. Raphaël Glémet,** *Senior Programme Officer, Water and Wetlands, Asia, IUCN Thailand (45 mins)* Mentimeter Exercise – analyzing participant's understanding of the NbS criteria (15 mins, by IUCN)	Understand the criteria and indicators for the design, verification, and evaluation of NbS projects.
Day 2: NbS for the resilience of the water sector in South Asia Facilitator: Mr. Vishwa Ranjan Sinha, Programme Officer, Water, and Wetlands, South Asia		
09:30-9:40	**Recap key takeaways and questions from Day 1** **Mr. Vishwa Ranjan Sinha,** *Programme Officer, Water, and Wetlands, South Asia*	
09:40 - 11:00	**Session 4: NbS for resilience – examples and planning cycle** 09:40 am to 10:15 am (40 mins including Q/A) NbS for resilience: 8-step planning process, **Ms. Kathryn Bimson,** Programme Officer, Water and Wetlands and NbS, Asia, IUCN Thailand (15 mins) Climate Change Impact and Vulnerability Assessment, **Mr. Susantha Jayasinghe,** Senior Climate Data Specialist, Asian Disaster Preparedness Center (10 mins) Case studies from South Asia – 10:15 am to 10:45 am **Case study 1.** Solving water scarcity – Banda district success story (Uttar Pradesh, India), **Dr. Heera Lal (IAS),** Additional Mission Director, National Health Mission, Uttar Pradesh, and Additional Project Director in UP State Aids Control Society (15 mins) **Case study 2.** Restoring wetlands to enhance biodiversity and ecosystem services in Hail Haor (Bangladesh), **Dr. M. Mokhlesur Rahman,** Executive Director, Center for Natural Resource Studies (CNRS), Dhaka, Bangladesh (15 mins) Q/A and participants' feedback and interaction with case study presenters (15 mins)	Understand climate projections and NbS approaches for resilience in specific water-dependent sectors.
11:00 - 11:15	**Coffee break**	

Time (Pakistan Time)	Sessions	Learning Outcome
11:15-12:30	**Session 5: Mainstreaming of NbS in Policies and Governance** Overview – to what extent are NbS mainstreamed in relevant policies in South Asia? **Mr. Shawahiq Siddiqui,** *Environmental Lawyer, and Founding Partner Indian Environment Law Organization (IELO) Delhi (20 mins)* **Country Group exercise** – discuss how NbS is integrated with relevant water sector policies and identify gaps and national priority for enhancing resilience through NbS (35 mins); Country group work (5 mins for each group – 20 mins) Facilitation support for group work by the IUCN country team	Improved understanding of the opportunities for mainstreaming of NbS in policies at the national level. Identification of gaps and priority areas for resilience building.
Day 3: Green-grey infrastructure and financing of NbS Facilitator: Mr. Raquibul Amin, Country Representative, IUCN Bangladesh		
09:30 – 09:40	**Recap key takeaways and questions from Day 2** **Mr. Rohit Kumar Singh,** *Senior Project Associate, IUCN India Programme*	
09:40 - 11:00	**Session 6: Green-grey infrastructure solutions and cost-benefit analysis of NbS** *A new generation of infrastructure projects that harness the power of nature can help achieve development goals, including water security and climate resilience. The session will review approaches and examples of how to integrate green infrastructure and its cost-benefit analysis – using examples from the Asia region.* **Introduction to the session and grey-green infrastructure solutions** **Mr. Raquibul Amin,** Country Representative, IUCN Bangladesh (5 mins) **Case study presentations –** • **Case Study 3: Designing grey-green infrastructure solutions – experiences from the Mekong Delta** **Mr. Andrew Wyatt,** Deputy Head, Indo-Burma Group, IUCN Viet Nam (10 mins)	Improved understanding of strategies linked to grey-green (or hybrid) infrastructure solutions.

