

Scaling GESI-responsive Nature-based Solutions in the Hindu Kush Himalaya

An operational guide



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Scaling GESI-responsive Nature-based Solutions in the Hindu Kush Himalaya

An operational guide

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Foreword

There is growing recognition around the world that Nature-based Solutions are the optimal choice to address the accelerating triple planetary crisis of climate change, biodiversity loss, and pollution. However, uptake and implementation have been slow and scattered, even with tried and tested solutions. If we don't implement these solutions with speed and at scale, we are never going to match the scale of the unfolding crises. This operational guide makes key recommendations and outlines the key actions that governments, civil society, and the private sector can take to substantially scale up the adoption of NbS.

These actions are particularly critical for the Hindu Kush Himalaya, a region at the frontlines of the climate crisis, where most communities still depend heavily on nature for their sustenance and livelihoods. Here, NbS become crucial for addressing the complex environmental and social challenges that are being exacerbated by climate change. There are outstanding examples of community-led NbS from the region, such as community forestry, wetland restoration, and springshed management – which have delivered biodiversity, water security, and livelihood co-benefits. However, given the scale and complexity of the crisis, we need to step up collaborative efforts, capacity building, and access to finance for co-designing and scaling NbS across the

region, drawing on lessons from the past.

Evidence is critical for scaling. An important aspect to consider, therefore, is robust monitoring and outcome reporting. This is critical if we expect to generate the evidence that will enable uptake and scaling by governments and other actors. In addition to the core societal challenge, NbS usually have other desired outcomes, such as clear benefits for biodiversity and livelihoods. This needs to be captured – and for that we need frameworks and tools to ensure robust and repeatable monitoring.

We are grateful to the United Kingdom International Development for supporting this work under its Climate Action for a Resilient Asia (CARA) programme. Through the Himalayan Resilience Enabling Action Programme (HI-REAP), we have been able to hold consultations, co-design NbS pilots, and facilitate adoption in Bangladesh, Bhutan, India, and Nepal. Our work also draws on learning from China. We hope that the lessons from these pilots and the key actions outlined in this guide can help scale NbS with support from government, civil society and private sector partners across our region.

Izabella Koziell

Deputy Director General, ICIMOD

Foreword

Bangladesh has recently experienced a noticeable shift in nature's behaviour, highlighted by this year's unprecedented natural disasters, including heatwaves and floods – a stark warning of the severe impacts of climate change. Experts predict that such disasters may become more frequent, posing significant threats to Bangladesh and beyond. In this context, considering Nature-based Solutions (NbS) for sustainable development becomes crucial.

NbS harness the power of natural ecosystems to address environmental and socio-economic challenges, offering an effective and sustainable way to combat climate change and trigger sustainable development to meet the present needs without compromising the needs of future generations.

Let us imagine this: our degraded and deforested areas are reforested, and degraded and unused land is covered with native plants. This boosts biodiversity, prevents soil erosion, and improves air and water quality. Rows of native tree species, such as shimul (*Bombax ceiba*) and palash (*Butea monosperma*), along roads enhance the landscape's beauty and serve as natural shields against heatwaves. This is not a distant dream but a real example of how NbS can transform our landscapes and communities.

In the Chattogram Hill Tracts (CHT) in southeastern Bangladesh, NbS are vital for addressing water security challenges the hill communities face. These communities rely on *charas* (springs) and streams to drink water, but rising temperatures and longer dry seasons threaten these natural water sources. Forested areas upstream can help regulate water flow, while planting native plants around springs can purify the water and ensure a continuous supply

even during the dry seasons. In addition,, the natural regenerating and planted species can help retain forest soils and moisture, prevent soil erosion, and reduce sediments in streams, thereby preserving the health and vitality of these crucial water sources.

This operational guide on 'Scaling GESI-responsive Nature-based Solutions in the Hindu Kush Himalaya' will be critical in ensuring that NbS initiatives, particularly in the CHT, are equitable and inclusive. By integrating Gender Equality and Social Inclusion (GESI) principles into NbS, we can promote solutions that will protect and restore the natural environment, empower communities, enhance resilient livelihoods, and promote social equity.

NbS has emerged as a beacon of hope in today's world, where we face the dual challenges of climate change and biodiversity degradation. However, to realise the full potential of NbS, we need appropriate and specific policy frameworks that encourage their adoption and sustenance. It is also essential to foster cooperation between government bodies, non-governmental organisations, experts, civil society, and local communities. Moreover, investment in research and development is critical in order to identify the most effective NbS for Bangladesh and beyond.

By embracing NbS, we can mitigate the long-term risks of climate change and biodiversity loss, protect our natural resources, and ensure a sustainable future for all. NbS are not just a slogan but an urgent requirement for our very survival, and the Chattogram Hill Tracts can serve as a shining example of how GESI-responsive NbS can be designed and implemented successfully.

Prodip Kumar Mahottam ndc

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Foreword

Despite the pressing challenges posed by climate change, Bhutan remains resolutely committed to environmental sustainability. The kingdom's Constitution enshrines the protection and preservation of our natural environment, ensuring its benefits for both present and future generations. This commitment is vividly reflected in Bhutan's expansive network of protected areas, which encompass over 50 per cent of the country. In addition,, Bhutan proudly upholds its carbon-negative status, a testament to its dedication to reducing greenhouse gas emissions.

Our approach to development is distinctive, characterised by the integration of Nature-based Solutions with our principles of Gross National Happiness (GNH). This model seamlessly aligns economic growth with environmental sustainability and cultural values. By harnessing NbS, Bhutan addresses both environmental and socio-economic challenges, thereby fostering sustainability in a holistic manner. Our rich biodiversity and unwavering commitment to conservation are leveraged to enhance ecosystem services, mitigate climate change, and support community livelihoods. Our recent graduation from least developed country status highlights our socio-economic progress achieved through diligent environmental stewardship and a focus on holistic well-being.

As a founding member of ICIMOD, Bhutan values our enduring partnership. We have recently renewed our memorandum of understanding to align Bhutan's

13th Five-Year Plan with ICIMOD's Medium-Term Action Plan (MTAP V). Our collaborative efforts prioritise scaling NbS for disaster risk reduction, water security, and green mountain livelihoods. We are particularly excited about our joint initiatives in springshed management, bioprospecting with medicinal plants, and rangeland restoration.

We are also pleased to contribute to the development of the operational guide on 'Scaling GESI-responsive Nature-based Solutions in the Hindu Kush Himalaya', led by ICIMOD and supported by the the United Kingdom International Development-funded Himalayan Resilience Enabling Action Programme (HI-REAP). This guide aims to mainstream and enhance the application of NbS by addressing many of the societal challenges we face in the Himalaya.

Bhutan remains committed to advancing sustainability through innovative solutions and collaborative partnerships in order to ensure a resilient and thriving future for our people and our environment.

Dechen Yangden, Director
Department Of Water
Ministry of Energy and Natural Resources
Royal Government of Bhutan

Karma Dema Dorji, Programme Director
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Ministry of Agriculture and Livestock
Royal Government of Bhutan

Foreword

Healthy ecosystems are a basic prerequisite for climate change adaptation, biodiversity conservation, and sustainable development. The majority of farm or non-farm livelihood strategies in the Himalayan region rely on the integrity, diversity, and functioning of freshwater and terrestrial ecosystems. Major environmental problems like climate change, glacier retreat, forest fires, biodiversity loss, ecosystem degradation, and unplanned urbanisation are causing adverse impacts on the Himalayan region. The Himalayan communities had adapted to environmental changes over millennia through cultural responsiveness, collective actions, and individual creativity. In the modern era, however, many communities, especially the marginalised, are unable to effectively adjust to such environmental challenges due to rapid socio-ecological changes.

The current paths of economic development in the Himalaya are undervaluing ecosystem services and processes, which leads to overexploitation and degradation of natural resources like soil, water, forests, and rangelands. This is made worse by unsuitable policies and paucity of financial incentives. All of this is leading to extinction of species and a decline in the adaptation capacities of mountain communities; this also compromises the alternatives for present and future generations to make a decent living.

In recognition of these challenges, development agencies must step up incorporation of biodiversity and ecosystem management in their development actions, and include ecologically sound, socially

beneficial, and economically feasible practices. Furthermore, it is critical to acknowledge the needs and expertise of local communities, especially that of women and marginalised groups.

Drawing from a multi-stakeholder workshop in September 2023, supported by the United Kingdom International Development, on rethinking Ecosystem-based Adaptation (EbA) for water, livelihoods, and disaster risk reduction (DRR) in the Indian Himalaya, the G.B. Pant National Institute of Himalayan Environment (GBPNIHE) and the International Centre for Integrated Mountain Development (ICIMOD) identified several EbA practices, including springshed management and bioprospecting. The experts expressed the opinion that although there are several effective NbS (Nature-based Solutions) or EbA techniques, their adoption is still on a relatively small scale, and as a result, so are the outcomes.

This guide is a highly relevant knowledge product that explains the salient features of NbS, which include EbA, and shows how policies, procedures, capacity building, and investment assistance may be used to scale up and scale out NbS concepts and practices. I am certain that this endeavour is valuable and look forward to seeing the guidelines put into practice.

Sunil Nautiyal

Former Director, GB Pant National Institute of Himalayan Environment (GBPNIHE), India/Professor, Centre for Ecological Economics and Natural Resources (CEENR)

Foreword

“Nature never did betray the heart that loved her.” Wordsworth’s words remind us that trust in nature is never misplaced. In the Hindu Kush Himalaya, where mountains cradle rivers and forests shelter lives, that trust is being tested. Climate change, biodiversity loss, and pollution threaten to unravel the very systems on which communities depend. Yet nature, when respected, still offers resilience and renewal.

Robert Frost observed that “Nature is always hinting at us. It hints over and over again. And suddenly we take the hint.” Today the hints are urgent: melting glaciers, thirsty springs, landslides, smoke-filled valleys. But there are also gentler hints—forests absorbing floods, soils storing water, wetlands breathing life into landscapes. They tell us that the path forward lies not in mastering nature, but in working with her wisdom.

As the Nepali poet Pramod Sarang expressed: “Bathed in the sun’s warm embrace, a person becomes a river.” That image captures what this region needs most: people flowing with nature, not against her, shaping livelihoods and economies that are as dynamic and life giving as rivers themselves.

Scaling Nature-based Solutions across this diverse region must follow such flows. It requires defining and implementing scaling pathways tailored to each landscape and community, ensuring that solutions reflect local knowledge, needs, and aspirations. Agroecology is one such solution: restoring soils, nourishing families, improving air quality, and

strengthening incomes, especially for women and marginalised farmers. The bioeconomy and ecotourism open others, offering new mountain economies that create jobs and dignity while safeguarding the ecosystems on which they depend.

This is more than adaptation. It is transformation—an invitation to rethink prosperity in ways that place harmony with nature at the centre. If we heed the hints, respect the flows, and trust in nature’s constancy, the Hindu Kush Himalaya can become a living model of resilience, inclusion, and hope for the world.

The UK’s support for this crucial work through the £273-million Climate Action for a Resilient Asia programme is part of our commitment to couple climate and nature finance with technical assistance. I am personally grateful for our excellent collaboration with ICIMOD and its Regional Member Countries.

Jonathan Reeves

Senior Climate and Energy Adviser
Indo-Pacific Regional Department
Foreign, Commonwealth and Development Office

Abbreviations and acronyms

CBD	Convention on Biological Diversity
CRP	Community Resource Person
DRR	Disaster Risk Reduction
EbA	Ecosystem-based Adaptation
EbM	Ecosystem-based Management
FED	Forest and Environment Department, Sikkim
FPIC	Free, Prior, and Informed Consent
GBP	Green Benefit Planner
GESI	Gender Equality and Social Inclusion
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographical Information Systems
GPNBS	Global Program on Nature-Based Solutions for Climate Resilience
HKH	Hindu Kush Himalaya
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPLCs	Indigenous Peoples and Local Communities
IUCN	International Union for Conservation of Nature
MEL	Monitoring, Evaluation, and Learning
MELA	Monitoring, Evaluation, Learning, and Adaptation
NBC	National Biodiversity Centre
NbS	Nature-based Solutions
NTFP	Non-Timber Forest Product
RDD	Rural Development Department, Sikkim
RMCs	Regional Member Countries
RS	Remote Sensing
SDGs	Sustainable Development Goals
SIRD	State Institute of Rural Development, Sikkim
SSM	Springshed Management
ToT	Training of Trainers
UAV	Unmanned Aerial Vehicle
UNCBD	United Nations Convention on Biological Diversity
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEF	World Economic Forum
WRI	World Resources Institute



About the guide

Nature-based Solutions (NbS) have a huge potential to support biodiversity, climate, and sustainable development objectives, but their implementation has been rather slow and fragmented. There are policy, governance, coordination, design, and financial barriers to wider-scale adoption of NbS. This operational guide elaborates on the key actions that are necessary to scale NbS.

NbS in the Hindu Kush Himalaya (HKH) region are vital for addressing the complex environmental and social challenges that are being exacerbated by climate change. The region, characterised by its diverse ecosystems and unique sociocultural contexts, has been witnessing a growing interest in NbS, such as in the form of reforestation, eco-disaster risk reduction, sustainable agriculture, nature-based tourism, community-based watershed management, wetland restoration, and springshed management. These solutions have shown promise in enhancing biodiversity, improving water security, and supporting livelihoods. However, challenges remain in scaling these solutions effectively across the HKH due to limited financial resources, varying levels of institutional capacity, and the need for more comprehensive policies (Mehta et al., 2023). Collaborative efforts, capacity building, and innovative financing mechanisms are crucial for the successful implementation and scaling of NbS in this ecologically and culturally rich region.

The insights on the actions for scaling NbS have been drawn from published literature and stakeholder consultations in Bangladesh, Bhutan, India, and Nepal as part of a process to facilitate wider scale adoption of NbS through the Himalayan Resilience Enabling Action Programme (HI-REAP).

HI-REAP is a nine-year programme (2023–2031) being implemented by the International Centre for Integrated Mountain Development (ICIMOD), funded by the United Kingdom International Development under its Climate Action for a Resilient Asia (CARA) programme; its aim is to

‘deliver a major shift on resilience in Asia – moving from incremental and isolated investments to building systems resilience to climate change in Asia that unlocks action and finance needed for transformational adaptation’. HI-REAP is being implemented in four countries – Bangladesh, Bhutan, India, and Nepal – and is building on knowledge and learning from China.

This guide has three sections:

SECTION 1

THE THREE KEY TERMS – NATURE-BASED SOLUTIONS, GESI RESPONSIVENESS, AND SCALING

Understanding these key terms is crucial as they form the foundation of an integrated approach to addressing climate, biodiversity, and sustainable development challenges.

NbS are innovative solutions that provide holistic, adaptative, and integrated remedies. Unlike traditional solutions that may offer quick fixes or come at the cost of environmental health, NbS are innovative solutions that provide holistic, adaptative, and integrated remedies.

NbS lay emphasis on the restoration, protection, and sustainable management of ecosystems, and are a paradigm shift from short-term, sector-driven actions to more sustainable and equitable practices.

Responsiveness to Gender Equality and Social Inclusion (GESI) is integral to the success of NbS. GESI responsiveness is designed to ensure that the benefits of NbS are equitably distributed, taking into account the diverse needs and contributions of all stakeholders, including of marginalised and vulnerable communities. GESI responsiveness promotes inclusivity and fairness, and aims for interventions that do not aggravate existing inequalities, prioritising social equity; rather prioritises and empowerment.

Scaling refers to the process of expanding the reach and impact of NbS. This involves not only increasing the geographic area covered by these

solutions but also enhancing their effectiveness and sustainability. Scaling NbS requires strong policy frameworks, multi-stakeholder collaborations, and the integration of innovative technologies and practices. It also demands continuous learning and adaptation to ensure that solutions remain relevant and effective in changing environmental and social contexts.

SECTION 2

ACTIONS TO SCALE NBS

This section outlines seven actions to facilitate the scaling of NbS:

- **Action 1:** Building a shared understanding and knowledge on NbS
- **Action 2:** Creating a strong sense of ownership among local communities and environmental stewards
- **Action 3:** Integrating NbS into policy, planning, and programmes
- **Action 4:** Strengthening institutional capability and operational partnerships (and awareness to operationalise on-the-ground NbS actions)
- **Action 5:** Developing a robust monitoring, evaluation, learning, and adaptation (MELA) system (as well as sound science and IPLCs – Indigenous Peoples and Local Communities – knowledge systems)
- **Action 6:** Developing robust (and long-term) financing partnerships
- **Action 7:** Embedding GESI principles across all actions

SECTION 3

A DIAGNOSTIC CHECKLIST FOR DESIGN, IMPLEMENTATION, AND OUTCOMES

We have devised a diagnostic checklist to evaluate NbS across their design, implementation, and result phases. This tool offers a comprehensive set of indicators to assess how well the remedies align with NbS criteria. By systematically applying these qualifiers, stakeholders can identify strengths and

areas for improvement, thereby ensuring that NbS initiatives are robust, effective, and scalable.

TARGET AUDIENCES

This guide will be useful for development practitioners who facilitate actions on the ground and for decision-makers who provide strategic support. It is also intended for those who are trying to understand, design, implement, and scale NbS. The information herein is applicable at a broader level and is relevant to non-governmental organisations, private-sector agencies, academia, and training institutions engaged and interested in NbS.

DISCLAIMER ON USE OF THE TERM NBS

In the countries where HI-REAP operates – Bangladesh, Bhutan, India, Nepal, and China – the term ‘NbS’ is interpreted differently within different countries’ policy frameworks. For instance, in India, ‘Ecosystem-based Adaptation’ (EbA) is the more commonly used term. This document adheres to the global definition and concept of NbS, focusing on the principles that underpin nature’s solutions. Our primary aim is to emphasise the substance and processes of solution design and their scalability, rather than advocating for a specific terminology. The intent of this document is to highlight the transformative potential and practical applications of integrated solutions, regardless of the terms used by individual countries. We respect and acknowledge each country’s preferred terminology and do not intend to impose the term ‘NbS’ on national policies. Our goal is to support and enhance the implementation of these solutions under any recognised nomenclature, thus facilitating their broader adoption and impact.

While this guide is primarily based on HKH experiences, it also builds upon the call by the United Nations Environment Assembly of the United Nations Environment Programme (UNEA-UNEP) to follow ‘a country-driven, gender-responsive, participatory and fully transparent approach when designing, implementing and monitoring NbS. Thus, this manual is relevant for global application.

What is not working well

GROWING SOCIETAL CHALLENGES

Human activities have pushed Earth's systems to their limits. Despite numerous positive actions and plans to address societal challenges such as climate change, disasters and natural hazards, poverty, disease, food and water insecurity, and ecosystem degradation – these continue to grow. As such challenges are intertwined, the risks are complex and cascading, and the investments in solutions are usually sectoral and not applied equitably (Pörtner et al., 2023). Often, solutions are designed targeting the symptoms, which misses the root causes and deeper consequences. Also, the focus on sector-specific mandates ignores the factor of interdependence and synergy among various sectors.

