Promoting Nature-based Solutions for Climate Resilience in Water Sector in South Asia

Training Module (Virtual) 2023

Caption: Tanguar Hoar@IUCN

International Union for Conservation of Nature and Natural Resources

Climate Adaptation and Resilience (CARE) for South Asia Project

Promoting Nature-based Solutions for Climate Resilience in Water Sector in South Asia:

Training Module (Virtual)

2023

adpc

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The training materials build on the IUCN Global Standards for Nature-based Solutions (NbS) and existing training courses on NbS developed by the IUCN Academy, as well as, modules developed by IUCN Asia to support training for the Asian Development Bank (ADB), the Agence Française de développement (AFD), and the Swiss Agency for Cooperation and Development (SDC).

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ACRONYMS

ADPC	Asian Disaster Preparedness Center (ADPC)
CARE	Climate Adaptation and Resilience
ES	Ecosystem Services
IUCN	International Union for Conservation of Nature (IUCN)
NbS	Nature-based solutions (NbS)
RAWES	Rapid Assessment of Wetland Ecosystem Services
TESSA	Toolkit for Ecosystem Service Site-Based Assessment
WB	World Bank

1. BACKGROUND

1.1 About the training module

Capacity building is critical to developing innovative NbS for solving water sector challenges that are technically and financially feasible and sustainable. Furthermore, at the local and national scales, governments must support research and knowledge sharing, further developing local technical capacity to implement NbS and promoting the use of existing tools to perform ecosystem services valuation at scale. The results must be integrated within national targets, plans, and policies, and the benefits of NbS approaches should be captured and shared with other countries in the region.

Considering this, the NbS training module is designed for the capacity building of practitioners, and policymakers working on the management of water resources or having an influence on the water sector, such as the Ministry of Water, environment, agriculture, land use, finance, and planning.

For the development of this training module International Union for Conservation of Nature (IUCN) collaborated with the Asian Disaster Preparedness Center (ADPC), under the World Bank (WB) funded initiative, Climate Adaptation and Resilience (CARE) for South Asia. This collaboration aims to promote the mainstreaming of NbS to increase the climate resilience of the water sector in South Asia. Please click HERE for further information on the ADPC-IUCN collaboration.

1.2 Objective and structure

This training module is designed for virtual delivery but can be adapted for on-site training. The specific objectives of the training include:

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

Training structure: The training is designed for three days, 3 hours each day, and divided into six sessions (See detailed agenda in Appendix I).

- On day 1, introduce participants to Ecosystem Services, discuss what are NbS and the tools for monitoring and verification of NbS initiatives, as well as, case studies from the region liked to the implementation of NbS at scale.
- On day 2, discuss climate projections and examples of NbS approaches for resilience in water-dependent sectors, as well as, the current status of NbS mainstreaming in policies and planning.
- On day 3, explore strategies linked to grey-green infrastructure solutions and specific funding mechanisms for financing and upscaling NbS initiatives.

2. SESSION'S INTRODUCTION AND FACILITATION PLAN

The sections below provide stepwise guidance and reference materials for those interested in developing training on NbS for promoting climate resilience in the water sector in South Asia.

2.1 Participants' introduction and icebreaking exercise

Plan an introductory session to discuss the objectives of the workshop and the flow of the agenda. See Appendix I for the indicative agenda of the three days of visual workshops.

Understand who is in the room, what is their expectation from the workshop, and how comfortable they are with the main topic of the training. Below are suggested questions to facilitate an online Mentimeter interaction with the participants.

- Which sector do you represent?
- What is your understanding of NbS? Any examples from your work?
- Level of confidence in defining, designing, implementing, and M&E for NbS?
- What are the key opportunities for NbS in your work?

2.2 Session 1 - Introduction to the Ecosystem Services (ES)

1) Objective: Understanding multiple values of the ecosystem and different types of ecosystem services. Discuss how we assess the value of the benefits that nature provides.

   Ecosystem management decisions are often made without understanding the full range of values of ecosystem services. Often the ecosystem services are only recognized when they have disappeared. The session, therefore, is designed to help participants understand ES.

2) Content design:

   - Understanding ES: Introduction to the multiple values of ecosystems and ecosystem services.
   - Categories of ES: provisioning services, regulating services, cultural services, and supporting services.
   - How to assess ES? Examples of ES Assessment methodologies, e.g.,
     - » Rapid Assessment of Wetland Ecosystem Services (RAWES),
     - » Toolkit for Ecosystem Service Site-Based Assessment (TESSA)

3) Interactive exercises: Design questions and exercises to assess participants' understanding of different ecosystem services. Show photographs of a mixed-use landscape with the ecosystem and anthropogenic activities. Ask participants to identify different types of ecosystem services. Discuss how these services are linked to each other.

Session presentation: see Appendix II

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

1) Objective: Discuss the evolution of the NbS concept, and its definition (IUCN, 2016 and UNEA-5, 2022). Through case studies discuss the application of NbS at scale.

Figure 1: NbS - common foundation but distinct approach

2) Content design:

- Understanding NbS: Introduction to the definition of NbS, development of the concept, and how it is different from traditional conservation or nature-inspired solutions.
- IUCN defines Nature-based Solutions, as actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature."
- Applying NbS at landscape/basin level: NbS activities must be strategically deployed across the larger landscape/seascape, because ecosystems interact with the larger land and seascape in which they are embedded and cannot be managed in isolation, thus requiring landscape-level design of NbS.
- Case studies: discuss case studies and examples of NbS application from the Asia region, such as forest landscape restoration, and ecosystem-based adaptation. Below is a link to NbS case studies from the Asia region.
  - » Nature-based Solutions in the Ganges Brahmaputra Meghna (GBM) river basin: Case Studies and lessons learned
  - » Ecosystems protecting infrastructure and Communities: lessons learned and Guidelines for Implementation
  - » Nature-based solutions in practice: the example of the Namey Nichu watershed in Bhutan

3) Interactive exercise: Differentiate among NbS, grey infrastructure, and hybrid solutions.

Session presentation: see Appendix III.

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

1) Objective: Introduce participants to IUCN Global Standard for Nature-based Solutions. The standard provides a user-friendly framework for the verification, design, and scaling up of NbS.

2) Content design: Introduction to the eight criteria (see Error! Reference source not found.) and 28 indicators linked to the ecological, social, and economic dimensions of NbS. These criteria and indicators aim to ensure the application of Nature-based Solutions is credible and its

uptake tracked and measured for adaptive management so that its contributions can inspire others. Below is a link to the global standards and related references:

- » IUCN Global Standard for Nature-based Solutions,
- » Launch event – IUCN Global Standards
- » NbS Group Website.