Time (Pakistan Time)	Sessions	Learning Outcome
	Case study 4: Cost-benefit analysis of grey-green infrastructure – experiences from Nepal **Ms. Anu Adhikari,** Senior Program Officer, Climate Change, Gender & Social Inclusion (10 mins) Plenary discussion and participants' interaction with the case study presenters (10 mins) Country group exercise – status, priorities, hindrances to development and implementation of hybrid infrastructure solutions (30 mins) Presentation of group exercise in plenary discussions (15 mins)	
11:00 -11:30	**Coffee break**	
11:30 – 12:30	**Session 7: Sustainable financing for scaling up NbS** **Opportunities for financing national and regional level NbS initiative, Mr. Vishwa Ranjan Sinha,** Programme Officer, Water and Wetlands, South Asia, IUCN Thailand (15 mins) **Private sector engagement and resource mobilization for upscaling NbS, Mr. Piyush Jha,** Director, PricewaterhouseCoopers (PwC) Nepal (15 min) Plenary discussion – funding opportunities and strategies countries could prioritize (30 mins)	Improved understanding of funding mechanisms and strategies for financing NbS for the resilience of the water sector nationally.
12:30 – 12:50	Workshop Conclusion and Participants' Feedback **Thanking participants and next steps after the workshop** **Dr. Niladri Gupta,** Sr. Water Resources Management Specialist Climate Resilience, ADPC 5 mins – what were the participant's expectations, and how we tried to address these? **Participants' feedback on the training and ways to improve it (10 mins)** **Facilitated by Mr. Vishwa Ranjan Sinha,** Programme Officer, Water and Wetlands, South Asia, IUCN Thailand (10 mins)	

Annex 3. Photos



Screenshot of the Training Session

Annex 4. Details of Training evaluation

(A) Pre-training survey results

In total, we received 28 responses before the training. Almost all respondents, except one IUCN country office staff, work for government departments related to water resources management, planning, and agriculture, with ¼ being engineers and 4 having Ph.D. degrees. Male respondents dominated the survey (68%).

Technical Survey

Regarding the understanding of 'Nature-based Solutions (NbS)', the answers were given on 10-point scores, with 1 being very low and 10 being very high. Only one respondent showed great confidence in the concept and Global Standard.

Most respondents (64%) chose medium and low scores (below 6 points), showing a gap in related knowledge, and 9 respondents (32%) gave relatively positive responses (between 7-9). Based on the brief description of their understanding, half of the answers highlighted social-ecological challenges, especially related to climate change and disaster mitigation, while the other half translated NbS into actions that protect and restore ecosystems. However, some answers showed a clear misunderstanding of NbS, such as confusion between nature-derived, nature-inspired, and nature-based solutions, and between green and grey infrastructure. Some answers understood all sustainable practices as NbS.

Thirteen respondents listed previous experience in applying NbS in their professional work, including:

- Understanding e-flows to enhance water security;
- Climate mitigation through the Ten Billion Tree Tsunami Program;
- Disaster prevention using bio-engineering measures to prevent landslides, floods, and soil erosion.

Two additional questions with 10-point scores intended to further capture participants' capability to promote the mainstreaming of NbS. Most respondents (71%) chose medium and low scores (below 6 points), indicating a limited capability to identifying entry points and enabling factors for mainstreaming NbS in development planning and budgeting.

Regarding the concept of climate resilience, adaptation, and mitigation, 14 respondents (50%) chose medium and low scores (below 6 points), and 11 respondents (39%) gave relatively positive responses (between 7-9), demonstrating more positive feelings towards climate change-related knowledge.

General Survey – Learning Priority and Expectations

In total, there were 5 questions with 10-point scores asking participants to rate their learning priorities. The results (Figure in section 5) suggested a higher interest in understanding the benefits of NbS (grey), integration of NbS in policy and governance (orange), and technical capacity building (yellow), especially successful experiences based on regional/country stories.

(B) Post-training questionnaire

In total, 20 respondents answered the post-training questionnaire. Almost all respondents, work for government departments related to water resources management, planning, and agriculture. There were six respondents from Bangladesh, three from India, four from Nepal, and seven from Pakistan.

General assessment

Regarding the objectives of the training activities, ¾ of the respondents indicated that it has been presented at the beginning, with ¼ choosing 'to some extent'. 65% of the respondents suggested that the content of training supports the objectives 'to a great extent', and 35% chose the answer 'to some extent'.

For complexity level, 5% of respondents chose too basic, 30% chose too advanced and 65% chose just fine.

For the amount of time required for the training, 15% of respondents chose too little, 20% chose too much, and 60% chose just fine.

For social-network expansion, 85% gave positive answers and 15% felt not sure.