SILOED APPROACHES

The silo approach, characterised by agencies operating within their own mandate and space, hinders the designing of comprehensive solutions to address societal challenges (Sarabi et al., 2019). For example, conservation agencies that accord priority only to nature preservation may overlook the need for local communities to use ecosystem resources and services; Conversely, when development interventions accord priority to economic gains without giving due consideration to the sustainability of natural resources, societal challenges go unaddressed. The Global Ecosystem-based Adaptation Fund reports that only 17 per cent of EbA initiatives are implemented as part of broader, integrated approaches.

KNOWLEDGE AND AWARENESS DEFICIT

Limited awareness and understanding about NbS among different groups, including policymakers, communities, and investors, pose challenges to their adoption. In a survey conducted by the World Economic Forum (WEF), nearly 60 per

cent of the respondents stated that they were unfamiliar with the concept of NbS. Notably, the Fifth Session of the UNEA formulated a resolution emphasising the importance of setting a common standard and best practice guidelines for NbS. However, the current status is that, the concept of NbS needs to be elaborated upon and conveyed to stakeholders in a clear way. It is also important to prepare a region-wise list of barriers and to contribute to improvising the global adoption of NbS.

FRAGMENTED AND INSUFFICIENT FINANCE

Current finance for NbS is fragmented and inadequate. As per the State of Finance for Nature 2021, it is estimated that an investment of USD 8.1 trillion in nature is needed between now and 2050 to tackle the triple planetary crisis (UN et al., 2021). Besides, the report indicates that the annual investments in NbS need to triple by 2030 and increase fourfold by 2050 from current levels, which highlights the need for significant financial resources to scale these solutions. While the private sector has a crucial role to play, its engagement in NbS projects remains limited due to its wariness about financial risks and uncertainties, and the lack of an enabling environment for its engagement and involvement.

LIMITED POLICY INTEGRATION

NbS should be locally implemented but nationally designed, connecting physical, jurisdictional, and temporal boundaries, thereby entailing interactions among governance at local, subnational, and national levels (Timboe & Pharr, 2021). However, efforts to mainstream these solutions into the broader development agenda have not materialised. Likewise, there are no clear policies and legal frameworks in countries to back NbS interventions. Only 37 per cent of countries have specific policies that support NbS (IUCN, 2016). A good starting point is to develop a shared

understanding of the terminology and definition of NbS which can influence their mainstreaming into policies.

LACK OF ROBUST MONITORING AND EVALUATION

The absence of a robust monitoring and evaluation framework hinders the assessment of NbS effectiveness, making it challenging to demonstrate their impact, especially its cost-effectiveness, long-term. Less than 20 per cent of NbS projects globally have adequate monitoring and evaluation systems in place (UNEP, 2022). The challenge also lies in appropriately funding research to objectively define verifiable NbS indicators for Monitoring, Evaluation, and Learning (MEL), particularly over time frames, in order to demonstrate the long-term impacts

of NbS. To date, anecdotal evidence has been used, making the case for NbS less appealing for funders and policymakers (Tye et al., 2022).

BARRIERS TO INCLUSIVE ENGAGEMENT

For the successful implementation of NbS, community involvement is necessary; however, barriers such as lack of inclusivity and lack of local empowerment hinder effective community engagement. Research from the World Resources Institute (WRI) suggests that only 29 per cent of NbS projects have established mechanisms for meaningful community engagement. Working with local stakeholders, women, youth, the marginalised and vulnerable communities, and Indigenous People is essential to balance competing goals and harness synergy.

Scaling of NbS is urgent

Some of the reasons for the urgent need to scale NbS are:

- The extent of the triple planetary crisis is growing and the extent of degradation demands large-scale efforts implemented across larger geospatial and temporal scales.
- The challenges posed by the triple planetary crisis necessitates both local and global solutions that are sustainable and relevant in the long term.
- As challenges around climate change, biodiversity loss, and sustainable development are complex and interrelated, it is necessary to devise solutions that simultaneously address these challenges.
- NbS build resilience in terms of both biodiversity (by safeguarding ecosystems) and community (through sustainable development and climate adaptation actions).
- NbS address the myriad societal challenges that people are facing – related to food, water, livelihood, health, poverty, pollution, energy, disasters, and settlements – while also generating environmental co-benefits.
- GESI-responsive NbS can address the unique climate change adaptation needs of women and other disadvantaged groups.

The global imperative for scaling NbS

NbS are gaining prominence in the global policy arena given the climate (IPCC, 2019) and biodiversity crises (IPBES, 2019). The first draft of the Kunming-Montreal Global Biodiversity Framework emphasises on increasing the resilience of biodiversity through mitigation, adaptation, and disaster risk reduction actions, which include Nature-based Solutions and/or ecosystem-based interventions (CBD, 2020).

Since NbS are linked to the international agenda on climate, biodiversity, and sustainable development, while the actions have to be linked to nationally determined commitments, regional actions (beyond one nation) are required to facilitate scaling. Both UNFCCC (United Nations Framework Convention on Climate Change) and UNCBD (United Nations Convention on Biological Diversity) advocate for mainstreaming NbS into national and subnational policies across sectors, thereby integrating them into public decision-making processes. Recognising the connection between climate and biodiversity actions, both UNFCCC and UNCBD have also urged parties to combine efforts to scale NbS.

Science-policy platforms such as the IPCC (Intergovernmental Panel on Climate Change) and IPBES (Intergovernmental Science-Policy

Platform on Biodiversity and Ecosystem Services) point to the ability of NbS and biological actions to deliver both climate and sustainable development outcomes (H.O. Pörtner et al., 2022). They call for investments in rigorous science so as to assess the performance, cost-effectiveness, and impacts of NbS, as well as to integrate NbS into climate scenario analysis. IPBES recognises the importance of assessing the contributions of NbS in sustaining the value of natural capital and in providing a wider range of ecosystem services.

Thus, the global implications of scaling NbS are multifaceted and touch on various aspects of environmental sustainability, climate resilience, and socio-economic development; the solutions also empower countries to abide by their global commitments.



SECTION 1

Three key terms

1.1. NATURE-BASED SOLUTIONS

1.2. GENDER EQUALITY AND
SOCIAL INCLUSION (GESI)
RESPONSIVENESS

1.3. SCALING





1.1 Nature-based Solutions

NbS include actions to protect, sustainably manage, or restore natural ecosystems that address environmental, social, economic, and gender-related challenges while simultaneously providing human well-being and biodiversity benefits. NbS harness the inherent potential and principles of nature to address societal challenges. These are collective actions rooted in a shared cause for environmental, economic, and sociocultural well-being, and designed to provide multiple benefits – primary benefits are related to core societal challenges and secondary benefits related to efficiency and sustainability.

NbS that are GESI responsive present an opportunity to address the unique climate change adaptation needs of women and other disadvantaged groups; this can enhance their adaptive capacity while also strengthening the resilience of the ecosystems that sustain their livelihoods (Dazé & Terton, 2021).

In practice, NbS refer to:

1. Solutions that address myriad societal

challenges that people are facing – concerning food, water, livelihood, health, poverty, pollution, energy, disasters, and settlements – without damaging or negatively affecting nature, biodiversity, and the environment.

2. Solutions that are designed to uphold the ecological principles of nature – diversity, interdependence, inclusiveness, adaptability, and resource efficiency – with approaches that are more equitable, inclusive, and holistic.
3. Solutions that deliver co-benefits in terms of the environment, climate, and sustainable development while addressing context-specific societal challenges.
4. Solutions that acknowledge gender and social differences in needs and capacities, and promote equitable participation and influence for adaptation-related decision-making and for equitable distribution of benefits.



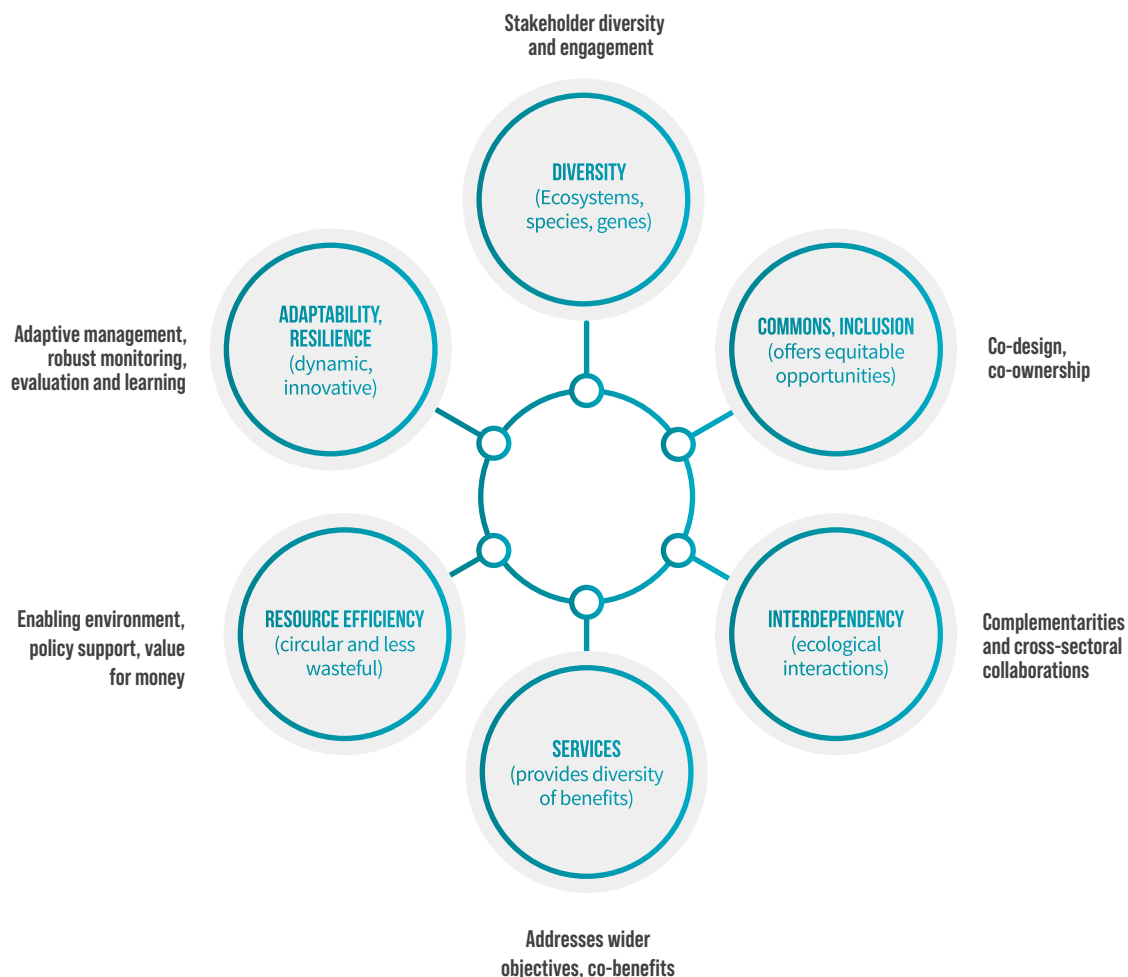
Embedding ecological principles in the design of NbS

Nature and ecosystems are integrated entities where components or parts work together to achieve a common purpose or function. The design of NbS embodies nature's inherent ecological principles – such as diversity, dynamism, interconnectedness, commons, interdependence, resource efficiency, recycling, and adaptability – to optimise the implementation of the solutions (Figure 1). NbS, therefore, are more efficient and sustainable by addressing multiple developmental and environmental goals at the same time.

Science indicates that understanding the connectedness of nature and its manifestations can inform strategies for the sustainable transformation and long-term well-being of both humans and nature (Helne, 2022). Some of the ecological principles of nature that underpin the NbS narrative are described below.

FIGURE 1

ECOLOGICAL PRINCIPLES AND THEIR INTEGRATION INTO THE NBS CONCEPT AND DESIGN



DIVERSITY

In a natural system, diversity of ecosystems, species, and genes interact to collectively create a balanced environment. When applied to NbS design, this implies recognising and harnessing the potential of diverse actors and institutions in order to make the solutions more holistic and integrated. These diverse actors and institutions with their own mandates must work together for a shared cause – that of addressing a key societal challenge. The extent of diversity must be a subject of discussion to improve and optimise the intended results. In terms of NbS, this also implies adopting inclusive practices and co-developing solutions that benefit wider communities, including disadvantaged groups, and ensuring that they do not exacerbate existing inequalities. The broader vision of equitable engagement and benefit sharing has to be considered while designing the solutions.

INTERDEPENDENCY

In nature, various ecological functions –such as nutrient and water cycling, energy flow, decomposition and waste management, climate and water regulation, resilience towards disturbance, and interactions between land, plants, and animals – take place simultaneously, one or more complementing other(s). In terms of NbS, this implies enhancing the synergy and complementarity among different sectors with their specific functions, including working with men and traditional powerholders to address gender and social norms that create barriers to optimising the benefits.

SERVICES AND BENEFITS FLOW

Nature provides a multitude of ecological services. Diverse organisms and their interactions create ecosystem services and benefits – from the provisioning of food and water to nutrient cycling and waste regulation. In terms of NbS, this implies generating wider environmental, economic, and sociocultural well-being and ensuring equal co-benefits that contribute to climate, biodiversity, and sustainable development goals and objectives.

RESOURCE EFFICIENCY

In nature, nothing gets wasted and results are optimised through strong coordination and feedback mechanisms among the functions of the various components. In terms of NbS, this implies adopting resource-efficient practices wherein resources (both financial and non-financial) are judiciously used, thereby minimising negative environmental impacts and optimising benefits and services. This also means creating an enabling environment in terms of policy, finances, institutions, and incentives to make the solutions more equitable and inclusive.

DYNAMISM AND ADAPTABILITY

Nature is dynamic. As it undergoes changes, it builds in mechanisms to adapt to the changing conditions or to bounce back and recover after disturbance. In terms of NbS, this implies creating a robust learning mechanism and building in the adaptive management capability.

Understanding the relationship and differences between NbS and other approaches is crucial for effectively operationalising and scaling NbS. Although the NbS framework aligns with the ecosystem approach (Secretariat of the Convention on Biological Diversity, 2004), it extends further by integrating various approaches and solutions to address societal challenges on a larger scale (Cohen-Shacham et al., 2019). Achieving sectoral policy coherence and synergy is essential for NbS as this enables learning from other methodologies, such as combining ecosystem-based and community-based approaches to enhance the sense of ownership over biodiversity management actions. Scale is critical here – NbS require a larger operational scale, both spatially and temporally, to generate broader co-benefits. This necessitates coordination among elements such as capacity building, policy development, legal frameworks, and financial mechanisms for successful implementation.

Integrating GESI aspects into NbS is important given the multifaceted and persistent nature of the climate and biodiversity crises and their interactions with social and gender inequalities. Research has shown that attention to gender

aspects improves the overall effectiveness of adaptation efforts (Dazé & Church, 2019; Dazé & Dekens, 2017; Global Gender and Climate

Alliance, 2016; Huyer, 2016; IPCC, 2019; United Nations Framework Convention on Climate Change, 2016).

SOCIAL AND CULTURAL BENEFITS	ENVIRONMENTAL BENEFITS	ECONOMIC BENEFITS
Social and cultural benefits can include improved health and well-being, and increased social safeguards, enhanced sense of local ownership, and empowerment. Since NbS are designed and implemented in an inclusive manner, they are culturally appropriate and meet the needs of the local population, including Indigenous People and the marginalised and socio-economically vulnerable communities. NbS are designed ensure that social benefits are distributed fairly and equitably among all members of society.	Environmental benefits can include effective management of biodiversity, ecosystem, and habitats, as well as preservation and protection of critical ecosystems. NbS also enhance the potential for carbon sequestration and climate mitigation, as well as climate adaptation and resilience, thereby improving air quality, water quality, and soil health, and also mitigating natural disasters. Moreover, NbS enable the integration of ecological and cultural aspects into their design, which translates to giving due respect and acceptance to the traditional ecological knowledge of the local communities.	Economic benefits can include sustainable food systems and food security, green job creation, support to local livelihoods and economies, and saving costs related to water resources management, health management, and development of disaster risk reduction (DRR) infrastructure. In addition, integrating NbS into real estate development enhances property value by boosting the aesthetic appeal of the property and promoting the well-being of its users, for example, via cooling of temperature and having a positive effect on mental health (Perera et al. 2024). NbS also enable the production of eco-friendly products and services, which improves the income power of communities.



Embedding ecological principles in NbS design

The resolution of the UNEA-UNEP defines [NbS for supporting sustainable development](#) as ‘actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits’ (UNEP, 2022).

While this definition broadly aligns with the [IUCN definition](#), the UNEA-UNEP resolution further unpacks NbS as actions that:

- respect social and environmental safeguards, including those for local communities and Indigenous Peoples
- can be managed adaptively in accordance with the local, national, and regional circumstances

- address major social, economic, and environmental challenges, such as biodiversity loss, climate change, land degradation, desertification, food insecurity, disaster risks, urban development, water insecurity, poverty, inequality, and unemployment
- are cognisant of the concept of ecosystem-based approaches identified in the Convention on Biological Diversity (CBD)

In 2015, the European Commission broadened the concept of NbS as actions ‘*inspired by, supported by, or copied from nature; both using and enhancing existing solutions to challenges, as well as exploring more novel solutions to help societies address a variety of environmental, social and economic challenges in sustainable ways*’ (European Commission, 2015). There are two other facets linked to this definition:

- nature derived, mainly relating to energy solutions from wind, wave, and sun to help fulfil low-carbon energy needs

BOX 1

SOCIAL AND ENVIRONMENTAL SAFEGUARDS AS A PREREQUISITE FOR NBS DESIGN

Environmental and social safeguards are fundamental prerequisites for the effective implementation of NbS. This entails:

- prioritisation of rigorous social and environmental impact assessments
- inclusive stakeholder engagement
- deliberate actions to enhance GESI outcomes

NbS initiatives, in their very design, need to emphasise the needs and concerns of the most marginalised and vulnerable communities, and promote equitable access to benefits. In addition, designing a robust monitoring and evaluation mechanism to allow for continuous assessment and adaptation can ensure that NbS interventions remain aligned with environmental and social objectives. These safeguards are essential to mitigate potential risks and to enhance the resilience and long-term viability of NbS initiatives.

- nature inspired, relating to innovative design and use of materials that mimic biological processes and functions.

A definition updated five years later (in 2020) added the element of cost-effectiveness, stating that NbS are ‘cost-effective, and simultaneously provide environmental, social and economic benefits and help build resilience’ (European Commission, 2020). This definition also highlights the design dimension of NbS by stating that ‘such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions’.