Table 1 NbS Criteria

	Criteria
1.	NbS effectively address societal challenges
2.	The design of NbS is informed by scale
3.	NbS result in a net gain to biodiversity and ecosystem integrity
4.	NbS are economically viable
5.	NbS is based on inclusive, transparent, and empowering governance processes
6.	NbS equitably balances trade-offs between the achievement of its primary goal(s) and the continued provision of multiple benefits
7.	NbS have managed adaptively, based on evidence
8.	NbS are sustainable and mainstreamed within an appropriate jurisdictional context

3) Interactive exercise: Assess how comfortable participants are on NbS criteria.

Presentation: see Appendix IV

2.5 Session 4 – NbS for resilience – examples and planning cycle

1) Objective: Discuss how to integrate NbS into climate resilience planning, and guide participants throughout the full project cycle from planning and assessment to implementation, M&E, and mainstreaming. Explore these steps through real-life case studies from the South Asia region.

2) Content design:

- NbS for resilience – criteria: Introduce participants to the following three criteria to determine whether or not an action is an NbS for resilience

  a) Is the approach focusing on tackling a climate-induced threat and on providing adaptation benefits?

  b) Is the proposed/implemented solution to climate threats based on (or includes elements of) restoration/conservation/management of ecosystems to maintain/ enhance ecosystem services?

  c) Does this approach provide biodiversity benefits?

- Understand the steps: Introduction to the eight key steps of the planning process for an NbS for a resilience project for the water sector. The eight steps of the cycle, complemented by the associated forms, aim to guide practitioners through the process of designing, implementing, monitoring and evaluating, and mainstreaming, Ecosystem-based Adaptation interventions for building water sector resilience. Below idd the reference material to support the design and facilitation of this session.

  - » The Guidebook for the Design and Implementation of Ecosystem-Based Adaptation in River Basins in Thailand.

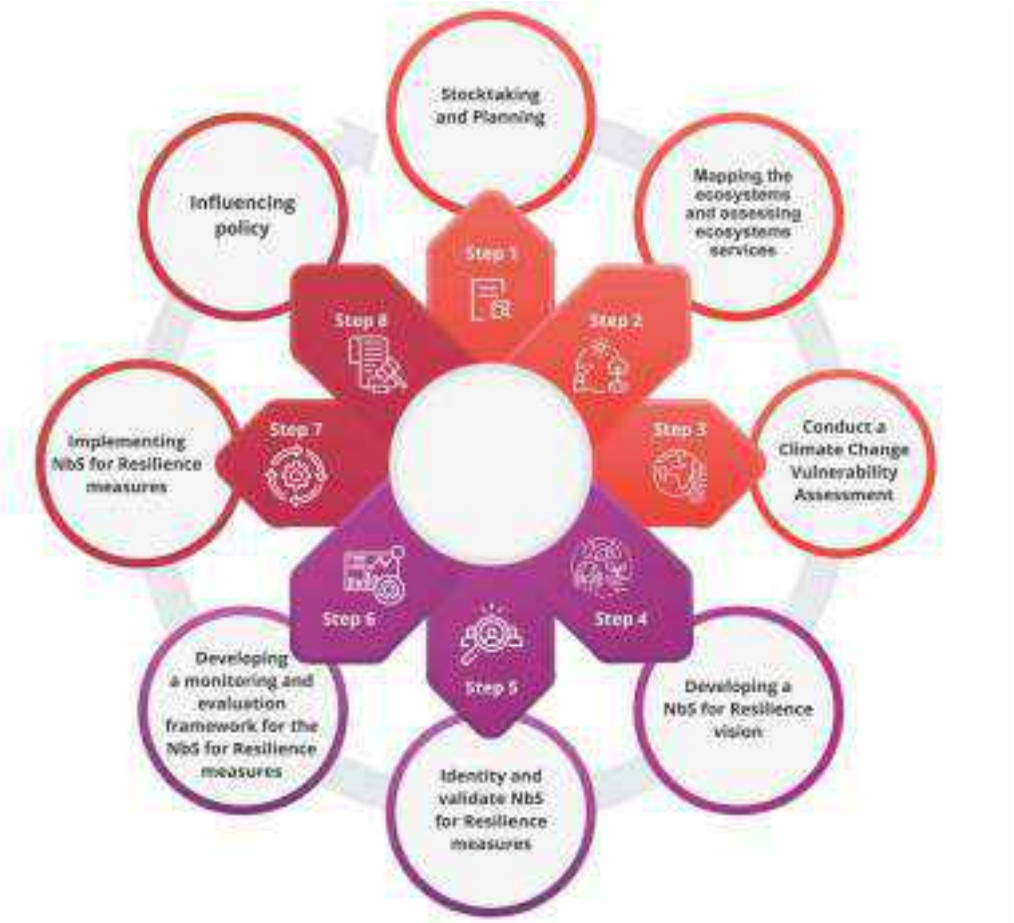


Figure 2: Steps - NbS for resilience planning in the water sector

- Discuss the global climate models, their application, and climate change projections for South Asian countries.
- Discuss case studies: Through case studies and examples explore the implementation of eight steps planning process for NSb for Water resilience projects. Examples of case studies are below:
  - » Solving water scarcity – Banda district success story (Uttar Pradesh, India)
  - » Wetland Management and Conservation, Hail Haor, Bangladesh