Effectiveness and relevance

There were four questions intended to assess how well the training contributed to deepening the understanding of specific issues (see Figure 5). After the training, all respondents reflected positively on the session on concepts and standards of NbS. However, a large number of respondents (55%) chose to some extent regarding the understanding of planning and budgeting of NbS, which suggests the need for continuous practice and training on the issue. For climate resilience and adaptation, 25% of respondents felt confident that they were able to put what they learned into practice. Further, 70% agreed that the training has contributed to the understanding of NbS mainstreaming to a large extent.

Most respondents (more than 75%) indicated excellent with the first three sessions. A small portion (5%) of the respondents rated unsatisfactory for sessions four and five, demonstrating the need for improving the design of content. Sessions four and five, demonstrate the need for improving the design of content.

Annex 5. Main Questions Raised by Participants During Training

Day 1

- How to deal with conflicting ecosystem services? - Dinesh Bhatt, DWRI, Nepal
- How NbS helps on reducing the pandemic as shown on the previous slide? - Gayatri Joshi
- NbS requires integrated planning of different stakeholders which is very challenging how can we cater to this issue - Sarfraz Ali Memon
- Can you please show an elaborate example representing all the criteria of NbS? - Atika Sultana
- Do all the criteria have equal weightage? - Dinesh Bhatt, DWRI, Nepal
- Without having an NbS National policy, how we can integrate NbS in public sector projects? - Yasir Gul Khan
- Is there a case study, one with NbS & the other with conventional approaches? How the cost differs and what's the long-term implication - Saif-Bangladesh-BWDB
- How sustainable O& M for NbS be adopted? - Dr. M Ejaz Tanveer Federal Flood Commission
- The economic values of NbS are discussed to be only a small fraction of the overall benefits; this poses a difficulty in actually doing economic feasibility... Will a lot of projects not fail to meet the C4 criteria? - Laxman Sharma
- How to take care of the intangible benefits in economic analysis - Dinesh Bhatt, DWRI, Nepal
- Term differentiation: biosphere and ecosystem.
- Advantages of NbS? Does NbS always have more benefits than the conventional approach?
- Why developed countries always give loans to developing countries for grey infrastructure development, rather than green infrastructure?
- Is it necessary to meet all criteria for a project to be regarded as an NbS approach?

Day 2

- Do we have a regional GCM or not? - Dr. M Ejaz Tanveer Federal Flood Commission
- What about our South Asian region whether we have any other regional model for that climate model for that prediction? - Dr. M Ejaz Tanveer Federal Flood Commission
- The 2022 rains in Pakistan, which was not predicted by the models. I want to know about our if we have our regional or South Asian models, then we have we can predict more in a good way. - Dr. M Ejaz Tanveer Federal Flood Commission
- What about climate models' reliability when we see the reasons for the unprecedented 2022 rains in Pakistan which are beyond the prediction of models? - Dr. M Ejaz Tanveer Federal Flood Commission
- Can we integrate GCMs into Decision Support System (DSS)? - Yasir Gul Khan_Pakistan
- This global model is like a live document that keeps on changing with additional information over time. - Sarfraz Ali senior agricultural engineer Federal Ministry of national food security Islamabad
- How we can provide a boundary condition of the global climate model and what is the uncertainty percentage of the global model? -Asghar Mahessar

- We have the largest Manchar Lake in Pakistan. Mokhlesur mentions some issues related to sediment problems in the wetland from hilly areas and some land has encroached. So what is the government policy related to sediment and encroachers removal? -Asghar Mahessar
- All water resources are held by the state as a public trust. So, if a wetland, for example, is to be restored, if any rights exist in both individuals and communities, it can be taken over. Livelihood rights could be settled for a period, compensation could be given. - Shawahiq Siddiqui, IELO, India

Day 3

- Is there any alternative with respect to NbS for the treatment of industrial wastewater? - Waris Ali
- Which crops we can grow in flood-prone areas? Can you guide us? - Sumaya Noshin
- Once we have prepared a proposal for vertical wetlands constructed wetlands, is there any example in any of the countries where the vertical wetland is successfully implemented? Or is there any issue or guidance which can we have from the experience of Nepal and Bangladesh or India? - Mufeezah Ahsan
- How much environment flow is required for the delta - Dr. Ali Asghar
- Could you please elaborate on the NbS transaction database? - Raphael
- You mentioned a standard that the private sector is currently developing on NbS, is there any similarity between the global NbS standard from IUCN or is there any link? – Raphael
- Is there any intention of IUCN to conduct any kind of project in Bangladesh? What is the procedure for getting funds through IUCN? - Atika Sultana, Bangladesh

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