Globally, NbS are being considered as the most promising strategy to increase both environmental and social well-being, one that can strengthen human–nature relationships (Helne, 2022) and help achieve both climate and biodiversity objectives (Pettorelli et al., 2021).

NbS are also seen as an approach that can trigger transformative social–ecological interactions in a way that can ‘sustain the Earth’s biophysical systems while meeting human needs’ (Palomo et al., 2021), thus optimising synergies between nature, society, and the economy, and promoting a more sustainable and competitive economy (Faivre et al., 2017).

It has also been noted that the benefits from NbS are distributed a way that is intricately tied to local, historical, cultural, political, economic, and environmental conditions and considerations, as well as to the inclusion of stakeholders in decision-making processes; the benefits are also tied to the incentive mechanisms employed (Thompson et al., 2023). This calls for careful design and implementation.

The potential of NbS to help achieve the sustainable development goals (SDGs) is made explicit in the definition by Seddon et al. (2021) where NbS are described as ‘actions that are underpinned by biodiversity and are designed and implemented with the full engagement and consent of local communities and Indigenous Peoples and cater to balanced societal, economic, environmental and climate outcomes – hence sustainable development’.

NbS are considered a powerful tool to increase the resilience of biodiversity while also providing co-benefits for humans through the increased use of biodiversity and ecosystem services (Kapos et al., 2019). The benefits are especially relevant when NbS are GESI responsive, as often the effects of climate and biodiversity degradation are felt most by the most marginalised and vulnerable communities (Cohen-Shacham et al., 2019).

An umbrella concept

There are several thematically focused approaches and practices that are linked to NbS (Figure 2). These include ecosystem-based approaches and ecosystem-based management (EbM) for the preservation of biodiversity and the protection of forests; integrated water resources management for water, soil, and agriculture; blue-green infrastructure for climate change adaptation; and ecosystem-based DRR (Nesshöver et al., 2017).

NbS are considered an umbrella approach encompassing all actions under different sectors, as they address crucial sociocultural, economic, and environmental concerns (Sarabi et al., 2019).

Science indicates that NbS need to be designed in relation to other existing concepts, without creating duplication and misunderstanding (Nesshöver et al., 2017). The strength of NbS therefore lies in:

- their potential to combine one or more approaches for innovation and optimisation of the outcome
- overcoming the bias of narrow sectoral perspectives and providing an alternative approach to quick-fix solutions
- adopting a systems approach and bringing in a long-term planning perspective to problem-solving
- mainstreaming environmental targets into sectoral policies, businesses, and practices, while also avoiding ‘overselling nature’ and ‘greenwashing’
- mainstreaming GESI so that it becomes

BOX 2

IUCN PRINCIPLES FOR NBS

- **Principle 1:** NbS embrace nature conservation norms and principles.
- **Principle 2:** NbS can be implemented alone or in an integrated manner with other solutions (e.g. technological and engineering solutions) to address societal challenges.
- **Principle 3:** NbS are determined by site-specific natural and cultural contexts that include traditional, local, and scientific knowledge.
- **Principle 4:** NbS produce societal benefits in a fair and equitable way in a manner that promotes transparency and broad participation.
- **Principle 5:** NbS maintain biological and cultural diversity and the ability of ecosystems to evolve over time.
- **Principle 6:** NbS are applied at a landscape scale incorporating a mosaic of ecosystems and ecosystem services.
- **Principle 7:** NbS recognise and address the trade-offs between the production of a few immediate economic benefits for development and future options to produce the full range of ecosystem services.
- **Principle 8:** NbS are an integral part of the overall design of policies and measures or actions, to address a specific challenge.

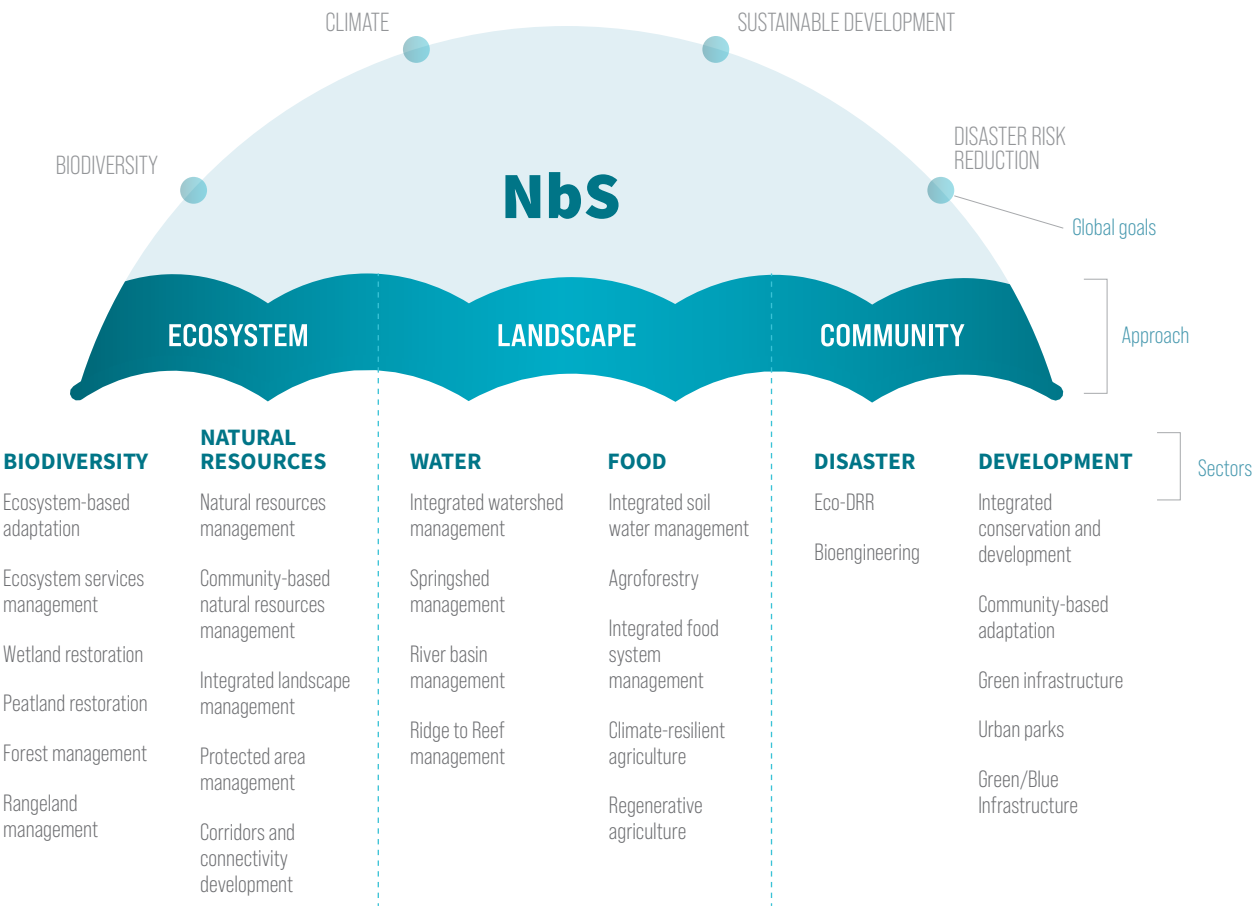
(Source: IUCN 2016)

‘business as usual’ within all aspects of climate adaptation planning, processes, and practices.

In all these approaches, NbS incorporate actions around protection, conservation, restoration, and the sustainable use of biodiversity, targeting the

sustenance of ecosystem services and benefits. Research indicates that greater biodiversity enhances the delivery of multiple ecosystem services, reduces trade-offs, and boosts ecosystem resilience to changing conditions (Key et al., 2022).

FIGURE 2 APPROACHES AND CONCEPTS LINKED TO NBS



BOX 2

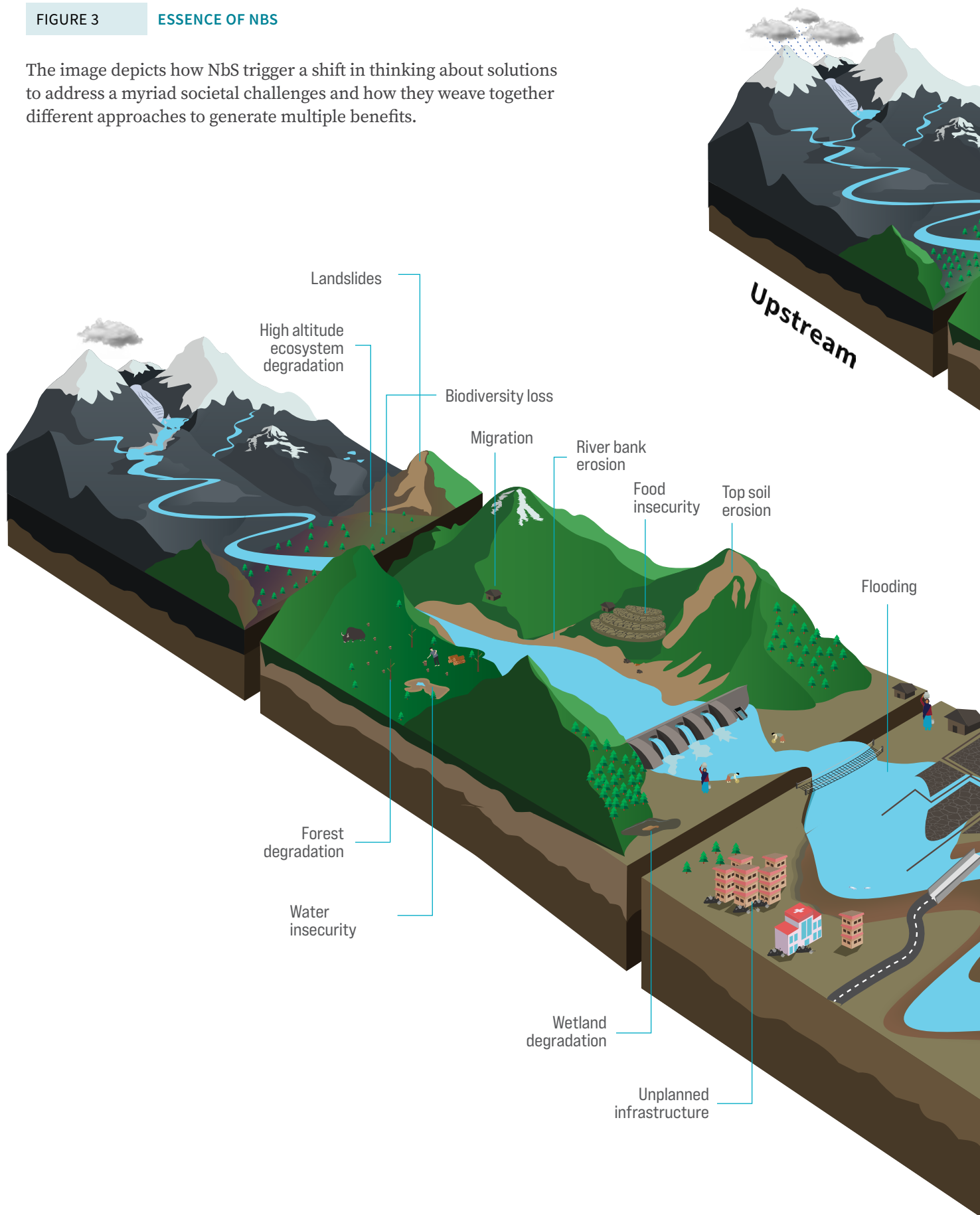
EXAMPLES OF RELEVANT APPROACHES AND ACTIONS THAT STRENGTHEN NBS

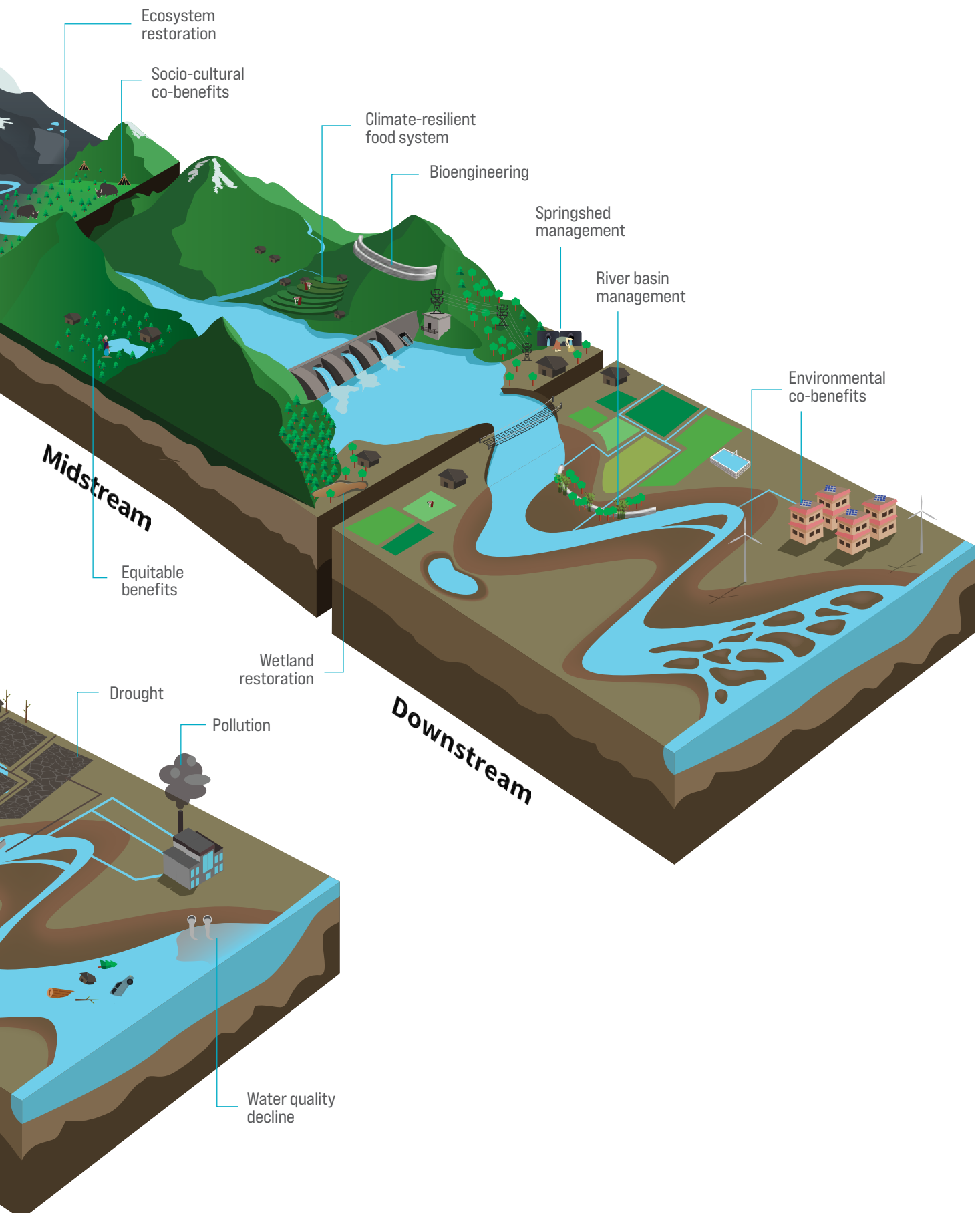
APPROACH	DESCRIPTION	REFERENCE	NBS PERSPECTIVE
Catchment system engineering or bioengineering	Use of vegetation to mitigate hillside instability, landslide, and erosion; also incorporates measures to reduce flood risk while restoring riparian vegetation; and maintains water run-off regimes and hydrological flow pathways.	(Wilkinson et al., 2014), (Stokes et al., 2014)	Consideration of integrated planning and restoration of damaged spaces
Green/blue infrastructure	Use of a spatially connected mosaic of multifunctional, natural, semi-natural, and man-made green and blue infrastructure, such as agricultural lands, bio-cultural spaces, forests, sacred groves, urban parks, wetlands, pastures, rivers, and corridors to enhance ecosystem services.	(European Commission, 2013), (Naumann et al., 2011), (Morris, 2007)	Weaving together natural features or processes to build green infrastructure
Ecosystem approach	Systemic natural resource management which considers levels of biological organisation and their functioning, and which recognises that humans, with their cultural diversity, are central to the management of land, water, and living resources. The emphasis is on managing ecosystems within their limit of functioning.	(CBD, 2000)	Uptake of principles of an integrated system to make solutions more cost effective, efficient, and sustainable
Ecosystem-based adaptation/mitigation and natural climate solutions	Focuses on carbon sequestration and water regulation to reduce climate-induced vulnerability, and encourages multi-stakeholder engagements.	(Roberts et al., 2012), (Kumar, 2022)	Making solutions climate resilient, involving multiple stakeholders; emphasis on policy integration
Ecosystem services management	Elaborates on the connection between ecosystem structures and functions, and the consequent benefit flow for human well-being. The idea is to relate to the goods and services provided by ecosystems and make informed decisions on the management and governance of these ecosystems.	(Millenium Ecosystem Assessment, 2005), (Primmer et al., 2015), (Díaz et al., 2015)	Multiple ecosystem services, equitable benefit sharing, and sustainable utilisation
Landscape approach	Taking landscape as a unit to understand the dynamism of change and considering the mosaic of landscape entities, including geophysical and cultural elements.	(Sayer et al., 2013), (Lavorel et al., 2015)	Spatial and temporal planning, shared understanding and co-designing of solutions
Social justice	Reaching out equally to all stakeholders; facilitating stakeholder-driven solutions and equitable distribution of benefits.	(Cousins, 2021), (Eggermont et al., 2015)	GESI responsiveness

FIGURE 3

ESSENCE OF NBS

The image depicts how NbS trigger a shift in thinking about solutions to address a myriad societal challenges and how they weave together different approaches to generate multiple benefits.







EXAMPLE A

SPRINGSHEDED MANAGEMENT

Springshed management is a holistic approach that safeguards water security by protecting and restoring upstream ecosystems, such as forests and wetlands. This strategy enhances groundwater recharge and promotes sustainable land-use practices, ultimately securing spring sources and increasing water retention. By focusing on the ecological health of the entire watershed, springshed management ensures reliable water supply while empowering communities by improving access to water and reducing the time and effort required for water collection.