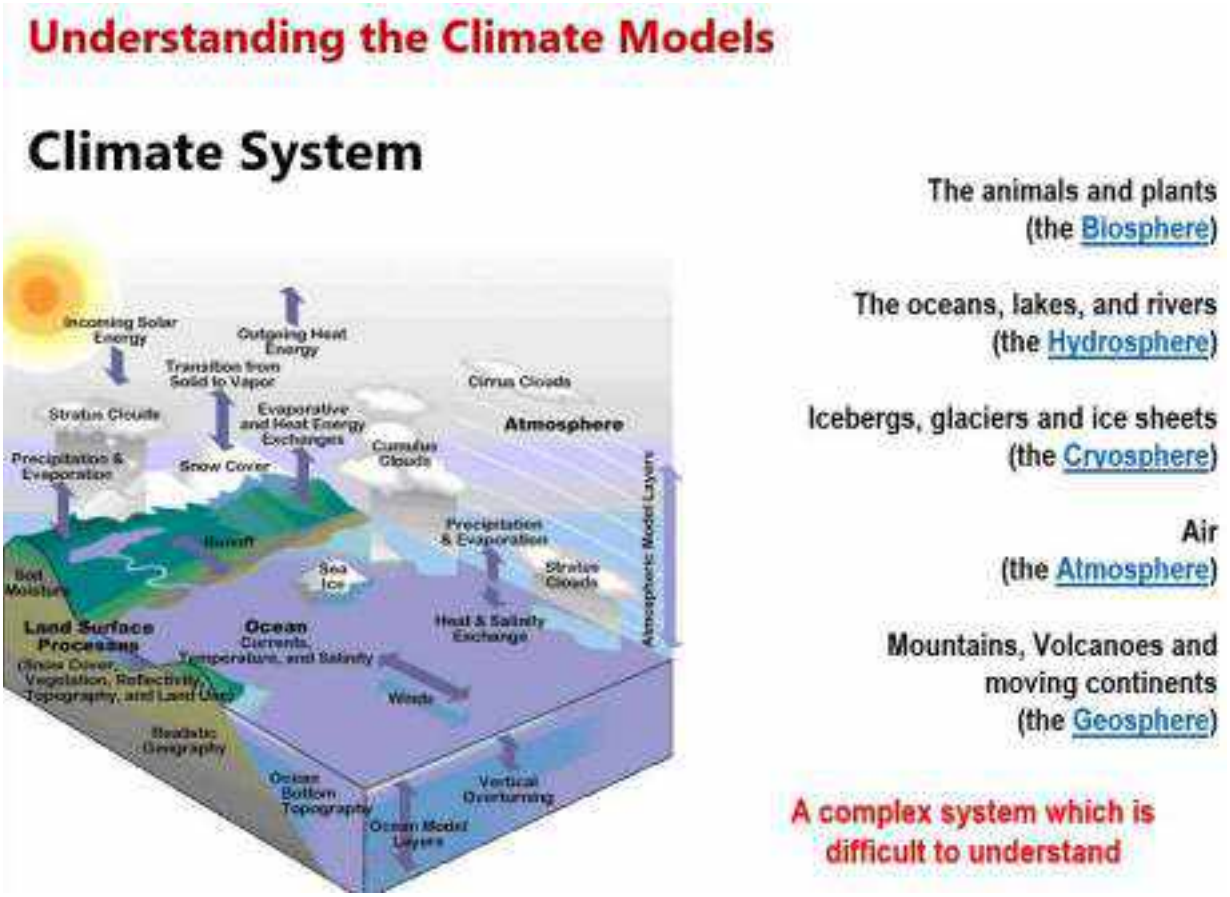


Figure 3: Understanding the climate models and systems

Session presentations: see Appendix V

2.6 Session 5 – Mainstreaming of NbS in Policies and Governance

1) Objective: Discuss how NbS is integrated into global and national policies in South Asian countries. Identification of gaps and priority areas for resilience building, and role of governments in developing the regulatory framework to support the mainstreaming of NbS in policy and planning process.

2) Content Design: Presentation and country group discussion

   Introduction of the regional context, methodology of analysis of NbS mainstreaming in policies.

   Present the mapping of NbS in existing national water governance frameworks and policies in Bangladesh, India, Nepal, and Pakistan.

3) Participants interaction: Questions for country group work

   - What role can local institutions play in mainstreaming NbS?
   - Identify priority policies and sectors for NbS integration in your country – concerning water resilience. Why are these important?
   - What do you think are gaps and opportunities for enhancing resilience through NbS – identify 5 gaps and 5 opportunities.

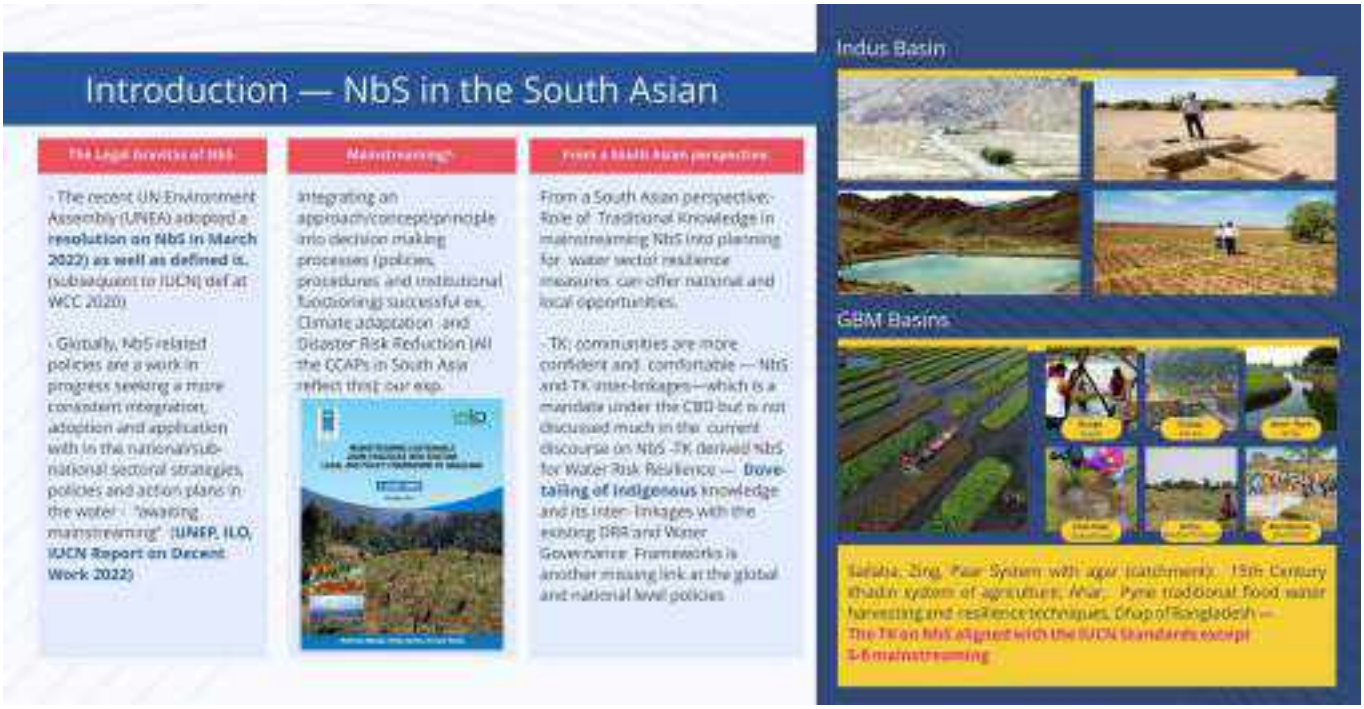


Figure 4: Introduction - NbS in the South Asian Context

Session presentation: see Appendix VI.

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

1) Objective: Improved understanding of strategies linked to grey-green (or hybrid) infrastructure solutions, and cost-benefit analysis of NbS interventions from Asia region using case studies.