Core societal challenge it addresses: Water insecurity due to the drying up of springs

ROOT CAUSES

Depletion of underground water sources such as aquifers due to:

- Erratic rainfall
- Decreasing snowfall
- Land-use and land-cover changes
- Deep borewells
- Seismic factors

CONSEQUENCES

- Lack of water for drinking, and for productive use such as farming and livestock rearing
- Drudgery for women and children to collect water

- Deterioration of health
- Insecure livelihoods and income
- Loss of habitat for flora and fauna
- Conflicts over access to scarce water

OTHER APPROACHES

- Rainwater harvesting
- Integrated watershed management
- Buying water
- Deep boring
- Tapping and conveying water from a distant source

THE NBS APPROACH

- Mapping of the springshed through community engagement commensurate with the scale of the challenge
- Identification of pilot sites to demonstrate solutions and ground actions (considered as a knowledge hub for learning and wider replication)
- Co-designing of solutions with local governments, communities, and other stakeholders who can provide technical and financial assistance
- Designing of ground actions using the six-step protocol for reviving springs; hydrogeological assessments for identifying recharge areas; land, water, soil, ecosystem, forest, and watershed management; solid waste management; and adoption of resilient agricultural practices
- Development of community and women-led institutions to facilitate springshed management and equitable water distribution
- Managing demand based on the capacity for productive use of water for farm and livestock (demand management)
- Development of a monitoring and adaptive plan consisting of cost-benefit analysis

- Supporting scaling plans for subnational and national levels
- Entering into partnerships with the private sector for wider-scale adoption
- Facilitation of knowledge sharing and dissemination

RESULTS

- Revived springs; water resources conserved
- Improved water security for home and farm
- Saved time of women and girls
- Effective water governance in place for fair and equitable distribution
- Sustained water regulation services
- Biodiversity and ecosystem restored in catchment and riparian areas, as well as around springs and rushes
- Enhanced socio-economic resilience
- Establishment of intersectoral partnerships
- Enhanced community and local government leadership capability



EXAMPLE B

BIRD-BASED NATURE TOURISM

Bird-based nature tourism as an NbS creates socially inclusive, resilient, and sustainable income opportunities by leveraging local biodiversity. It supports non-invasive tourism infrastructure, utilises local knowledge for guiding and interpretation, and fosters societal learning and capacity development. This approach not only protects and enhances natural ecosystems but also provides economic benefits to communities, contributing to climate resilience and conservation efforts.

Core societal challenge: Conflict between biodiversity protection and rural livelihoods

ROOT CAUSES

- Extensive land-use change from forest to agricultural land
- Lack of promising alternative livelihood options

CONSEQUENCES

- Habitat degradation
- Disruption of ecosystem services
- Decline in bird and wildlife population
- Loss of local culture and traditions
- Lack of interest among local communities in conservation actions

OTHER APPROACHES

- Ecotourism
- Biodiversity conservation
- Species conservation
- Buffer zone management
- Homestay development
- Value chain management

THE NBS APPROACH

- Integration of bird photography tourism
- Community-run bird hide infrastructure development for photography
- Bird habitat management
- Community capacity building on biodiversity conservation, and training of nature guides
- Government promotion of birdwatching tourism as an eco-friendly livelihood alternative
- Support for improving village infrastructure and road connectivity to strengthen ecotourism

- Establishment of community homestays and promotion of ethnic cuisine and culture
- Private-sector engagement for high-value tourism

RESULTS

- Enhanced household income and revenue generation through responsible and high-value nature-based tourism
- Community institutions-led benefit-sharing mechanisms
- Community-led proactive biodiversity conservation
- Conservation of bird habitats
- Knowledge sharing and enhanced local awareness of bird species
- Promotion of local culture
- Improvements in local infrastructure and communication channels
- Effective use of social media; more digital payments
- Effective public–people–private partnerships





EXAMPLE C

RANGELAND MANAGEMENT FOR MULTIPLE BENEFITS

Rangelands are home to iconic wildlife, such as the snow leopard and wild yak, and unique highland pastoral cultures that have evolved in harsh conditions among the world's highest mountains. This rich natural and cultural heritage is now threatened by climate and environmental change. Conserving, restoring and sustainably managing rangeland resources provides unique NbS to multiple societal challenges such as climate change, biodiversity loss, water shortage, and food security.

Core societal challenge: Degradation of rangeland ecosystems

ROOT CAUSES

- Policy barriers faced by herders and pastoralists carrying out their work based on traditional ecological knowledge
- Climate change
- Different aspirations of the new generation
- Unsustainable practices
- Land-use and land-cover changes, as well as land fragmentation
- Economic vulnerability of local stakeholders
- Increased human-wildlife conflict

**Currently Being Implemented in Bhutan and Nepal*

- Barriers to movement and genetic exchange
- Invasion of rangelands by weeds, invasive species and woody shrubs

CONSEQUENCES

- Degradation of rangeland ecosystems
- Weakening of water regulation
- Loss of rangeland productivity
- Degradation of the genetic vigour of livestock
- Loss of rangeland biodiversity and the culture and traditions associated with rangeland management
- Loss of entire bio-cultural practices and heritage

OTHER APPROACHES

- Sustainable rangeland management
- Rotational grazing
- Rangeland ecosystem services management
- Invasive species management
- Multiplication and sustainable storage of palatable fodder species via gene bank
- Ecotourism
- Agroforestry in winter pastures for additional fodder resources

THE NBS APPROACH

- Ecological restoration of degraded pastures by drawing from traditional ecological knowledge
- Strengthening of herders' institutions and networks
- Enhancing the capacities of the local stakeholders in sustainable rangeland management
- Advocacy for inclusive policies and legal support
- Economic valuation

- Identification of livestock germplasm and their improvement
- Characterisation of medicinal and aromatic plants
- Livestock-based value chain management
- Exploration of rangeland potential for carbon sequestration
- Innovative governance and policy insights

RESULTS

- Rangelands managed to support biodiversity and multiple ecosystem services
- Biodiversity enhanced, especially of palatable fodder species and rangeland medicinal and aromatic plant resources
- Sustainable harvesting of rangeland resources through a bioprospecting-based value chain
- Carbon and biodiversity potential defined for innovative funding mechanisms
- Empowered herders and pastoralist communities
- Cultural preservation and sociocultural well-being
- Increased forage availability for livestock and wild ungulates
- Enhanced motivation to manage rangelands because of multiple benefits



EXAMPLE D

SUSTAINABLE BEEKEEPING

Beekeeping serves as an effective Nature-based Solution (NbS) in the Hindu Kush Himalayas, providing marginalised and landless farmers, including women, with a viable income opportunity. Requiring minimal initial investment and small operational spaces, beekeeping can generate profits within the first year. It not only produces honey, beeswax, and other valuable products for household use and sale but also enhances livelihoods. By promoting sustainable practices, beekeeping contributes to ecosystem health, biodiversity, and community resilience.

Core societal challenge: Food and nutrition insecurity

ROOT CAUSES

- Inadequate access to and availability of adequate and diverse diets – leading to malnutrition
- Climate and anthropogenic changes
- Land-use and land-cover changes – leading to shrinking of agricultural land
- High fluctuation in yields due to weather variability
- Invasive species, weeds, and incidence of pests and diseases
- Loss of habitats
- Decline in pollinator diversity and population

CONSEQUENCES

- Decrease in fruit and seed setting due to inadequate pollination
- Loss of crop productivity
- Degradation of biodiversity – less pollination, leading to less fruit/seed setting and thus to less regeneration
- Loss of the culture and traditions associated with beekeeping and honey gathering from wild bees
- Less income for beekeepers and honey hunters
- Decrease in nutrition at the household level

OTHER APPROACHES

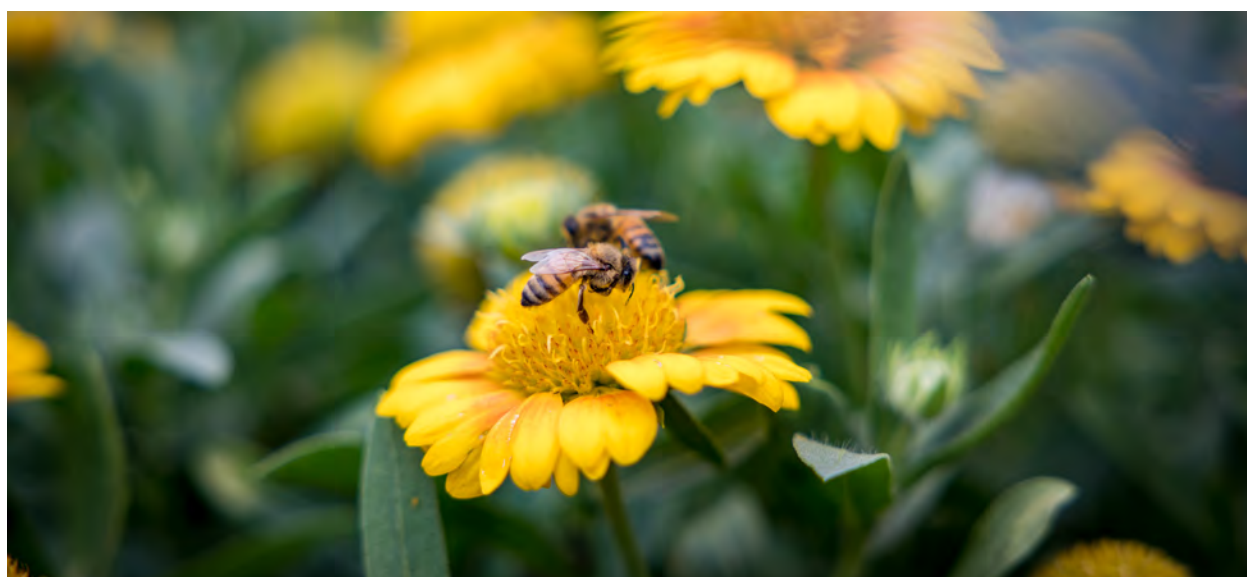
- Sustainable beekeeping management practices and honey-hunting protocols
- Honeybee habitat management
- Incentivisation of pollination services
- Provision of pollination services – smallholder beekeepers renting out bees for pollination of orchards and the orchard owners paying for the services
- Multipurpose bee flora
- Value chain development of bee products

THE NBS APPROACH

- Capacity building and training for sustainable management of bees
- Habitat mapping and management practices
- Protocols, guidelines, and piloting for sustainable honey harvests
- Innovative use of technologies for improving efficiency and saving time and cost
- Strengthening of beekeepers' institutions and networks
- Creating an enabling business environment with inclusive policies and legal support
- Adding value to honeybee products (such as honey, beeswax, pollen, propolis, royal jelly)

RESULTS

- Food and nutrition security enhanced with increased number of pollinators and increased frequency of pollination
- Sustainable harvesting of honeybee products and services
- Increased income from bee products-based value chain
- Empowered communities





EXAMPLE E

BIOENGINEERING/NBS FOR LANDSLIDE RISK MITIGATION

Bioengineering is a subset of green infrastructure that uses vegetation to serve an engineering function. The most common uses of bioengineering include soil surface protection against erosion, soil stabilisation, and improved drainage functions (ADB, 2020). This typically involves the use of vegetation to mitigate slope instability and soil erosion, restoring riparian vegetation and maintaining run-off regimes and hydrological flow pathways. Bioengineering to mitigate landslide risk includes ground actions such as reforestation and afforestation, construction of bioengineering structures, implementing sustainable land management practices – and even combining these with early warning systems. Since it is low-cost, uses traditional skills, and contributes to ecosystem function and services, bioengineering is sustainable, resilient, and inclusive.

Core societal challenge: Landslides disrupting lives and livelihoods in vulnerable areas

ROOT CAUSES

- Anthropogenic activities like land degradation, unplanned construction, and infrastructure development
- Geo-physical events such as earthquakes
- Climate change-induced extreme rainfall events

CONSEQUENCES

- Disruption of transportation and infrastructure
- Loss of life and property damage

- Negative impacts on ecosystems and biodiversity
- Psycho-social impacts on affected populations

OTHER APPROACHES

- Retaining walls and buttresses
- Slope stabilization with soil nailing, rock bolting, and shotcrete reinforcement
- Drainage systems to remove excess surface and sub-surface water and reduce pore pressure
- Landslide risk insurance

THE NBS APPROACH

- Identifying problems through community engagement, Geographical Information Systems (GIS)/Remote Sensing (RS) tools for mapping and use of drones/Unmanned Aerial Vehicles (UAVs) for detailed features and modelling
- Designing ground actions such as reforestation and afforestation, construction of bioengineering structures, implementing sustainable land management practices, and establishment of early warning systems
- Identifying of pilot sites to demonstrate the effectiveness of NbS
- Co-designing solutions in collaboration with

local communities, government agencies and technical experts.

- Developing community-led institutions to take ownership of NbS implementation and maintenance through focus groups and capacity building programmes
- Monitoring landslide risk and adaptive management strategies to address challenges or changes in conditions
- Scaling up by sharing lessons learnt and best practices from pilot sites
- Partnerships and policy advocacy that support mainstreaming of the NbS approach into disaster risk reduction and land management practices

RESULTS

- Reduced landslide risk and associated impacts on lives and property
- Enhanced ecosystem resilience and biodiversity conservation, co-benefits in wider ecosystem services
- Improved community preparedness and adaptive capacity to climate change
- Sustainable land management practices and increased livelihood opportunities
- Community empowerment and strengthened local resource governance





1.2 GESI responsiveness

NbS include various strategies that utilise nature to tackle challenges such as climate change, food insecurity, water scarcity, and disaster risk management. These approaches represent a wide range of natural resource governance methods, distinct from conventional approaches to solutions. Gender Equality and Social Inclusion (GESI) is a crucial consideration in these strategies (Elias et al., 2021). Research indicates that when women provide leadership in environmental and social arenas, this can lead to significant benefits in terms of natural resource management. However, despite this potential, women still encounter considerable barriers that hinder their equitable participation in formulating climate solutions, including NbS. Regarding overall adaptation efforts, research has shown that attention to GESI improves their effectiveness (Dazé & Church, 2019). The GESI approach to NbS is also crucial for identifying the structural problems that create power imbalances

which affect the disadvantaged groups. Focusing solutions on GESI can deliver more equitable outcomes and co-benefits.

Integrating a rights-based approach, with a specific emphasis on women's empowerment, has also been found to be effective in achieving related goals, such as enhancing household food security (Dazé & Terton, 2021). Studies conducted in India and Nepal have found that forest management groups with women members 'demonstrated improved resource governance and conservation outcomes' (IUCN, 2020), thus underscoring the beneficial ripple effects of enhanced diversity and equitable participation in natural resource governance.

Another significant point to note is that the gendered dimensions of NbS design and implementation have been less explored, with the result that the benefits of NbS are frequently portrayed as limited to the household level;

whereas, in fact, they extend far beyond this scope (Salcedo-La Viña et al., 2023).

Making NbS GESI responsive

An understanding of these three interconnected elements is crucial for making GESI responsiveness an integral part of NbS.

ACKNOWLEDGING GENDER AND SOCIAL DIFFERENCES IN NEEDS AND CAPACITIES

Gender and intersecting social factors influence roles, knowledge, and rights, leading to different needs and capacities in NbS. To ensure inclusivity, these differences must be addressed through targeted actions and equity measures. An intersectional gender analysis, considering age, economic status, ability, education, ethnicity, geography, and language, is essential for understanding these diverse needs (Government of Canada, 2023). Designing GESI-responsive and inclusive NbS requires assessing the specific environmental, climate, and socio-economic vulnerabilities of diverse groups. For this, the key action points include:

- Implementing initiatives that reduce the time burden and strikes a balance in gender division of labour.
- Ensuring equitable access to resources and financial support for all social groups.
- Providing training and support tailored to the diverse needs and capacities of different groups.
- Facilitating easy access for all to climate-related information.
- Regularly evaluating the specific vulnerabilities and risks faced by different gender and social groups.

Ensuring equity and inclusion in NbS governance

Governance, in terms of NbS, involves planning, implementation, and natural resource management. It is crucial here to ensure equity and the inclusion of under-represented voices, especially in leadership roles, across all decision-making processes. Empowering women and other disadvantaged groups in managing natural resources is essential for effective adaptation and smooth functioning of ecosystems (Woroniecki, 2019). This requires addressing the barriers to their meaningful participation in decision-making structures. The key measures that can be taken to facilitate equitable governance are:

- Introducing quotas for under-represented groups in natural resources management committees to ensure diverse representation.
- Embedding GESI considerations into all NbS policies and plans at every level of governance.
- Offering leadership and mentorship programmes for women and other disadvantaged groups to build their decision-making capacity.
- Supporting initiatives that empower marginalised groups, such as those that reduce climate-induced vulnerability and marginalisation.
- Identifying and addressing the specific barriers preventing the meaningful participation of disadvantaged groups in NbS governance.

Ensuring equitable distribution of benefits from NbS

Nbs policies and initiatives must ensure that socio-ecological and economic benefits are distributed equitably across all gender and social groups. Targeted interventions are needed to benefit women and other disadvantaged groups, and to bring about transparency and equal sharing of opportunities without exacerbating existing inequalities. It is crucial here to address traditional laws and sociocultural norms that

BOX 4

GESI IN WORLD BANK-FINANCED NbS OPERATIONS

The World Bank proposes various approaches to ensure the inclusion of groups that are often excluded or disadvantaged in society based on gender, disability, and sexual orientation, among other identities or factors. The Bank runs the Global Program on Nature-Based Solutions (GPNBS) to promote cross-sectoral efforts and investments across regions and sectors. A portfolio review of the Bank's lending operations from the fiscal years 2012 to 2021 shows that 67 of the 103 projects (65 per cent) with NbS were gender informed and they engaged local communities in project design and implementation to foster sustainability and ensure that local needs were understood and addressed (World Bank, 2023). The following four-step process is recommended to incorporate GESI into NbS:

1. Identify groups that are at risk of exclusion from NbS project benefits.
2. Analyse the gaps in inclusion in each NbS project context.
3. Design actions to address the identified gaps in inclusion in the NbS project.
4. Measure the impacts of the proposed actions on those at risk of being excluded using indicators and targets for inclusion.

Additional guidance on the above four-step approach is available in the GFDRR (Global Facility for Disaster Reduction and Recovery) report on [Entry Points for Social Inclusion and Gender in Disaster Risk Management and Climate Resilience Policy Operations](#) (Osman et al., 2022).

impact participation and access to NbS benefits (CBD, 2020). Effective monitoring, evaluation, and learning (MEL) systems are also essential for assessing equity in NbS outcomes and ensuring fair benefit distribution. Measures to ensure equitable and fair benefit distribution include:

- Setting aside dedicated funds to support equity actions within NbS projects.
- Engaging all stakeholders, especially the marginalised groups, in the design and implementation of NbS through participatory processes.
- Gathering and analysing data by gender, age, socio-economic status, and other relevant factors to understand and address disparities.
- Using inclusive monitoring methods to assess the qualitative benefits of NbS and ensuring that all voices are heard.
- Working with men and community leaders to create an enabling environment for the participation and empowerment of women and other disadvantaged groups.





1.3 Scaling

The triple planetary crisis of climate change, pollution, and biodiversity loss is deepening. Despite efforts at finding solutions, these societal challenges keep growing in scale and complexity. The intricate interplay of these challenges necessitates comprehensive and transformative measures at scale and speed, making the scalability of NbS an imperative proposition (Turner et al., 2015).