2) Content design:

   Introduction to the session and grey-green infrastructure solutions; Grey infrastructure in the water sector refers to structures such as dams, embankments, seawalls, roads, pipes, or water treatment plants, whereas, green infrastructure includes forests, floodplains, wetlands, and soils that provide additional benefits for human well-being, such as flood protection and climate regulation. Both approaches often form part of the same landscape-level strategy to adapt to risks and pressures

   In a number of cases, grey and NbS infrastructure can be merged to develop complementary hybrid solutions. Overall, the long-term vision for solving a societal challenge is to progressively shift toward more NbS approaches and less grey infrastructure.

   Discuss case studies highlighting the cost-benefit analysis of grey-green infrastructure solutions.

   - Nepal - Water source protection in Nepal and a framework of cost-benefit analysis and actual economic benefits for the intervention. Below are references linked to the case study.
     - » Community-based bio-engineering for eco-safe roadsides in Nepal
     - » Ecosystems protecting infrastructure and communities: Lessons learned and guidelines for implementation
   - Viet Nam - Designing grey-green infrastructure solutions, experiences from the Mekong Delta on flood-based agriculture systems to enhance climate and economic resilience of local communities.

» Scaling-up flood-friendly livelihoods to strengthen climate change resilience in the Mekong Delta

3) Country group discussion: Questions

» Discuss the current status of existing green-grey infrastructure in different landscapes (mountain, grasslands, coastal, flood plains).

» What are the priorities, and hindrances to the development and implementation of hybrid infrastructure solutions? Identify 5 priorities and 5 challenges, including your suggestion on how to mitigate these.

Session presentations: see Appendix VII.

2.8 Session 7 – Sustainable financing for scaling up NbS

Interest in NbS is growing from both the public and private sectors, as is the desire to scale up implementation. However, one of the major hurdles keeping NbS projects from scaling up is how to finance NbS sustainably.

1) Objective: Improved understanding of funding mechanisms and strategies for financing NbS for the resilience of the water sector. Discuss the engagement of the private sector in resource mobilization for upscaling NbS.

2) Content design:

- Discuss the current landscape of NbS financing (public and private sector) and gaps in the current investment.
- Introducing financing opportunities for national and regional level NbS initiatives, including multilateral-funding mechanisms and country-led thematic initiatives, such as the Global Environment Facility (GEF), Green Climate Fund (GCF), International Climate Initiative (IKI), and the Global EbA Fund.
- Exploring the challenges and opportunities for private sector engagement in financing NbS, and tools for mobilizing private sector engagement, such as blended financing by governments, impact investment, the role of green taxonomy in demarcating nature friendly vs nature-destructive practices, and means to measure, report and verify (MRV) the progress on NbS.
- Discuss case studies from the region and globally linked to private sector engagement.
  - » Operationalising Nature-based Solutions: innovative approaches to financing ecosystem restoration
  - » KPMG True Value Case Study: Ambuja Cement, India
  - » H&M offers EUR 500 million in sustainability-linked bonds

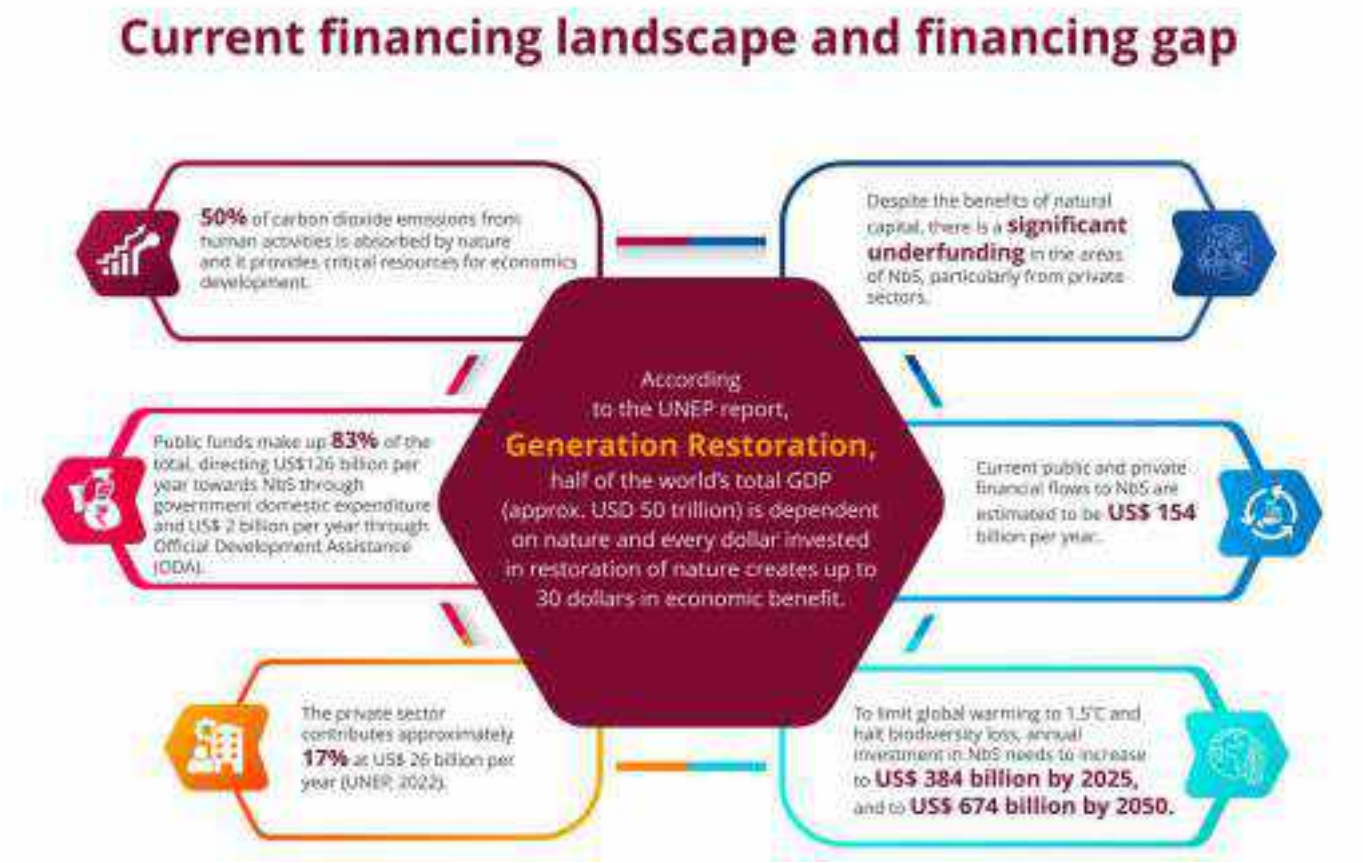


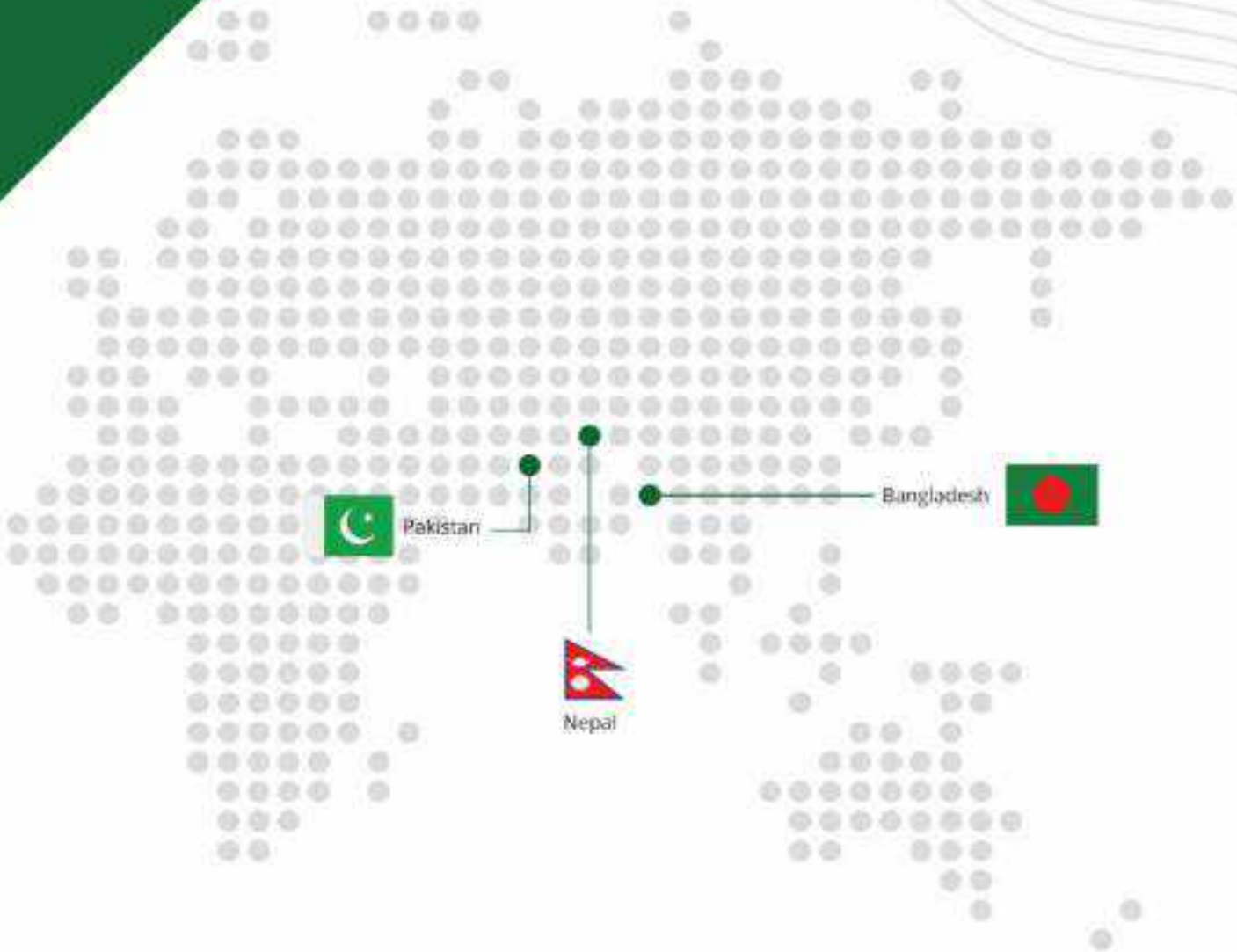
Figure 5: NbS - Financing needs and sources (source: PwC)

Session presentation: see Appendix VIII

APPENDIX I: SUGGESTIVE AGENDA FOR THREE DAYS

Duration	Sessions	Learning Outcome
Day 1: Inauguration and Introduction to NbS		
30 mins	Participants welcome, housekeeping and introduction to the training module and its objectives. ***Mentimeter interaction with the participants*** • Which sector do you represent? • Confidence in defining, designing, implementing, and M&E for NbS. • What are the key opportunities for NbS in your work?	All participants are aware of the purpose and objectives of training. Participants' introduction through the Chatbox.
30 mins	**Session 1 – Introduction to the Ecosystem Services (ES)** Introduction to the variety of ES and its linkages to the water sector. Interactive exercise to gauge participants' understanding of different types of ES.	Understand different types of ES and the linkages among them.
45 mins	**Session 2: Nature-based Solutions- background, definition, examples at scale** NbS background, definition, and examples at scale (35 mins, Mentimeter exercise – Use photos and ask participants if it is NbS or not? (10 mins)	Improved participant's understanding of NbS definition and application at scale.
60 mins	**Session 3 - Introduction to the IUCN Global Standards for NbS** Presentation on Global Standards for NbS Mentimeter Exercise – analyzing participant's understanding of the NbS criteria (15 mins)	Understand the criteria and indicators for the design, verification, and evaluation of NbS projects.
Day 2: NbS for the resilience of the water sector in South Asia		
10 mins	**Recap key takeaways and questions from Day 1**	
80 mins	**Session 4: NbS for resilience – examples and planning cycle** NbS for resilience: 8-step planning process (15 mins) Climate Change Impact and Vulnerability Assessment (10 mins) Case studies from South Asia (30 mins) Q/A and participants' feedback and interaction with case study presenters (15 mins)	Understand climate projections and NbS approaches for resilience in specific water-dependent sectors.

Duration	Sessions	Learning Outcome
75 mins	**Session 5: Mainstreaming of NbS in Policies and Governance** Overview – to what extent are NbS mainstreamed in relevant policies in South Asia? (20 mins) Country Group exercise – discuss how NbS is integrated with relevant water sector policies and identify gaps and national priority for enhancing resilience through NbS (35 mins) Country group presentation (20 mins);	Improved understanding of the opportunities for mainstreaming of NbS in policies at the national level.
Day 3: Green-grey infrastructure and financing of NbS		
10 mins	**Recap key takeaways and questions from Day 2**	
80 mins	**Session 6: Green-grey infrastructure solutions and cost-benefit analysis of NbS** Introduction to the session and grey-green infrastructure solutions (5 mins) Case study presentations (20 mins) Plenary discussion and participants' interaction with the case study presenters (10 mins) Country group exercise – status, priorities, hindrances to development and implementation of hybrid infrastructure solutions (30 mins) Presentation of group exercise in plenary discussions (15 mins)	Improved understanding of strategies linked to grey-green (or hybrid) infrastructure solutions.
60 mins	**Session 7: Sustainable financing for scaling up NbS** Opportunities for financing national and regional level NbS initiative (15 mins) Private sector engagement and resource mobilization for upscaling NbS (15 min) Plenary discussion – funding opportunities and strategies countries could prioritize (30 mins)	Improved understanding of funding mechanisms and strategies for financing NbS for the resilience of the water sector nationally.
20 mins	Workshop Conclusion and Participants' Feedback	