Scaling NbS implies not only increasing the quantity and geographical coverage of the projects but also ensuring that the principles and benefits of these solutions are embedded in policies, practices, and societal norms, thereby contributing to long-term resilience (Lam et al., 2020). It also refers to the process of expanding the reach, impact, and implementation of solutions beyond localised efforts or pilot initiatives to match the magnitude of the environmental and societal challenges. Besides, it involves replicating

successful NbS practices across different regions, ecosystems, or communities, aiming for widespread adoption and mainstream integration.

The scaling of NbS is a complex process and requires interdisciplinary expertise to unpack and understand ecological, economic, institutional, and sociocultural challenges (Fastenrath et al., 2020). It also involves co-developing knowledge, promoting societal learning, and pushing for knowledge integration for informed decision-making.

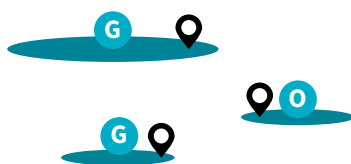
The scaling process also demands a rethink in the way solutions are designed; this is only possible through co-designing solutions, operationalising a network of solutions at the landscape level, monitoring outcomes for equitability and resilience, and ‘co-sensing’ societal challenges, which involves looking at the core challenge, root causes and consequences in order to ‘sense’ the system as a whole.

The NbS scaling procedure involves:

- **Context assessment:** Understanding the context of the societal challenges and the solutions they seek. It is of vital importance to disseminate information and provide targeted publications to all the relevant stakeholders, outlining the scope and components of the scaling process.
- **Potential value:** Quantifying the potential of NbS to achieve multiple policy objectives: biodiversity conservation, climate adaptation and mitigation, and sustainable development. In this regard, identification of case studies on implementation would be useful.
- **A scaling road map:** This map should include long-term vision perspectives, planning and implementation processes, and financing partnerships, as well as mechanisms for coordination and monitoring. This will contribute to making NbS a part of broader national, regional, and global strategies and goals. In addition, a socio-economic assessment of NbS can highlight the long-term implications of the solutions.
- **Rolling out solutions:** Engaging stakeholders in collaborative actions, identifying future risks, and employing adaptation and risk management strategies.

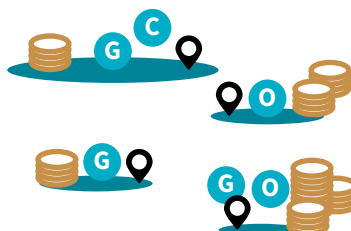
FIGURE 4

SCHEMATIC DIAGRAM ON SHIFT IN THINKING FROM A SILOED APPROACH TO NBS, WHICH TRIGGERS EQUITABLE LEVERAGING OF RESOURCES ACROSS GEOGRAPHIES AND SCALE, TO CREATE MORE INCLUSIVE SOLUTIONS



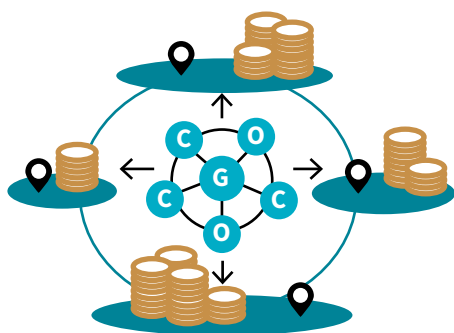
SILOED APPROACH

Efforts are fragmented and disproportionate for example **Government agencies (G)** are implementing efforts in different geographies, and efforts by other **other agencies (O)** do not overlap; solutions are designed from outside.



DISPROPORTIONATE AND EXCLUSIVE

Efforts are still fragmented. Some interest-led collaborations are happening between **Government agencies (G)** and **communities (C)**, but investments are still disproportionate. It is mostly supported by **public investment**.



NATURE-BASED SOLUTIONS

NbS are characterised by a relational partnership for a shared goal. Solutions are co-designed by communities, government and other agencies. **Communities (C)** are key players. There is equitable leveraging of resources, across geographies and scale; inter-sectoral innovations are designed to create more equitable, and inclusive solutions.



BOX 5

GESI IN WORLD BANK-FINANCED NbS OPERATIONS: A GREAT GREEN WALL TO PREVENT EXPANSION OF THE GOBI DESERT, CHINA

This example refers to a serious case of human-induced desertification in the drylands of Minqin in Gansu Province in north-west China.

Water from the Shiyang River is critical for Minqin County, situated downstream, especially to recharge desert oases. Due to the overuse of water upstream, when the desertification worsened in Minqin, the government introduced a scheme for wells whose number then increased from zero in 1964 to over 11,000 by 2007 (Zhang et al., 2007). This led to a gradual depletion of the groundwater table and the oases were covered by sand. Since this desertification process was also linked to wind-driven sand movement, the national and Gansu provincial governments introduced the Great Green Wall programme to restrict the spread of sand. Although some people state that the green wall programme focused too much attention on planting trees and not so much on controlling desertification (H. Jiang, 2016), this case is being used to cite a scaling strategy.

Ecological constructions are human-led interventions to rebuild ecosystems, such as the conversion of cropland into forests. In the case of controlling spread of sand in Minqin, linked to this was also ecological migration that saw people moving away from the degraded areas. In Minqin, the ecological construction was driven by policy discourse and a political context wherein the Chinese government needed to attend to large-scale environmental and poverty issues which were making global headlines. However, this ecological construction had many people pointing to the imbalances relating to too much focus on human-driven action and disregard for the natural environment – too much focus on planting trees and disregard for the cultural preferences of the ethnic communities and their connections to the land.

To control the spread of sand in Minqin, on-the-ground actions included planting of indigenous

shrubs (Hwang and Wei, 2009) along the railways and on drylands, and building shelter belts of trees. China's National Forestry and Grassland Administration led the initiative, which became one of the largest environmental programmes, covering 42.4 per cent of the country's landmass. This was supported by annual financial investments which increased from USD 1.6 million in 1998 to USD 20.2 million in 2009 (Wenfa et al., 2010). The forestry administration oversaw all the ecological rehabilitation efforts, with support from several institutions involved in monitoring, training, research, and policy.

Valuable lessons can be learnt from this case study. While the policy framework and government leadership set a firm footing for a programme with such a large geographic coverage, the implementation design would have benefitted from more participatory. Incorporating actions from different sectors into the co-design of approaches and solutions could have contributed to diversifying the strategy and helped to build synergy among the different sectors in the same space of operation. The consideration of the rights and responsibilities of the local communities and their cultural association with the land, including their active engagement in the decision-making process rather than as mere recipients of a government scheme, should have been an essential element of the NbS design. In addition, such a long-term policy decision should have considered findings from interdisciplinary science – for example, several studies have questioned the effectiveness of tree planting in dryland ecological systems (Cao et al., 2010).

Notwithstanding, the Great Green Wall programme was impressive in terms of the vision and scale of the solution, and showed the potentiation of scaling NbS.

BOX 6

USE OF SMALL- AND LARGE-SCALE NBS FOR FLOOD RISK MANAGEMENT

NbS for flood risk reduction and management need to embed actions for flood peak reduction (Yang & Chui, 2018), flood peak delay (Ishimatsu et al., 2017), and run-off volume reduction (Lee et al., 2013). Solutions such as green roofs perform better in reducing peak flows in the case of small and frequent storms (Ercolani et al., 2018), rain gardens and permeable pavements effectively cater to small quantities of rainwater, while storage ponds perform better in the case of large rainfall events.

NbS also rely on a combination of approaches, depending on what will best serve the need of the hour (Webber et al., 2018), for instance, hybrid solutions like increasing the height of road dykes and maintaining drainage systems, together with construction of networks of water retention ponds, infiltration trenches, vegetation swales, and maintenance of wetlands (Vojinovic et al., 2017). In such cases, in addition to the primary goal of flood risk management, several environmental goals (in terms of biodiversity, ecology, and water quality), social goals (of health and safety), and economic goals (by way of rainwater harvesting) are achieved.



What is the appropriate scale for NbS?

Scale is an important element in NbS (Vojinovic et al., 2017; Ruangpan et al., 2020). Temporal (time frame for NbS operationalisation), spatial (geographic), and action (intersectoral) scales are crucial aspects of NbS design.

The temporal scale considers the duration of NbS design, implementation, and results delivery. For example, it could take decades for NbS involving afforestation and sustainable land management to generate long-term ecological and economic benefits.

The spatial scale refers to the geographical scale for which the NbS are designed and implemented, for example, riparian restoration along river corridors, mangrove management in coastal regions, and regional rangeland management, including of wetlands, across many countries.

The action scale measures the magnitude of interdisciplinary actions and approaches embedded in the design, implementation, and results delivery of NbS. For example: some



actions can be localised and small, such as green roofs, rainwater harvesting, retention ponds, and permeable pavements; while some can be applied across a wider physical space, such as green corridors and connectivity development, watershed restoration, floodways, coral reefs, and ecosystem and natural waste management.

Scaling up, scaling out

Scaling up – or vertical expansion – can comprise:

- Programme institutionalisation, which means that the innovation, idea, or solution is adopted by agencies at the provincial or national levels through policy action; this requires proactive promotion, engagement, and advocacy.
- Mainstreaming, which is generally externally driven and represents adoption by other agencies in their programmes as a policy/guideline; this also requires active engagement and facilitation.

Scaling out – or horizontal expansion – can comprise:

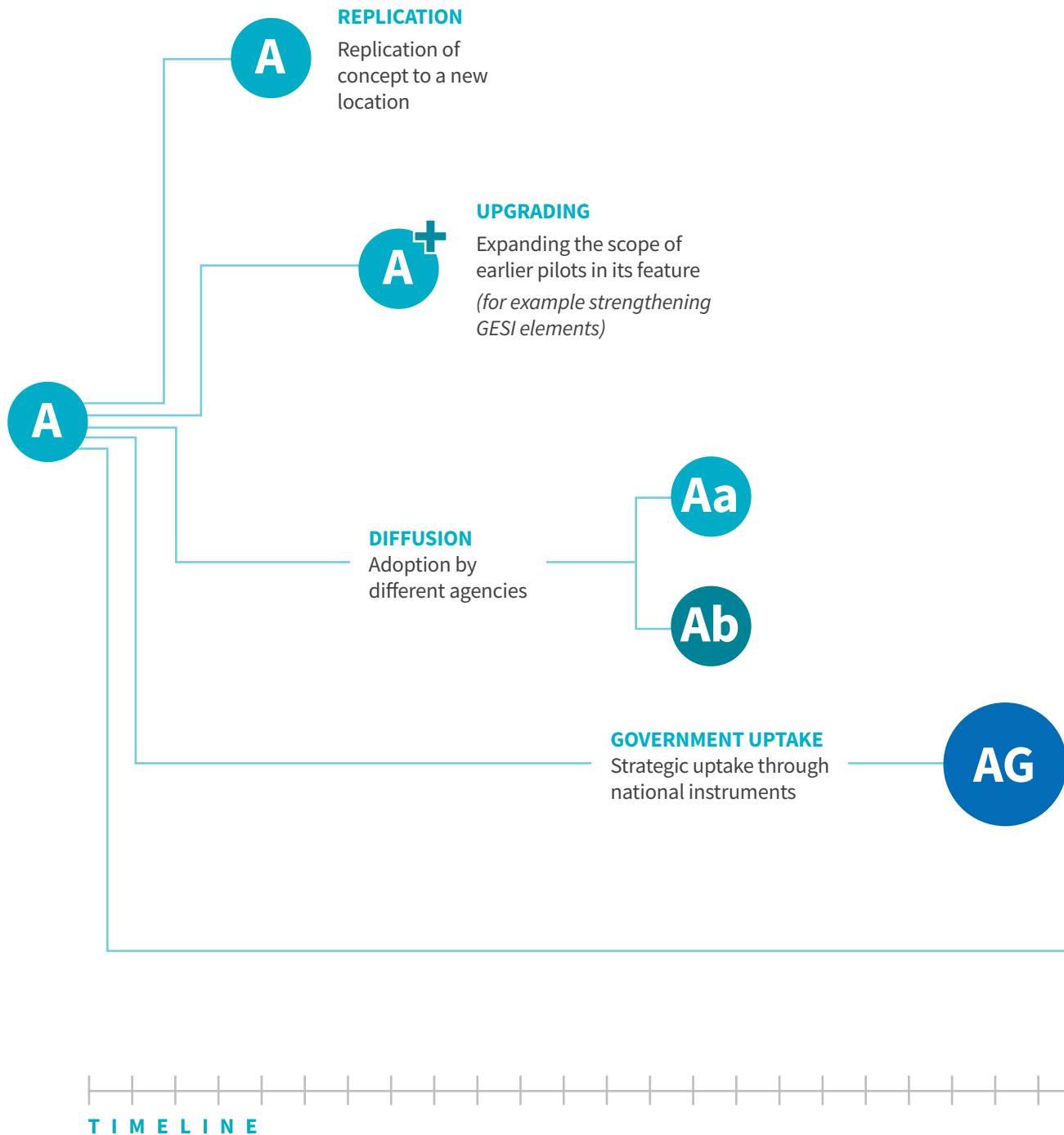
- Adoption or adaptation – this is spontaneous, an organic uptake, or copying which may require demonstration.
- Replication – this may be assisted or externally driven by NGOs or projects which require facilitation and promotion.

For more, [click here](#).

FIGURE 5

SCALING APPROACHES FOR NbS

A key dimension to scaling is the time frame needed to accomplish the desired outcomes. For example, if the parameter for NbS is carbon sequestration, the programme may have to wait for a decade for positive results.

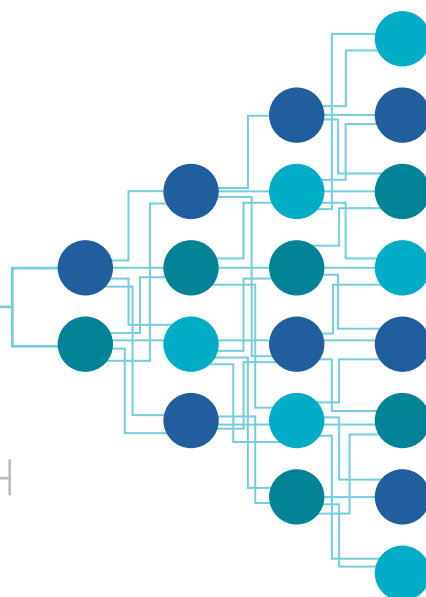


BARRIERS TO SCALING

- Inadequate policy enterprise to facilitate the engagement of key stakeholders, citizens, and technical experts, and mainstream NbS considerations into the policy and planning processes (Qiao et al., 2018).
- Lack of intra-organisational coordination processes and a risk-averse organisational culture (Croesar et al., 2021).
- Since delivery organisations have specific mandates and resources, shifting to intersectoral innovation becomes difficult (Matthews et al., 2015).
- Sectoral authorities operate in silos and often follow their own sectoral visions, goals, and regulatory frameworks, while NbS require full intersectoral cooperation and a shared vision (Vojinovic et al., 2021).
- NbS require a longer period to generate benefits, whereas institutions prioritise investments that generate quick returns in a short time (Kong et al., 2017).
- A general lack of awareness and knowledge regarding the benefits and requirements of NbS among communities and public workers, including among decision-makers (Versini et al., 2018).
- Lack of substantial knowledge and evidence base, and inequitable and small-scale allocation of budgets and resources for NbS (Kabisch et al., 2017).

TRANSFORMATIVE CHANGE

Mindset change of wider institutions



SECTION 2

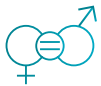
Actions to scale NbS

NbS demand interdisciplinary and cross-sectoral collaboration, and the engagement of policymakers and practitioners to mainstream them into policies, plans, programmes, and projects, as well as continual monitoring to assess their effectiveness and their long-term performance. Innovative financing models are also indispensable.

Scaling actions are interdependent processes that often require facilitation points or stepping stones, such as aligning NbS with strategic priorities, providing a public mandate; providing economic incentives, generating partnerships, building co-financing arrangements, engaging the insurance sector; establishing demonstration projects, improving data and monitoring, and advancing valuation models (Xie et al., 2020). The following key actions are necessary for scaling NbS:



The recommended actions presented here have been distilled from extensive conversations, dialogues, and discussions involving government agencies, academia, the private sector, development practitioners, communities, and reputed experts. In addition, insights have been drawn from our practical experiences, notably from implementing springshed management in the HKH. Our partners across five countries also added their contextual perspectives to these recommended actions. In essence, these actions are not just conceptual but also firmly rooted in diverse viewpoints, practical applications, and hands-on implementation experiences.

		FACILITATIONS		
	ACTION 1 BUILDING A SHARED UNDERSTANDING AND KNOWLEDGE OF Nbs	Multi-stakeholder consultations	Establishing a knowledge hub	
	ACTION 2 CREATING A STRONG SENSE OF OWNERSHIP AMONG LOCAL COMMUNITIES AND ENVIRONMENTAL STEWARDS	Capability reinforcement actions for local stakeholders	Benefit-sharing and incentive mechanisms	
	ACTION 3 INTEGRATING NBS INTO POLICY, PLANNING, AND PROGRAMMES	Science-policy dialogues and intermediary conversations	Strengthening local mandate and governance	Establishing a decision support system
	ACTION 4 STRENGTHENING INSTITUTIONAL CAPABILITY AND OPERATIONAL PARTNERSHIPS	Institutionalisation of training	Institutional engagement strategy	
	ACTION 5 DEVELOPING A ROBUST MELA SYSTEM	Improving the monitoring and evaluation platform	Adaptation and risk management strategies	
	ACTION 6 DEVELOPING ROBUST FINANCING PARTNERSHIPS	Business case development	Innovative financing	
	ACTION 7 EMBEDDING GESI PRINCIPLES ACROSS ALL ACTIONS	GESI analysis	Proactive support and co-designing of solutions	Sensitisation and awareness programmes
		Institutional capacity development	GESI-responsive policies and guidelines	Adaptive management



ACTION 1

Building a shared understanding and knowledge of NbS

Fostering a shared understanding and knowledge of NbS among stakeholders promotes effective collaboration, informed decision-making, and meaningful engagement.

NbS involve a diverse array of actors and stakeholders from the public to the private sectors, academia, and practitioners, and require particularly strong participation from the local community who experience first hand the impacts of climate change and biodiversity loss; the latter are also, for the most part, responsible for NbS management (Randrup et al., 2020). In building a shared understanding about NbS lies an important opportunity to collate the knowledge of the stakeholders so that the solutions are rendered relevant to a broader spectrum of society (Wickenberg et al., 2021).

This is also a foundational step to co-sense the extent of challenges and co-design solutions. The shared understanding helps align sectoral goals, strategies, and mandates of different agencies, and also paves the way for crafting various approaches to co-define what will work in different contexts. As the stakeholders gain a deeper understanding of the benefits from NbS and of the roles they need to play, setting up partnerships and financing mechanisms becomes more straightforward. This step is also crucial to assess policy support, institutional capacity, and the readiness for collaborative actions on the ground.