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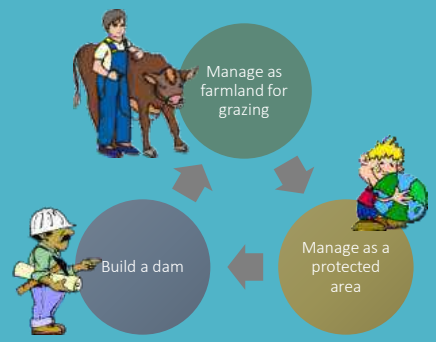
Introduction to the multiple values of ecosystems and ecosystem services

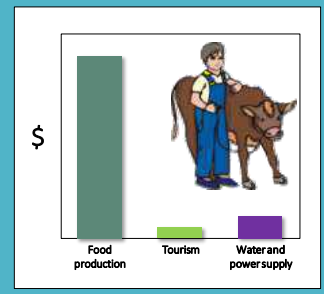
Introduction to the multiple values of ecosystems and ecosystem services

What do we see? Consider three views . . .



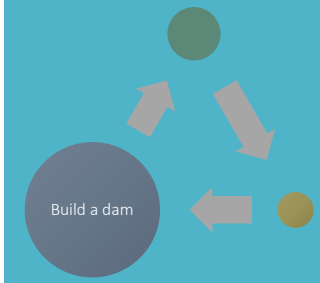
Introduction to the multiple values of ecosystems and ecosystem services

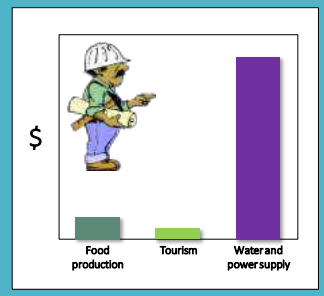
What do we see? A farmer's view



Introduction to the multiple values of ecosystems and ecosystem services

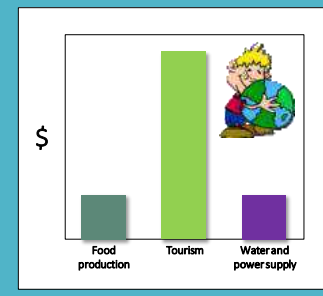
What do we see? An engineer's view





Introduction to the multiple values of ecosystems and ecosystem services

What do we see? A protected area manager's view



Introduction to the multiple values of ecosystems and ecosystem services

Ecosystem management decisions are often made without understanding the full range of values

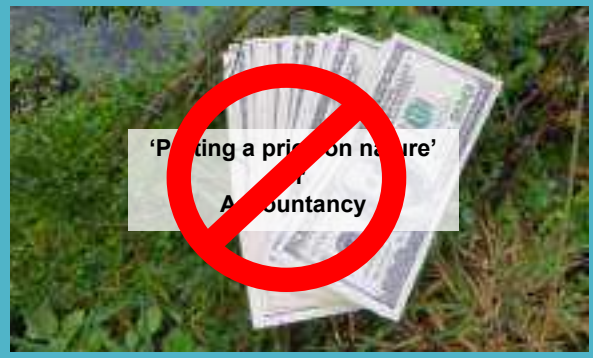
Wetland infilling for urban development

Types of Ecosystem Services

Millennium Ecosystem Assessment, 2005

Recognising, demonstrating and capturing the value of ecosystem services

Valuing the benefits that nature provides



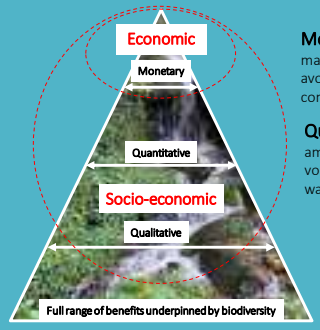
Recognising, demonstrating and capturing the value of ecosystem services

What happens if we don't value the benefits that nature provides?

Often the services are only recognized when they have already disappeared!

Recognising, demonstrating and capturing the value of ecosystem services

How do we assess the value of the benefits that nature provides?



Monetary:
market price of products, value of carbon storage, avoided costs of water purification, alternative construction costs, etc.

Quantitative:
amount of people enjoying given products, volume of stored carbon, volume of purified water, number of properties protected, etc.

Qualitative:
description of the range of various benefits, dependency of people on these benefits etc., e.g. stores carbon, cleans water, protects houses from flooding, etc.

Recognising, demonstrating and capturing the value of ecosystem services

How do we assess ecosystem services?

Recognising, demonstrating and capturing the value of ecosystem services

How do we recognise ecosystem services?

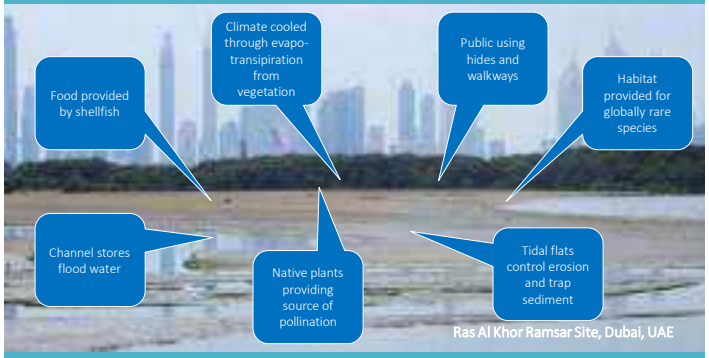
Examples of Ecosystem Services Assessment Methodologies

Rapid Assessment of Wetland Ecosystem Services (RAWES)

Toolkit for Ecosystem Service Site-Based Assessment (TESSA)

Recognising, demonstrating and capturing the value of wetland ecosystem services

How do we recognise wetland ecosystem services?



Recognising, demonstrating and capturing the value of ecosystem services

Practical Exercise 1: What do you see?
Which of the ecosystem services do you think are present?

Recognising, demonstrating and capturing the value of ecosystem services

Practical Exercise 2: What do you see?
Which of the ecosystem services do you think are present?