Facilitation: Multi-stakeholder consultations

Organising multi-stakeholder consultations bring together all the relevant stakeholders – decision-

makers, academia, the private sector, Indigenous People, local communities, development practitioners, non-governmental institutions, community institutions, women, youth, and the most marginalised sections of society. Representatives from diverse sectors – forestry, agriculture, infrastructure, culture, environment, park and protected areas, land commission, water, energy, finance, and education – can also be invited.

These multi-stakeholder consultations should ideally be led by the relevant government authorities, with support from appropriate institutions, and must have a purposeful mandate of inclusion of diverse actors (Faivre et al., 2017). This would reinforce a sense of shared ownership and responsibility for the solutions.

During the consultations, participatory and adult-learning approaches ought to be used to:

- Unpack the societal challenges to understand the core challenge, its root causes, immediate impacts, and long-term consequences.
- Map the existing approaches, solutions, and knowledge (both theoretical and empirical) to identify sectoral complementarities or mismatches.
- Map institutional capacities to implement solutions on the ground.
- Chart the role of different actors.
- Prepare a geospatial map to visualise the scale of the societal challenge and the extent of implementation and engagement that is required for the solutions.
- Develop an engagement strategy by identifying the contributions and resources of each actor within spatial and temporal scales.

BOX 6

DEVELOPING A SHARED UNDERSTANDING OF NBS IN BHUTAN

Building a common understanding of NbS helps to facilitate cohesive action and policy support for sustainable development. A multi-stakeholder consultation was organised in Paro in May 2023 to discuss the scaling of NbS for springshed management and green mountain livelihoods (bioprospecting) in Bhutan. The stakeholders included government officials, representatives from community institutions and the private sector, and experts from intergovernmental organisations.

The discussions began with the stakeholders expressing their views on NbS. Most stakeholders linked NbS with conservation-oriented solutions that have co-benefits in terms of climate mitigation and adaptation. Those they considered to be NbS are linked to sustainable forest management, birdwatching tourism, ecotourism, organic agriculture, species conservation, and biological corridors and connectivity. Some stakeholders also elaborated on their economic value by citing solutions like green value chain development. They also referred to Bhutan's NbS involving an integration of watershed management, irrigation and energy solutions.

The participants pointed to Bhutan's institutional and legal frailties as major barriers to effective coordination of NbS implementation. One of the ways forward, they said, is by having a lead agency at the national level in charge of integrating NbS into policies, plans, and programmes. The consultations identified Bhutan's National Biodiversity Centre (NBC), Department of Water, and local governments as potential agencies that can enable the execution

of NbS in the areas of water and livelihood insecurity, especially by promoting and scaling springshed management and value chains related to bioprospecting.

During discussions on springshed management, there were suggestions to utilise traditional ecological knowledge and to diversify the use of water sources beyond the purposes of drinking and irrigation. There were also suggestions to adopt a community-driven approach and integrate springshed management into the broader landscape practices. It was proposed that springshed management be integrated into flagship water policies. Another proposal was about providing incentives to local champions of conservation. In the area of bioprospecting, the participants called for blending traditional knowledge with modern practices and for assessing cost benefits and trade-offs. Some participants also stated that policy frameworks must streamline laws and ensure equitable benefit sharing among the local communities.

As for scaling NbS, the participants pitched for strengthening the capacity of local institutions, enhancing action research on springshed management, and exploring bioprospecting avenues. Many of the participants had the opinion that Bhutan could leverage NbS as a basis for sustainable development and conservation. Going forward, these discussions could contribute towards the conservation and sustainable development mandates of Bhutan's 13th Five-Year Plan, thereby including NbS in the wider national vision and agenda.

Facilitation: Establishing a knowledge hub

Identifying a pilot site for the demonstration of the solution will serve as a proof-of-concept or knowledge hub to facilitate further replication and scaling. This entails the following:

- Co-developing an action plan and specifying the roles and responsibilities as per the engagement strategy created during a multi-stakeholder workshop. It is important to ensure that all parties agree on their respective roles and responsibilities.
- Using the qualifier criteria to draw an NbS baseline for the pilots.
- Operationalising on-the-ground collective actions and engaging local stakeholders, women, youth, and marginalised communities.
- Developing education and awareness outreach materials for wider dissemination.
- Preparing appropriate protocols and operating manuals to ensure easier replication through the knowledge hub.

FIGURE 6

THE SIX-STEP PROTOCOL FOR GESI-RESPONSIVE SPRINGSHED MANAGEMENT

1. MAPPING



Help identify and map springs and other water resources in your area. Collecting basic information on water resources, geology, and socioeconomic conditions associated with springs can help lay the groundwork for spring revival. Make sure to include ponds, rivers, lakes, and wetlands.

2. DATA MONITORING



Help in monitoring the status of springs in your area. Selected springs can be tracked for long-term monitoring of factors such as rainfall, spring discharge, and water quality.

3. UNDERSTANDING SOCIAL AND GOVERNANCE SYSTEMS



Identify institutions and management systems within your community to help initiate spring revival and water management. Which agencies can help you, particularly in your area?

4. IDENTIFICATION OF RECHARGE AREAS



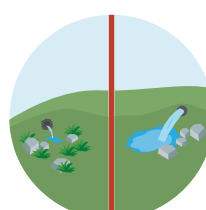
Work with experts to prepare a hydrogeological conceptual model of springsheds in the community to identify recharge areas for conservation.

5. IMPLEMENTATION OF RECHARGE MEASURES AND GOVERNANCE PROTOCOL



Have a discussion within your community and identify members who can implement different recharge measures (structural, vegetative, and management). Consider developing and mutually agreeing to a set of rules (dos and don'ts) that will help to protect springsheds.

6. UNDERSTANDING SOCIAL AND GOVERNANCE SYSTEMS



How have you made an impact? Did the water level of your springs increase? Did water quality improve? Did you notice an increase in water flows in the drier months after your interventions? Have you observed reduced workload and time spent fetching water?



ACTION 2

Creating a strong sense of ownership among local communities and environmental stewards

Empowering local communities and environmental stewards ensures that NbS initiatives are rooted in local contexts, thereby fostering a sense of ownership, responsibility, and long-term commitment.

Nature-based Solutions, while designed at a larger geospatial scale, must be locally implemented and socioculturally acceptable to the local environmental stewards. The key here is to build a sense of ownership among the local actors and strengthen their long-term engagement. Such a sense of local ownership is designed to ensure that solutions are culturally appropriate and aligned to community-specific needs and priorities.

To support positive connections with nature and the acceptance of NbS planning and implementation, it is paramount to understand and include citizens' concerns, needs, and preferences within programmes and processes (Kabisch et al., 2022). This step helps local communities and stewards see themselves as being integral to the solutions; they are then more likely to become the driving force for their sustainability.

Facilitation: Capability reinforcement actions for local stakeholders

It is necessary to engage with local stakeholders

to understand their sustainable development needs and aspirations, and also their capacity to contribute to or lead field-level implementation activities. Facilitatory actions include:

- Defining the opportunities to engage in MEL
- Exploring traditional ecological knowledge and practices, and also innovate on means for citizen science
- Defining the plans for capacity building
- Strengthening the capacity for field actions through training and exposure visits
- Organising debriefing sessions with the local government agencies for sharing updates and progress

Facilitation: Benefit-sharing and incentive mechanisms

This entails exploring innovative incentive mechanisms to retain the interest and commitment of local stewards towards NbS, especially by way of acknowledging the contributions of IPLCs. This involves:

- Either setting up or strengthening institutional mechanisms such as women's or youth groups to lead on-the-ground actions, including monitoring and reporting, and equitably distributing the benefits arising from the application of NbS.

- Embedding incentive mechanisms – both financial (supporting livelihoods and incomes) and non-financial (sustainable development) – into the action plan to reward local communities for their proactive involvement and engagement.
- Organising regular community engagement workshops to share updates on progress and challenges.
- Developing approaches to create markets for ecosystem services.

BOX 7

SPRING MAPPING IN KAVRE, NEPAL LED BY COMMUNITY RESOURCE PERSONS

In Nepal's Kavrepalanchok District, also known as Kavre, HI-REAP's is working to expand a successful springshed management initiative to seven municipalities across a vast 734-square-kilometre area, guided by the comprehensive six-step protocol for spring revival. Central to this effort is the adoption of the participatory mapping approach, facilitated by the expertise of 150 community resource persons (CRPs). Their involvement has been instrumental in documenting the status of 5,500 spring sources within just seven months.

A hallmark of the approach lies in the participation of women and marginalised communities, thereby ensuring that diverse perspectives shape these efforts. Embodying a bottom-up development ethos, the process begins with building rapport with municipalities and establishing a formal

partnership with them, which then facilitates connections with ward representatives. These representatives, in turn, select CRPs based on clear criteria, and they undergo rigorous training in areas such as app installation and mapping procedures.

This practice not only enriches HI-REAP's understanding of local dynamics but also ensures that its efforts resonate deeply within the communities it serves. Researchers from ICIMOD provide continuous support, cross-verifying data and offering guidance, thereby exemplifying their organisation's commitment to collaborative and data-driven community development in Kavre. Together with the CRPs, they are not just mapping springs, they are forging bonds of collaboration and empowerment to lay the groundwork for effective sustainable development practices.



BOX 8

BENEFIT-SHARING MECHANISM FOR BIRDWATCHING TOURISM IN BAIHUALING, CHINA

Hanlong village in Baihualing, Yunnan Province, south-western China, is located within a conservation priority area and hosts exceptionally diverse avifauna of the region. The village has capitalised on this rich local biodiversity to achieve economic prosperity.

Via the avenue of bird photography tourism, Hanlong has been witnessing significant changes in the livelihoods of its communities. Household earnings have seen a notable increase, with some households reporting substantial annual incomes, solely from bird photography tourism activities. This has also reduced excessive dependence on and exploitation of natural resources, thereby creating an environment-friendly economic development model. The employment opportunities this has created range from hospitality services to guiding and transportation. A vast majority of the households in Hanlong are actively engaged in homestays, guide services, and bird ponds. This surge in local entrepreneurship has also enhanced social cohesion and community empowerment. Moreover, through partnerships with conservation organisations and government agencies, Hanlong has implemented measures to manage and

preserve its natural assets sustainably.

Initiatives such as the establishment of cooperative mechanisms for pond management and the formation of a Bird Conservation Association have underscored the community's commitment to environmental protection. Birdwatching tourism has also been instrumental in knowledge exchange and skill development among the villagers; it has also empowered women and given them opportunities to be active participants and even leaders. More specifically, the villagers have gained expertise in bird identification and habitat management, which has enhanced their capacity to contribute to conservation efforts. In addition,, the influx of visitors has facilitated cultural exchanges and heightened environmental awareness.

In essence, this experience in Hanlong exemplifies a holistic approach to sustainable development. Through continued support from local leadership, government agencies, and external partners, the replication and upscaling of such initiatives holds promise for fostering resilient communities and preserving biodiversity for future generations.

Source: Basnet et al., 2021





ACTION 3

Integrating NbS into policy, planning, and programmes

Aligning NbS with local policies and planning frameworks ensures their incorporation into broader development strategies, thereby enhancing their impact and sustainability.

NbS work best when implemented at a larger scale – across whole landscapes with a mosaic of ecosystems and interconnected communities. In such circumstances, governments are best positioned to facilitate solutions at scale given their policy mandate, institutional set-up, and resources; however, government agencies must co-design the solutions with other stakeholders, including local communities. For the sustainability of the solutions, NbS must integrate a constellation of national and international plans, combined with the development of cross-cutting policies and plans at the municipality level.

The integration of NbS into policy and planning instruments is acknowledged as a key catalyser to their successful adoption in urban governance (Mendonça et al., 2021) and an important first step for their uptake. The policies and plans need to be open and flexible (Kabisch et al., 2022) to account for cross-sectoral, multi-level, and interdisciplinary governance (Kauark-Fontes et al., 2023). Throughout, the integration of policy requires strong scientific evidence, especially in terms of valuation and economic analysis (Nelson et al., 2020).

This key action provides the strategic, coordinated, and supportive legal framework necessary for scaling solutions across larger constituencies. It also establishes the foundation for collaborative actions and leveraging of resources for long-term sustainability.

Facilitation: Science–policy dialogues and intermediary conversations

In this facilitatory process, scientific communities, development practitioners, and decision-makers are brought together to share the latest scientific evidence and insights related to NbS and to highlight policy gaps. This entails:

- Conducting specific valuation and cost-benefit analysis of NbS to garner insights into their effectiveness. The economic effectiveness of NbS will be of particular interest to decision-makers to allocate public finances for NbS.
- Supporting policy review processes and sharing thoughts on policy enablers and barriers in order to allow for targeted policy adjustments and possible entry points for aligning NbS with the sectoral priorities.
- Encouraging sharing of case studies that demonstrate the practical applicability of NbS.
- Engaging with key policy think tank institutions to facilitate science–practice–policy dialogues and highlighting how sectoral public budgets and mandates can be combined for optimised outcomes for all sectors.
- Engaging with intergovernmental institutions and other intermediary institutions that can work across sectors and facilitate intersectoral conversations.
- Bringing NbS advocates and practitioners together to help build political will.



BOX 9

FACILITATING A SCIENCE-POLICY DIALOGUE FOR NBS IN BANGLADESH

Science-policy dialogues are a key platform to trigger valuable conversations between scientific communities and government decision makers. A science-policy dialogue was organised to facilitate a shared understanding of the science of NbS and policy for implementing NbS in the Chittagong Hill Tracts (CHT) Region in Bangladesh. The objective was to discuss the enablers and barriers to scaling NbS in the CHT region.

The Bangladesh science-policy dialogue was attended by senior government leaders, representatives from different government departments, research institutions, and development partners. The dialogue revealed the strong political will on the part of key agencies such as the Ministry of Chittagong Hill Tracts Affairs, Hill District Councils, and

Chittagong Hill Tract Development Board. It also brought to light some challenges around the science of Nbs, highlighting their effectiveness, and the absence of continuous monitoring and feedback mechanisms to adequately inform NbS supportive policies. It was a good realization on the part of government agencies, that NbS implementation requires strengthening intersectoral coordination and cooperation among various government agencies, line departments and collective development outlook.

The dialogue built a shared understanding on why NbS are necessary, what are good examples in the country, which institutions are actively engaged, what government programmes and policies support NbS, what are the advantages, prospects and barriers to promoting NbS in CHT.

Facilitation: Strengthening local mandate and governance

Scientific communities, development practitioners, and decision-makers are brought together to share the latest scientific evidence.

- Supporting local government to integrate the design and prospects of NbS into the official system – frameworks, plans, strategies, master plans, and action plans at municipality and subnational levels.
- Identifying lead public institutions to facilitate

cross-departmental coordination and cross-sectoral planning.

- Building the capability of public institutions to understand the shift in thinking in governance, based on NbS demands and facilitating partnerships for blended financing for NbS.
- Strengthening the capacity of local government in GESI budgeting to make NbS more inclusive.



BOX 10

MUNICIPALITIES GET TOGETHER TO SAVE KAVRE'S SPRINGS IN NEPAL

Seven municipalities of Kavrepalanchok District, also known as Kavre, in Nepal have backed a new campaign to revive drying springs and pledged to adopt community-led solutions to address the problem of growing water insecurity in the mid-hills. Dhulikhel, Namobuddha, Panauti, and Panchkhal, and the rural municipalities of Bethanchowk, Roshi, and Temal have signed an agreement with ICIMOD to roll out an innovative NbS to relieve water stress. A 2023 survey of 444 springs in Namobuddha municipality in 2023 revealed that nearly 20 per cent (93 springs) had dried up and many others were reporting a decline in water discharge. These springs are a critical water source for the local communities.

This commitment by the local governments builds on successful spring revival pilots in Kavre by ICIMOD and its partners. Water experts hope the landmark agreement will inspire other municipalities in Nepal and across the region wherever water stress is at a critical level, particularly during the lean seasons, to account for springshed management in their budgets and plans.

While joining hands in reviving the drying springs within the district, the municipal mayors also pledged funds and resources for Kavre to grow into a learning hub for springshed management.

Source: [ICIMOD, 2024](#)

Facilitation: Establishing a decision support system

This involves building an NbS model at the national level and providing key recommendations to the decision-makers on how to fast track wider scale adoption, while also developing a repository of best practices. This includes:

- Providing policy recommendations on entry points for integrating NbS into climate

change-related cross-cutting policies, national adaptation plans, biodiversity management plans, and sustainability plans in order to reinforce intersectoral cooperation.

- Creating evidence-based decision tools to support planning, implementation, and meaningful reinforcement for scaling NbS.
- Establishing a coordinating body or an NbS cell to synchronise the actions of different departments and to connect the dots between sectoral efforts.

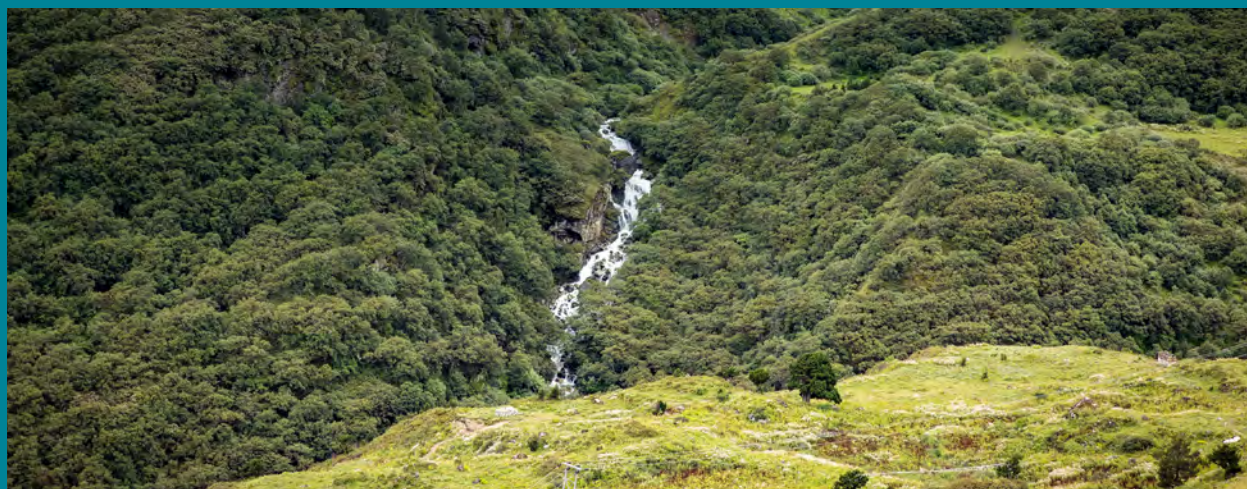
BOX 11

THE GREEN BENEFIT PLANNER

The Green Benefit Planner (GBP) is a valuation tool to estimate the monetary value associated with NbS. It is designed to help decision-makers make policy and investment decisions around NbS. Co-developed by the National Institute for Public Health and the Environment in the Netherlands, the toolkit was originally prepared to provide greener guidance when planning for urban infrastructure. The GBP is part of the natural capital approach in valuing the role of nature when planning for any developmental activities.

The European Commission has included the GBP as part of its [10 steps in mainstreaming NbS](#) for

joint actions on climate change and biodiversity preservation. Studies show that NbS can provide not only environmental benefits but also health and social benefits; for instance, the co-benefits of increased vegetation come in the form of reduction in healthcare and labour costs, as well as improved air quality and overall social well-being (Maas, 2008; Paulin et al., 2019; Remme et al., 2018). The GBP can also help to identify the most appropriate NbS that are required for a location facing a climate or environmental crisis. It can be a valuable tool for communities seeking to implement NbS to address climate change issues, improve biodiversity, and build urban resilience.





ACTION 4

Strengthening institutional capability and operational partnerships

Strengthening institutional capability is one of the keys to the successful operationalisation of NbS as it provides the necessary framework for effective governance, collaboration, and resource management. Investing early in the capacity building of local communities, government officials, and development practitioners improves sustainability of the solutions and awareness of equitable benefit sharing.

Institutional capability, especially in measuring the cost-effectiveness of NbS, is crucial. Research indicates that measuring the cost-effectiveness of NbS is complicated as the solutions require time to mature; cost also depends on the value of land on which the measure is being implemented (Vogelsang et al., 2023).

Facilitation: Institutionalisation of training

This is related to strengthening the skills and capacity of relevant public institutions so that they are capable of providing technical backstopping and extension services which can effectively operationalise on-the-ground NbS actions. Also, fostering leadership in key coordinating institutions is crucial in driving institutional change. This involves:

- Conducting institutional capacity needs assessment and mapping institutions for leadership and coordination roles.
- Identifying technical institutions and equipping them with the necessary information and capacity-building materials on the actions and approaches relevant to specific NbS.
- Integrating NbS into education programmes through curriculum design.

- Facilitating cross-learning among trainers and technical facilitators.
- Strengthening the role of institutions to align policies and regulations to support NbS.

Facilitation: Institutional engagement strategy

Assigning clear roles and responsibilities in different institutions engaged in NbS implementation is crucial to reinforcing efficiency and for wider uptake of NbS. Several mechanisms for this are available, including multi-stakeholder alliances and public-private partnerships. Such mechanisms also enhance the pool of existing competencies and perspectives (Brokking et al., 2021). The value of co-creation and co-management is critical here. This involves:

- Mapping actions by sectors and identifying cross-sectoral collaborative actions, and clearly defining the responsibilities of each institution, including the type of contribution or partnership that is expected.
- Using the service of a communication specialist to 'translate' technical information into language appropriate for a lay audience.
- Engaging in pilot interventions and making the necessary adjustments through an adaptive engagement strategy for scaling.
- Consensus building and co-sensing – these are crucial for the stakeholders to understand the significance of their roles.
- Drawing engagement actions from the mandate and strength of individual institutions.
- Putting in place a monitoring and evaluation mechanism for regular updates on stakeholder engagement.

BOX 12

INSTITUTIONALISATION OF SPRINGSHED MANAGEMENT CAPACITY IN SIKKIM, INDIA

Scaling of springshed management becomes feasible when the capacities of the relevant institutions are built across the entire HKH region. As a crucial step in this process, ICIMOD worked with the State Institute of Rural Development (SIRD) in Sikkim, north-east India, and jointly organised a springshed management (SSM) training course in 2022. As a result of the training, Sikkim's Forest and Environment Department (FED) and its Rural Development Department (RDD) jointly implemented a springshed management programme targeting around 7,700 people in Soreng district.

The SSM programme of Soreng aimed primarily to reduce water scarcity in the rural areas and to achieve co-benefits such as ecosystem restoration, climate adaptation, flash flood reduction, soil erosion control,

and enhancement of inclusive governance by engaging *gram panchayats* (local bodies), the wider community, and other stakeholders.

Building on past collaborations and the first stint of training, ICIMOD and SIRD conducted a training of trainers (ToT) programme in 2023 in Sikkim. Eleven professionals from SIRD, RDD, and FED who had taken the training in 2022 were part of the latest training programme.

The aim of the ToT was to develop a cadre of resource persons in Sikkim so that it doesn't have to depend on external experts in implementing SSM activities in the state. Since institutionalising springshed management requires long-term commitment and continual engagement with key government institutions, SIRD has now decided to conduct a ToT on springshed management every year.

BOX 13

PERU'S GREEN BELT INDEPENDENCIA INITIATIVE

The ingredients of a scaling strategy are made from a thorough assessment of stakeholder interests, priorities, concerns, and capacities, thereby enabling the development of inclusive and participatory approaches. In Peru, the Green Belt Independencia, initiative aimed to create a green belt and green spaces in the neighbourhood of Independencia, which was particularly vulnerable to landslides. This initiative relied on a consortium composed of private, public, national, and international actors, as well as academia – all supported by the municipality. Led by this strong group of organisations and communities, the initiative was able to deliver on several sustainable practices and create better living conditions for the people. The partnership context for scaling was important to orient a large group of mayors and local government leaders towards a common set of goals, thus institutionalising the partnership process.



ACTION 5

Developing a robust MELA system

Establishing a robust system for Monitoring, Evaluation, Learning and Adaptation (MELA) allows for continuous assessment of NbS effectiveness and learning from experiences, thereby facilitating adaptive management to improve future initiatives.

NbS address a diversity of societal challenges and generate several co-benefits. This makes their monitoring a complex process. A robust MEL system is thus the cornerstone of effective scaling of NbS.

A vigorous MELA system needs to run in parallel with NbS implementation, as NbS need a longer fruition timescale – often over a decade to show their full impact, especially in the areas of climate adaptation and biodiversity resilience. MELA indicators also need to reflect on the design, implementation, and results, in a context where co-designing and co-implementation are key to achieving impact through NbS.

In addition,, since NbS operate in a dynamic system, they need to deal with several uncertainties, and the expected results might not be achieved. NbS, therefore, must build in experiential learning as an important process for adaptive management and governance (Rogers et al., 2013).

Moreover, protecting and supporting biodiversity and ecosystems to maximise climate and biodiversity co-benefits is a fundamental action in NbS. Therefore, a range of biodiversity and ecosystem function indicators must be explicitly considered.

Facilitation: Improving the monitoring and evaluation platform

This facilitation process seeks to establish a robust MELA system to provide the necessary feedback, insights, and evidence to guide policy and investment decisions. This entails:

- Building a knowledge base for a scaling outline of what will work and what will not, and informing government agencies and investors about enablers and barriers.
- Innovating cross-learning and knowledge-exchange mechanisms.
- Integrating data and insights from different sectors to prepare case studies addressing a wide range of societal challenges.
- Identifying successful approaches and best practices, and enhancing data-driven decisions.
- Rigorous assessment of NbS and comparing them with engineered alternatives or business-as-usual solutions.
- Careful consideration of the indicators of GESI responsiveness in designing MEL indicators (Action 7).

Facilitation: Adaptation and risk management strategies

This involves the following adaptation and risk management methods:

- Monitoring progress in pilots and refining approaches as the solution matures, thereby proactively minimising setbacks and failures.
- Drawing up an adaptive management plan to identify, assess, and manage risk, and developing proactive risk management strategies.
- Demonstrating the effectiveness of NbS in the context of changing biodiversity, climate and making necessary improvements in approaches and actions for scaling.

BOX 14

DESIGNING THE HKH-NBS MEL PLATFORM

The Hindu Kush Himalaya Nature-based Solutions platform for MEL (monitoring, evaluation, and learning), being designed by ICIMOD and to be co-implemented by the RMCs, is set to be a robust system with an evidence feature that will allow institutions to publish their NbS cases, which then will be evaluated against the NbS criteria (NbS meter). The idea is to help institutions know exactly where exactly the solutions need to be strengthened. The platform will also feature pilot HI-REAP interventions involving select NbS, and their progress will be measured periodically.

Monitoring indicators relate to design, implementation, and results. For the design phase, the emphasis is on the process of co-designing, unpacking of societal challenges to understand root causes and consequences,

and estimating the scale of the required solutions. For the implementation phase, the scope of co-designing, finances, integrated actions and approaches, capacities, and policy mainstreaming are considered. In the case of results, the progress made in addressing the societal challenge is evaluated, while also monitoring the co-benefits around biodiversity, climate, and sustainable development. The GESI elements that are monitored include:

- Number of vulnerable communities that are part of the NbS
- Number of women-led actions and projects
- Number of women-led livelihood projects and businesses
- Number of women-led institutions engaged in carrying out the NbS.





ACTION 6

Developing robust financing partnerships

Collaborative actions and financing partnerships leverage resources, expertise, and support from various stakeholders, thus enhancing the collective impact of NbS initiatives.

NbS are increasingly being recognised as a cost-effective way to address societal challenges, but the factors of funding and financing remain key barriers to scaling these solutions. That said, the inherent multifunctional, multidisciplinary, and place-based characteristics of NbS do open up avenues for cross-scale collaborative governance and partnerships for resource leveraging (Dorst et al., 2019).

NbS need to be connected beyond physical, jurisdictional, and temporal boundaries, thereby requiring the interaction of multiple governance levels (Timboe & Pharr, 2021) and therefore partnerships for collaborative financing.

Governments need to play a strong role in reorienting policies, subsidies, and public investments to incentivise local stewardship and private and impact investors. While governments, the private sector, and philanthropic organisations may have the funds for scaling NbS, it is important to explore and learn from successful financing models; the funders should also consider investing in existing adaptation initiatives for high-impact scaling (Tye et al., 2022).

Facilitation: Business case development

The business model for NbS needs to strengthen the narrative of return on investment in order to capture the interest of traditional financing institutions. Packaging lessons and results

from NbS cases for a business model for wider-scale investment needs innovations which should specify not just the return on investment requirement but also the true value created through environmental and social co-benefits. This involves:

- Engaging with academia to quantify benefits and to demonstrate the cost-effectiveness of NbS (see Annexe 1 for NbS effectiveness indicators).
- Encouraging multi-partner proposals for financing NbS.
- Encouraging NbS enterprises that can create economic opportunities while contributing to environmental sustainability; for example, unlocking climate finance especially from the private sector.
- Establishing long-term stakeholder partnerships by bringing together diverse stakeholders, including governments, non-governmental organisations, businesses, and international agencies.
- Engaging with communication specialists to show how NbS makes a compelling case for a local adaptation success story and to translate technical information into language suitable for a lay audience.
- Making a case for mobilisation of finances for products including biodiversity credits and green bonds.

Facilitation: Innovative financing

This involves exploring avenues for funding pilots or early-stage projects- an important precursor to scaling funding. This kind of financing would entail:

BOX 15

AN NBS BUSINESS MODEL GUIDEBOOK

The Financing and Business Models Guidebook (McQuaid and Fletcher, 2022) introduces the topic of financing and business models for NbS. It also identifies some common challenges and enablers to financing and presents a step-by-step guide on how to secure financing. Besides, it outlines the various ways in which NbS can be financed, such as:

- Small-scale projects like community gardens can be funded by local government grants through concessional financing. Concessional finances are non-repayable finances from the public sector or private institutions.
- Environmental impact bonds – this is a financing solution wherein companies pay for the benefits from NbS.
- Public-sector financing – this remains one of the most important sources of financing.

- Commercial financing from public development banks such as investment banks or equity funds.
- Hybrid financing, often referred to as blended finance, is seen as a key to the future funding of NbS; this combines finances from different sources.

The guidebook outlines three key areas for developing a successful NbS business case:

- Identifying the value proposition – what value or benefits do NbS offer?
- Creating and delivering value – who are the main beneficiaries and who are the key partners to deliver on the benefits of NbS?
- Capturing value – what are the costs associated in delivering the benefits of NbS?

- Securing funding from government budgets, international donors, private-sector investors, and other relevant sources, and mobilising collective financial resources.
- Identifying incentive measures and regulatory frameworks to encourage the engagement of local stewards and private actors.
- Establishing flexible financing mechanisms such as NbS funds and blended finances, and exploring impact investment models.
- Engaging with financial intermediaries to design robust financing systems that incorporate accountability mechanisms and transparency standards; this is to allow

funds to be utilised efficiently and reported accurately.

- Using geospatial and analytics tools to explore the scale and scope of the required investment; analysis of interconnected challenges drive sufficient impact funding to implement a variety of NbS.
- Establishing a mechanism for co-financing to stimulate institutional investment in risk reduction; bringing together several funding streams (for example, green bonds) so that the stakeholders share the costs and both the risks.



BOX 16

PAYING FOR NBS

Several financing mechanisms and market-based options are available to direct funds to NbS, such as green bonds, which align investors and green solutions designers (Y. Jiang, 2023). In 2021, the global annual issuance of green bonds was worth more than USD 500 billion (Climate Bonds Initiative, 2022). Meanwhile, blended finance combines public and philanthropic capital with private finances, which offers a potential solution when the risk in private financing is high. (Rode et al., 2019).

Microfinance can also be an option for developing countries (Seddon et al., 2020). Market-based mechanisms such as payments for ecosystem services and REDD+ have also been used to finance NbS. REDD+ schemes incentivise activities that protect, restore, and conserve forests, and in these schemes, the public sector pledges most of the funding (Norman & Nakhouda, 2015). The voluntary and compliance forest carbon offset markets have also been crucial in directing private investments into REDD+ (Maguire et al., 2021). Another option is subsidy-based markets, where the public funds private landowners

to engage in sustainable land management practices, such as the grain-for-green scheme in China.

Financing of NbS via municipality budgets – especially in the case of urban NbS – however limited, is also becoming popular (Dorst et al., 2019). Other mechanisms such as credits, discounts, rebates, co-funding, tax increment financing, mitigation banking, and sustainable banking are alternative options (Cousins & Hill, 2021). The key concern of economic incentives and market-led private financing is inequity in access and benefit sharing. Recognising this disparity, the concept of social equity is being promoted which gives weightage to inclusiveness and equity in procedure, distribution, recognition, and context (Pascual et al., 2014).

Highlighting the role of NbS in promoting economic development is vital to retaining the interest of local communities in these solutions, which implies that the ecosystem services of NbS should be assigned a significant financial value (Finewood et al., 2019).



ACTION 7

Embedding GESI principles across all actions

Making NbS responsive to GESI acknowledges the importance of gender equality and social inclusivity, and is designed to ensure that the benefits and decision-making processes of NbS are equitable and inclusive.

Ethnic minorities, Indigenous communities, women, children, and other vulnerable groups are disproportionately affected by climate change impacts and biodiversity degradation. Making the social equity case stronger for NbS will mean proactive engagement of these stakeholders in NbS design and implementation.

Rendering NbS GESI responsive also implies that the outcomes of NbS are more inclusive and equitable, and that the benefits and risks are distributed equitably among different gender and social groups. The aim is also to dynamically promote women's and marginalised communities' engagement and participation in NbS.

As a transformative concept intended to improve society–nature relationships, NbS must avoid some of the latent risks of shifting the burden to the marginalised and vulnerable, inequitable distribution of benefits, uneven distribution of risks and opportunities, misalignment regarding the needs and desires of the local communities, and gender biases (Cousins, 2021).

Facilitation: GESI analysis

Tracking the progress of NbS against the indicators of gender equality and social inclusion can make the solutions more visible and socio-economically more prominent. Such analysis would not only help in identifying the specific needs, roles, and priorities of different gender and social groups, but also help in grasping the social dynamics and challenges in the intervention area.

In this facilitation process, apart from gender, it is important to recognise and address the intersectionality of identities by considering factors such as age, ethnicity, disability, and socio-economic status to particularly answer the questions of why and for whom NbS are relevant.

Facilitation: Proactive support and co-designing of solutions

This facilitation process involves women, Indigenous Peoples, and marginalised and vulnerable communities in the co-designing of NbS, and provides targeted support to strengthen their capacity and skills. It also ensures that inclusive and empowering approaches are used rather than resorting to the token gesture of their mere presence. In addition, it promotes women's leadership and creates opportunities to institutionalise their efforts and roles. In the early planning and design stages, it is important that incentives are put in place to encourage the meaningful participation of women and marginalised sections of society; this will also help in acquiring different forms of knowledge in terms of adaptive governance (Folke et al., 2005) and co-production of transdisciplinary knowledge (Brandt et al., 2013).

Facilitation: Institutional capability development

While co-production of knowledge is one of the keys to successful NbS, sustaining and managing the co-produced knowledge for societal relevance is equally important. Here, the capability strengthening of institutions plays a vital role in sustaining new institutional relationships and collaborative actions, especially for women and the vulnerable and marginalised sections of society. This facilitatory GESI process in NbS

equips the vulnerable with adequate capacity and underlines the transformatory nature of these solutions. It also allows the marginalised sections of society to design and deliver innovative institutional solutions as part of collaborative governance.

In addition, NbS can be embedded in inclusive adaptation-related livelihood support programme, where marginalised groups can adjust and modify their livelihoods when at risk, such as by resorting to natural regeneration activities, low-cost soil systems, water and land management to decrease water run-off and maximise water for farms, and the promotion of agroforestry and climate-smart agricultural practices.

Facilitation: GESI-responsive policies and guidelines

This involves mainstreaming GESI into the policies, plans, strategies, and guidelines that support NbS. It is about ensuring that women and marginalised and vulnerable communities have equitable access to the resources – including land, finances, and capacity – that are critical for implementing NbS. This means addressing any legal and customary barriers hindering their control and access over productive resources. Special attention should be given to efforts by Indigenous communities to improve land use and manage ecosystems sustainably. Moreover, efforts should be made to mainstream local strategies into public programmes and measures. Likewise, the land tenure for women and related implications for access to productive resources and finances are vital for creating policy and legal enablers for NbS. At the same time, mechanisms to address issues of justice and social cohesion are critical.

Facilitation: Sensitisation and awareness programmes

This involves sensitisation of stakeholders on the importance of integration of GESI into NbS. This entails preparing a focused sensitisation training programme to build a collective understanding on the indicators and principles of social equity, gender equality, intersectionality, and cultural

biases. Here, it is important to realise that local stakeholders, public institutions, the private sector, and development agencies all have their own motivations and interests that surface unevenly over time and space. Therefore, understanding how NbS can be rendered relevant is key to their acceptability and scaling.

Facilitation: Adaptive management

This facilitation action involves collecting disaggregated data based on gender and social categories to monitor the impact of NbS and regularly assessing the gaps and adjusting actions accordingly – all with the aim to achieve gender balance as NbS mature. The NbS agenda needs to become part of the wider social and economic transformation process, but it is a complex process that takes time; it also demands iterative progress from GESI sensitivity to GESI responsiveness to GESI transformation. NbS will also have to ensure that the demand for increased access to market and technological innovations are used to benefit women and the vulnerable communities.