We are facing complex challenges

*Floods caused by rising sea levels could cost as much as **$14 trillion** if we fail to keep global warming below 2°C.*
- Jevrejeva et al, 2018

climate change | food security | water security | human health | socioeconomic development | disaster risk reduction | ecosystem degradation & biodiversity loss

The population currently affected by land degradation/desertification and drought is estimated at 1.8 billion people
– UN Water

Over 2/3 of world population will live in urban areas by 2050
– UN DESA

But nature can help - ecosystem services: are services provided that benefit people

Nature-based Solutions – common foundations but a distinct approach

EXTENDING CONSERVATION'S REACH AND RELEVANCE

Priority to address drivers of loss of species and species habitat

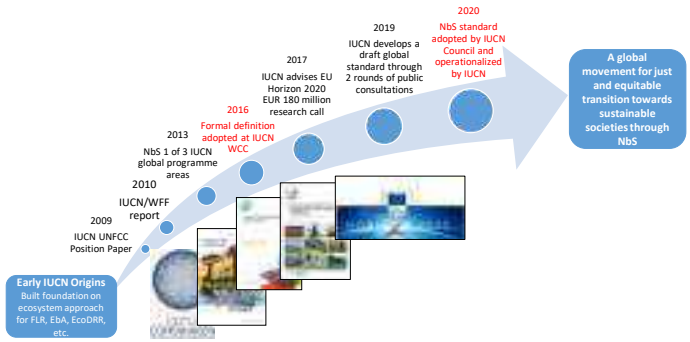
Priority to resolve pressing societal problems and challenges

Safeguarding nature **Safeguarding society**

Conservation norms and science

The biosphere underpins economic and social well-being

IUCN has framed and developed the NBS concept



A common global understanding of NbS

IUCN 2016

Actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.

UNEA-5 2022

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 and resilience** and biodiversity benefits.

An umbrella term

Ecosystem restoration approaches	
ER	Ecosystem Restoration
EE	Ecosystem Engineering
FLR	Forest Landscape Restoration
Issue-specific ecosystem-related	
EbA	Ecosystem-based Adaptation
EbM	Ecosystem-based Management
Eco-DRR	Ecosystem-based Disaster Risk Reduction
CAS	Climate Adaptation Services
Infrastructure-related approaches	
GI	Green Infrastructure
NI	Natural Infrastructure
Ecosystem-based Management	
EbMgt	Ecosystem-based Management
Ecosystem protection approaches	
AbC	Area-based Conservation

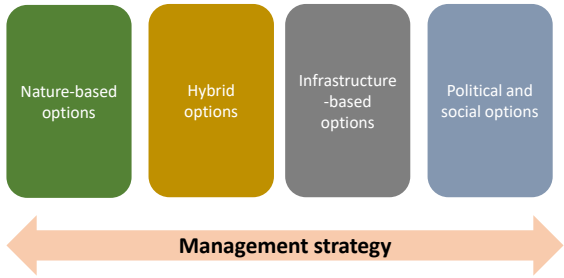
What is the scope of Nature-based Solutions?

Nature-derived solutions

Nature-inspired solutions

Nature-based solutions

Is part of an overall management strategy



Green - Grey infrastructure: Key messages

- Grey infrastructure in the water sector refers to structures such as dams, embankments, seawalls, roads, pipes or water treatment plants
- Green infrastructure can include forests, floodplains, wetlands and soils that provide additional benefits for human well-being, such as flood protection and climate regulation
- Both approaches often form part of the same landscape-level strategy to adapt to risks and pressures
- In a number of cases, grey and NbS infrastructure can be merged to develop complementary **hybrid** solutions.
- Overall, the long-term vision for solving societal challenge is to progressively shift toward more NbS approaches and less grey infrastructure

Leveraging complementarity

Hybrid approaches, utilizing a combination of natural and grey infrastructure

Natural infrastructure

Grey infrastructure

Applying NbS at scale at landscape/basin level

Example 1 - Forest Landscape Restoration

The Bonn Challenge is a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and 350 million hectares by 2030;

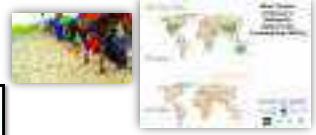
It was launched in 2011 by the Government of Germany and IUCN, and later endorsed and extended by the New York Declaration on Forests at the 2014 UN Climate Summit;

The restoration will create approximately **USD 84 billion per year** in net benefits that could bring direct additional income opportunities for rural communities.

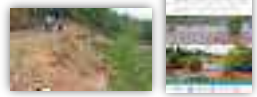
"Pakistan has achieved its restoration target through a combination of protected natural regeneration (60%) and planned afforestation (40%). In addition, it has established 13,000 private tree nurseries, which have already boosted local incomes, generated thousands of green jobs, and empowered unemployed youth and women in the province."

Example 2 - Ecosystem Based Adaptation, Mitigation and Eco-DRR

Build climate resilience by harnessing the benefits of wetlands in Cambodia, Lao PDR, Thailand, and Viet Nam



Increasing resilience of infrastructure to disasters in Nepal



Restoring and managing Blue Carbon ecosystems for carbon storage and coastal protection

Example 3 – NbS for Water

China Mega-cities and their watersheds: nature-based solutions for sustainable drinking water sources, pilot in Miyun and Jiaquan watersheds, before expanding to another 5-10 Chinese mega-cities.

In the 3S basins (Cambodia, Lao PDR and Viet Nam)

- ✓ Changing coffee practices in the headwater of the basin would save 200 million m3 litres of water per year benefitting both coffee production in Viet Nam and downstream country;
- ✓ Leaving the Sekong free flowing would ensure maintenance of Cambodian fisheries and sediment flow to Mekong Delta

Example 4- Funding for NbS - Payment for Ecosystem Services

- Innovative market-based mechanism, which stands on twin principles: those who benefit from environmental services should pay to those who provide environmental services.

Sharing of hydropower revenue in Kulekhani reservoir, Nepal – upstream communities receives payment for the maintenance of watershed, less sedimentation in the reservoir.

PES for water in Bhutan - Communities commit to managing the watershed sustainably, to ensure the provision of water. In exchange, the main water users downstream pay a fee to the communities for the service provided.

This support, which amounts to approximately US$ 2,000 per year per watershed, is allocated to community-level investments related to development and livelihoods.

Example 5 - Nature based solution to human health in the context of Covid 19

- **NbS to prevent epidemics**

Science shows that humanity's destruction of biodiversity is creating the conditions for new viruses and diseases. Deforestation drives wild animals out of their natural habits and closer to human populations, creating greater opportunities for viruses like Covid-19 to spread.

- **NbS for mental health;**

Health Parks, Healthy People model by Parks Victoria, Australia - developing park-based activities for people, building awareness of parks, producing evidence of their benefits and informing cross-sector policies and plans.

London's green spaces saved £370 million per year from improved mental health and £580 million per year due to better physical health.

- **NbS to build back better;**

If we want a more resilient post-COVID-19 world we will need to scale up investment in NbS, for which we need a strong accounting of our natural capital.