SECTION 3

A diagnostic tool for NbS design, implementation, and outcomes

FEATURES OF NBS

The features of NbS include integrating the geospatial and temporal aspects of long-term planning, ensuring inclusive policies and regulations, and embedding NbS principles into public plans and programmes. They emphasise the importance of strong governmental leadership and institutional capacity whereby a sense of community ownership is fostered which considers gender and other intersecting factors in order to address unique/diverse climate change adaptation needs and build the overall adaptive capacity. They also seek to strengthen the resilience of ecosystems to sustain community livelihoods; in addition, they promote innovative investment partnerships and blended financing models. Together, these elements create a solid base for sustainable and GESI-responsive NbS initiatives.



Features of Nature-based Solutions

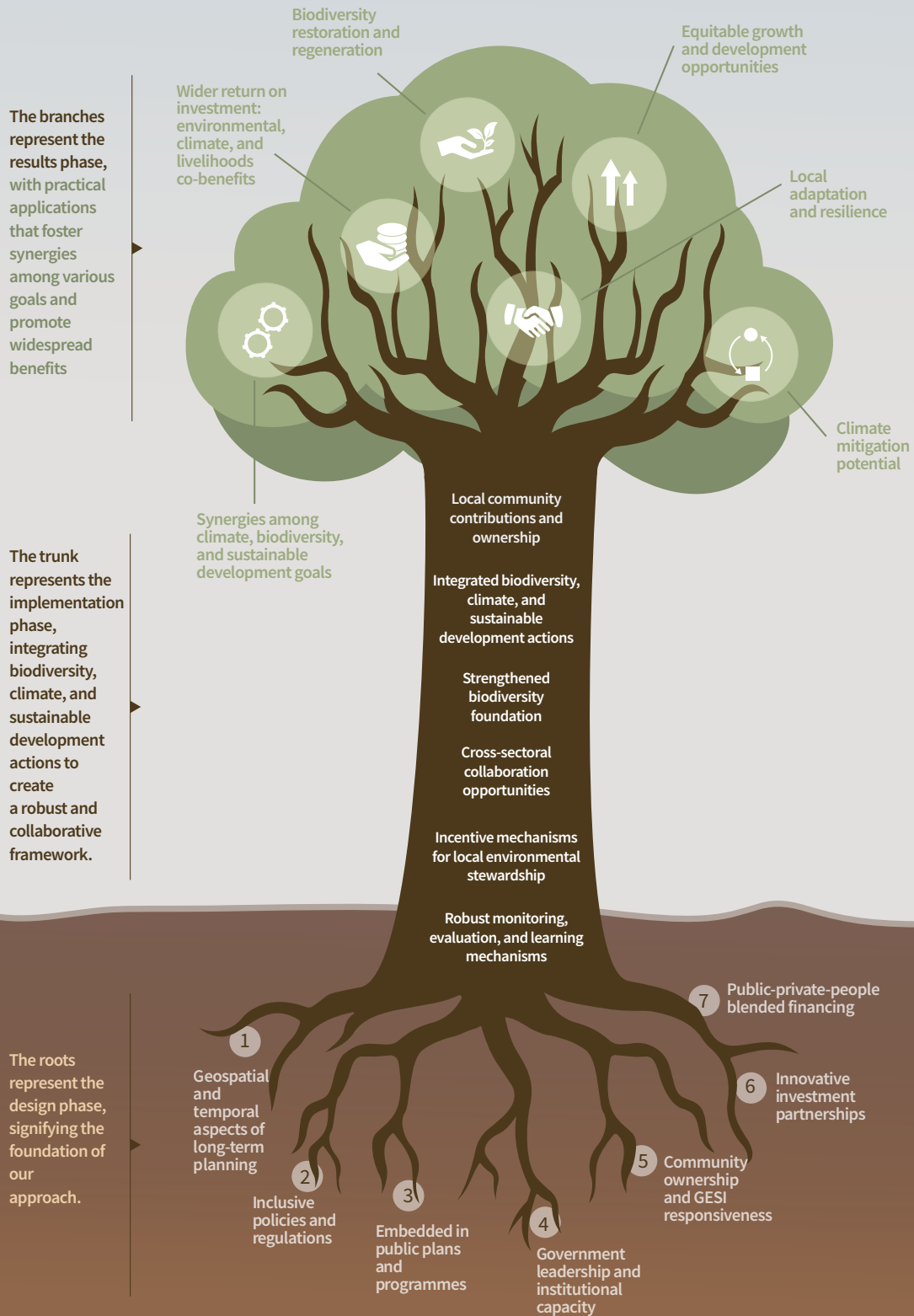


Diagram capturing the essence and progression of NbS from the stages of foundational design (roots) and implementation (trunk) to achieving impactful results (branches).

The checklists

The following checklist of qualifiers can be used to check where NbS stand in terms of design, implementation, and result criteria.

A. Are you planning to design NbS?

If you are yet to design NbS, please consider using the following qualifiers to assess your readiness to design NbS. Tick as appropriate. Wherever there is 'No' as an answer, consider revising the design and plugging the gap ; if you have ticked 'partially', what can be done to improve this?

SN	QUALIFIER	YES	PARTIALLY	NO
1	Shared understanding: Have we developed a shared understanding about the societal challenge? Do all the stakeholders understand the extent of the challenge?			
2	Spatial scale: Do we understand the spatial scale of the societal challenge? Do we know how big the scale of the challenge is?			
3	Discussion/co de-design of solutions: Have we discussed with the local stakeholders (including women, Indigenous Peoples, and the vulnerable and marginalised) on what the possible solution/s could be? Has the solution been co-designed with them?			
4	Alternative solutions: Have we identified the alternative solutions and approaches being implemented by different actors, including incentive mechanisms, and discussed what would work?			
5	Mapping engagements/approaches: Have we mapped intersectoral engagements and possible collaborative approaches for climate, biodiversity, and sustainable development?			
6	Government readiness: Is the government ready to invest and willing to provide policy, governance, and extension support?			
7	Policy Readiness: Are existing policy measures adequate to support NbS implementation?			
8	Engagement strategy: Is there an engagement strategy in place to support collaborative implementation actions?			
9	MEL mechanism: Is there a robust MEL mechanism to inform the stakeholders on adaptative management or on results, lessons, progress, and gaps?			
10	GESI design/lens: Is Gender Equality and Social Inclusion (GESI) embedded into the design? Have the societal challenge and solutions been looked at through the GESI lens?			
11	GESI actions: Are actions that strengthen GESI discussed and planned?			
12	Solution potential: Are we confident that our solution has the potential to increase its effectiveness over time?			

B. Have you already designed and defined the solutions and wish to know how close the solution is to NbS?

If you have already designed NbS, use the following implementation qualifiers. Wherever 'No' is an answer, consider strengthening the solution/s using some of the design criteria; if you have ticked 'partially', what can be done to improve this?

SN	QUALIFIER	YES	PARTIALLY	NO
1	Community mobilisation: Have community institutions and local actors been mobilised to lead on-the-ground actions or to implement the solutions?			
2	Cross-sectoral cooperation: Have different sectors come together to address the challenge?			
3	GESI principles: Have GESI principles been considered to engage the most marginalised and vulnerable sections in implementing the solution?			
4	GESI for capacity: Have the provisions for strengthening GESI-specific actions in terms of capacity and engagement been factored in?			
5	Benefit sharing: Is there a robust benefit-sharing mechanism in place to harness the co-benefits from NbS equitably?			
6	Incentive mechanism: Is there an incentive mechanism in place to support the actions by local environmental stewards?			
7	Balanced actions: Is there a balance of actions between nature conservation and socio-economic development?			
8	Risk management: Is there a risk management strategy in place?			
9	Capacity development: Is there a capacity development package in place for sector-specific interventions?			
10	Partnership mechanism: Has a partnership mechanism been formalised to facilitate collective actions?			
11	Financial partnership: Is there a long-term financial partnership available to finance NbS initiatives?			
12	Resources: Are there adequate resources for local community-led interventions and institutional set-ups to fast-track ground actions?			
13	Extension services/technical assistance: Are public extension services and institutional technical assistance available to support on-the-ground actions?			
14	Baselines: Are baseline studies and measures in place to monitor the state of progress?			
15	Scaling opportunities : Is there an opportunity to scale up or scale out the solutions?			
16	Local government: Are local government authorities on board and invested in the solutions?			

C. Have you implemented the solution and some progress is evident?

If you have implemented NbS, use the following result qualifiers. Wherever 'No' is an answer, consider addressing it by using the design and implementation qualifiers; ; if you have ticked 'partially', what can be done to improve this?

N	QUALIFIER	YES	PARTIALLY	NO
1	Root cause: Has the root cause of the core societal challenge been addressed?			
2	Consequences: Have the wider sociocultural and environmental consequences of the societal challenge been addressed?			
3	Community ownership: Is there community ownership of the solution? Are communities (even the most vulnerable and marginalised) part of the solution? Are they continuing with it?			
4	Community empowerment: Has the solution empowered the community and created wider sociocultural and well-being opportunities for it?			
5	Government ownership/partnership engagement: Is there ownership by the government and other agencies? Is there a long-term letter of Intent, memorandum of understanding, or any other partnership engagement strategy in place?			
6	Mainstreaming solutions: Have the solutions been mainstreamed into public policies, plans, and programmes?			
7	GESI outcomes: Are the GESI outcomes evident? (Please refer to Action 7.)			
8	Sectoral engagement: Are the contributions and engagements of different sectors evident?			
9	Ecosystems/biodiversity: Are ecosystems and biodiversity being protected, preserved, managed, and improved upon, and are they being sustainably used?			
10	Climate co-benefits: Do you think the solution is adequately generating climate co-benefits?			
11	Stakeholder aspirations: Are the basic development aspirations of the local stakeholders (women, Indigenous People, and the marginalised and vulnerable communities) being met?			
12	Scaling financial partnerships: What are the prospects for long-term financial partnerships to scale the solution?			
13	Solution effectiveness: Is there a mechanism to visualise the effectiveness of the solution over time?			
14	Technical support/capacity development: Are there institutions in place to provide adequate technical support and capacity development?			
15	Communication: Has the progress or change because of NbS been communicated to the government, communities, the private sector, and to a wider audience, for future investment and engagement purposes?			

D. Reinforcing actions for GESI integration

STEPS	ACTIONS	YES	IF 'NO', THEN...
System and Context Analysis This step helps to understand the diverse actors (government, civil society organisations, community-based groups, etc.) that are working on GESI issues; it also helps to understand their roles in the governance mechanisms.	Have you planned a GESI analysis to identify systemic social and gender inequality issues?		Initiate a GESI analysis to identify and address systemic social and gender inequality issues related to NbS.
	Have you identified the disadvantaged populations in the NbS site?		Conduct an assessment to identify the disadvantaged populations in the NbS site in order to understand their specific needs and challenges.
	Have you identified the government, civil society organisations, and community-based groups working on GESI issues in the area?		Map out relevant organisations to collaborate on GESI issues and integrate their perspectives into NbS planning.
	Have you assessed the GESI capacities and priorities of the relevant actors, including partners?		Conduct a capacity assessment of the relevant actors regarding GESI.
	Have you identified the government's priorities and requirements for GESI and NbS?		Consult with government stakeholders to identify their priorities related to GESI and NbS.
	Are there any safeguarding policies – whether of government or partners – in place?		Develop safeguarding policies/strategies/guidelines in collaboration with partners and stakeholders, and orient all the actors concerned.
Risk and Vulnerability Assessment This step helps to uncover the complex power structures related to NbS and thus helps to design effective climate adaptation interventions. It also addresses systemic barriers.	Have you planned consultations with women and other disadvantaged groups on processes like free, prior, and informed consent (FPIC)?		Plan and conduct consultations with women and other disadvantaged groups; also ensure that the required FPIC processes are followed.
	Have you identified the different impacts of climate change on different gender and social groups in the NbS site?		Conduct a GESI assessment to identify and understand how climate change affects different gender and social groups.
	Have you considered how gender and intersecting factors influence climate vulnerability and adaptive capacity?		Conduct a vulnerability analysis to understand how gender and intersecting factors influence climate vulnerability and adaptive capacity.
	Are local GESI-focused organisations and women and other disadvantaged groups engaged in the climate vulnerability and risk assessment processes?		Identify and engage local GESI-focused organisations and women and other disadvantaged groups in climate vulnerability and risk assessment processes.

Identifying NbS Options This step involves assessing comparable risks so that NbS interventions do not exacerbate maladaptation risks.	Have you established criteria to prioritise NbS options? Are participatory approaches being used to ensure equitable participation and equitable benefit sharing?		Develop criteria to prioritise NbS options and ensure that participatory approaches are used to involve diverse stakeholders.
	Have you identified specific NbS options in consultation with different gender and social groups?		Identify and develop specific NbS options tailored to meet the needs of different gender and social groups.
	Have you assessed the risks of maladaptation for different gender and social groups?		Conduct assessments to identify and mitigate risks of maladaptation practices .
Implementation This step helps break barriers and maximise opportunities for disadvantaged groups to benefit from NbS-related activities.	Have you established partnerships with local GESI-focused organisations?		Establish partnerships with local GESI-focused organisations to enhance community involvement in NbS activities.
	Are local community members, especially disadvantaged groups, being involved in NbS activities?		Engage local community members, especially disadvantaged groups, in NbS activities to ensure their meaningful participation and gaining of benefits.
	Are strategies in place to break barriers and maximise opportunities for disadvantaged groups to benefit from NbS activities?		Identify the barriers and develop strategies to maximise opportunities for disadvantaged groups to benefit from NbS activities.
	Are attitudes, social norms, and structural processes that exacerbate gender and social exclusion being addressed?		Implement measures to address the attitudes, social norms, and structural processes that exacerbate gender and social exclusion, and devise an engagement plan to involve men and people in positions of power.
	Are contextual technological innovations being considered to maximise the co-benefits of NbS for disadvantaged groups?		Identify and co-develop technological innovations to maximise the co-benefits of NbS for women and other disadvantaged groups, and also ensure access and usability.
	Are safeguarding principles, including the ‘do no harm’ approach, being integrated into the implementation of NbS initiatives?		Embed safeguarding measures, including the ‘do no harm’ approach, in the implementation of NbS initiatives and plan an orientation exercise for the actors concerned.
	Did you consider cultural diversity during implementation?		Consider the factor of cultural diversity during implementation to ensure that the activities are culturally appropriate and respectful.
	Will the budget for GESI commitments suffice for the entire implementation phase?		Allocate adequate budget for GESI commitments to support effective integration and sustainability.

Monitoring, Evaluation, and Learning (MEL) This step will help in assessing the effectiveness of NbS interventions in promoting GESI and in addressing the equitability of adaptation measures.	Has a MEL system been established with GESI-responsive indicators?	Establish a gender-responsive MEL system to monitor and evaluate the impact of NbS initiatives on GESI outcomes.
	Are participatory methods being used to engage diverse NbS actors in MEL activities?	Implement participatory methods to engage the diverse NbS actors in MEL activities in order to ensure inclusivity and transparency.
	Is disaggregated data being collected and used to evaluate the impact of the NbS initiative?	Collect and use disaggregated and qualitative data to evaluate the impact of the NbS initiative, thereby ensuring a comprehensive assessment of GESI outcomes.

SECTION 4

Regional cooperation Scaling NbS in the HKH



Regional cooperation among the eight HKH countries- Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan - is crucial for scaling NbS due to the shared mountain-specific challenges that transcend national borders. Issues like pollution, glacier melt, glacial lake outburst floods (GLOF), landslides, drought, water insecurity, food insecurity, income insecurity, and biodiversity loss impact the entire region, cutting across societies.

A united regional voice for the mountains on NbS can effectively advocate for global policy changes and mobilise international support for scaling of NbS. Such a collective effort could build resilience, ensuring sustainable solutions that address shared societal challenges, especially in transboundary contexts, and protect the region's unique ecological and cultural heritage.

Coordinated efforts across borders and harmonised actions among different countries can create impact at scale. NbS can enable the shift from one-country-led effort to co-sensing and co-creating actions through regional cooperation.

- Foster joint research and establish transboundary innovation hubs to address transboundary societal challenges.
- Facilitate the harmonisation of policies and standards related to NbS, thereby enabling the implementation of these solutions at scale.
- Help mobilise regional and global funding mechanisms for NbS and pave the way for joint investments.
- Make overall NbS funding significant and reliable to generate impact at scale.
- Substantiate business and incentive cases for NbS.
- Trigger coordinated actions among countries, especially those where landscape elements are interconnected or are shared by two or more countries.
- Facilitate cross learning and development of expertise and skills across borders.
- Unify the voice of countries for wider-scale advocacy on NbS, especially to activate financial flow and harmonised public support.

REGIONAL TEAMWORK CAN:

- Facilitate exchange of knowledge, research findings, and best practices on NbS.
- Pool expertise for co-designing effective NbS strategies.

BOX 17

COLLABORATION ACROSS BORDERS

The HKH region is characterised by diverse ecosystems and climates. Shared knowledge and understanding among the stakeholders in the eight countries (Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan) is crucial to scaling NbS. Since the societal challenges concerning glacial melt, water insecurity, biodiversity loss, poverty, food insecurity, ecosystem degradation, and disaster are common, solutions ought to be collaboratively designed to meet the region's specific needs. Harmonised policies supporting biodiversity, climate, and sustainable development can trigger coordinated actions and strengthen financing mechanisms. Several initiatives such as regional rangeland management, transboundary landscape management, and integrated river basin management can be developed into meaningful NbS through holistic planning, intersectoral coordination, and advocacy aimed at striking a balance among environment, climate, and sustainable development actions.

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Annexe I: General indicators to assess the effectiveness of NbS

Climate outcomes

- Enhanced water availability
- Improved water quality
- Increased availability of fodder for livestock
- Reduced soil erosion
- Reduced risk from flood hazards
- Reduced risk from landslides

Biodiversity outcomes

- Increased biomass cover
- Healthy ecosystems
- Increased forest cover
- Restored grasslands
- Conserved and protected wetlands
- Increased species diversity
- Enhanced slop revegetation
- Increased benefits from carbon sequestration
- Increased forest carbon stock
- Healthy agroecosystems
- Increased agrobiodiversity
- Decreased invasive species
- Enhanced native vegetation
- Reduced pressure on habitat
- Enhanced acknowledgement of value of nature/biodiversity

Sustainable development outcomes

- Increased food availability and accessibility
- Increased water availability
- Wider livelihood opportunities and diversification
- Innovative NTFP (non-timber forest product)-based livelihoods
- Enhanced recreation opportunities
- Enhanced capability of communities
- Decreased conflict over resources
- Increased social safeguarding
- Increased societal resilience
- Equitable access and benefit sharing
- Incentive measures for local stewardship

GESI outcomes

- Increased social cohesion
- Increased equity
- Increased gender equality
- Empowered community



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