The Global Standard for Nature-based Solutions:

- Is a facilitative standard for quality design, verification and scaling up of NbS;
- Safeguards nature from overexploitation;
- Engages (and ensures the involvement of all) stakeholders;
- Builds common language and understanding;
- Increases demand;
- Incentivizes positive sustainable change;
- Has 8 criteria and 28 indicators;
- Is based on knowledge co-creation: conservation science, social science, traditional knowledge.

Nature based Solutions

Criteria

	Criteria
1.	NbS effectively address societal challenges
2.	Design of NbS is informed by scale
3.	NbS result in net gain to biodiversity and ecosystem integrity
4.	NbS are economically viable
5.	NbS is based on inclusive, transparent and empowering governance processes
6.	NbS equitably balances trade-offs between achievement of its primary goal(s) and the continued provision of multiple benefits
7.	NbS are managed adaptively, based on evidence
8.	NbS are sustainable and mainstreamed within an appropriate jurisdictional context

Criterion 1 – Societal challenges
NbS effectively address societal challenges

- 1.1 The most pressing societal challenges for rights holders and beneficiaries are prioritised
- 1.2 The societal challenges addressed are clearly understood and documented
- 1.3 Human wellbeing outcomes arising from the NbS are identified, benchmarked and periodically assessed

Criterion 2 – Design at scale
Design of NbS is informed by scale

- 2.1 Design of NbS recognises and responds to the interactions between the economy, society and ecosystems
- 2.2 Design of NbS integrated with other complementary interventions and seeks synergies across sectors
- 2.3 Design of NbS incorporates risk identification and risk management beyond the intervention site

Criterion 3 - Biodiversity net-gain

NbS result in net gain to biodiversity and ecosystem integrity

- 3.1 NbS actions directly respond to evidence-based assessment of the current state of the ecosystem and prevailing drivers of degradation and loss
- 3.2 Clear and measurable biodiversity conservation outcomes are identified, benchmarked and periodically assessed
- 3.3 Monitoring includes periodic assessments for unintended adverse consequences on nature arising from the NbS
- 3.4 Opportunities to enhance ecosystem integrity and connectivity identified and incorporated into the NbS strategy

Criterion 4 – Economic Viability

NbS are economically viable

- 4.1 The direct and indirect benefits and costs associated with the NbS, who pays and who benefits, are identified and documented
- 4.2 A cost-effectiveness study is provided to support the choice of NbS including the likely impact of any relevant regulations and subsidies
- 4.3 The effectiveness of an NbS design is justified against available alternative solutions, taking into account any associated externalities
- 4.4 NbS design considers a portfolio of resourcing options such as market-based, public sector, voluntary commitments and actions to support regulatory compliance

Criterion 5 – Inclusive Governance

NbS are based on inclusive, transparent and empowering governance processes

- 5.1 A defined and fully agreed upon feedback and grievance resolution mechanism is available to all stakeholders before an NbS intervention can be initiated
- 5.2 Participation is based on mutual respect and equality, regardless of gender, age or social status, and upholds the right of Indigenous Peoples to Free Prior and Informed Consent (FPIC)
- 5.3 Stakeholders who are directly and indirectly affected by the NbS have been identified and involved in all processes of the NbS intervention
- 5.4 Decision-making processes document and respond to rights and interests of all participating and affected stakeholders
- 5.5 Where the scale of the NbS extends beyond jurisdictional boundaries, mechanisms are established to enable joint decision-making among the stakeholders in those jurisdictions affected by the NbS

Criterion 6 – Balance trade-offs

NbS equitably balances trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits

- 6.1 The potential costs and benefits of associated trade-offs of the NbS intervention are explicitly acknowledged and inform safeguards and any appropriate corrective actions
- 6.2 The rights, usage of and access to land and resources, along with the responsibilities of different stakeholders are acknowledged and respected
- 6.3 Established safeguards are periodically reviewed to ensure that mutually-agreed trade-offs limits are respected and do not destabilise the entire NbS

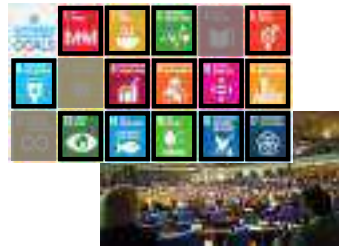
Criterion 7 – Adaptive management

NbS are managed adaptively, based on evidence

- **7.1 A NbS strategy is established and used as a basis for regular monitoring and evaluation of the intervention**
- **7.2 A monitoring and evaluation plan is developed and implemented throughout the intervention lifecycle**
- **7.3 A framework for iterative learning that enables adaptive management is applied throughout the intervention lifecycle**

Criterion 8 – Sustainability and mainstreaming

NbS are sustainable and mainstreamed within an appropriate jurisdictional context



- **8.1 NbS design, implementation and lessons learnt are shared for triggering transformative change**
- **8.2 NbS inform and enhance facilitating policy and regulation frameworks to support its uptake and mainstreaming**
- **8.3 Where relevant, NbS contribute to national and global targets for human wellbeing, climate change, biodiversity and human rights, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)**

Criteria

	Criteria
1.	NbS effectively address societal challenges
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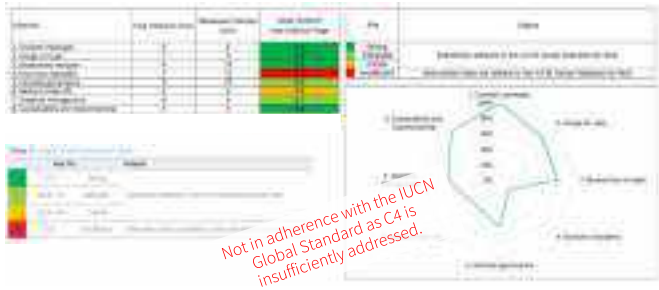
What does the Standard look like?

Measure of standard adherence



NbS Group website

https://www.iucn.org/theme/nature-based-solutions

Open-access documents

https://portals.iucn.org/library/node/49070

Launch events YouTube videos: +2000 livestream participants, +8500 views since, Participants from 140 countries

https://www.youtube.com/watch?v=hpDN-svlgZI

Consultation synopsis

https://www.iucn.org/sites/dev/files/content/documents/synopsis_of_consultation_on_the_development_of_the_iucn_global_standard_for_nature.pdf

Self-assessment sheet

https://www.surveygizmo.com/s3/5741878/IUCN-Global-Standard-for-NbS-User-Group

2 page issues brief

https://www.iucn.org/resources/issues-briefs/ensuring-effective-nature-based-solutions

Questions ?

Appendix V - Nature-based Solutions for Resilience Planning Cycle

adpc

IUCN

THE WORLD BANK

Nature-based Solutions for Resilience- a subset of NbS

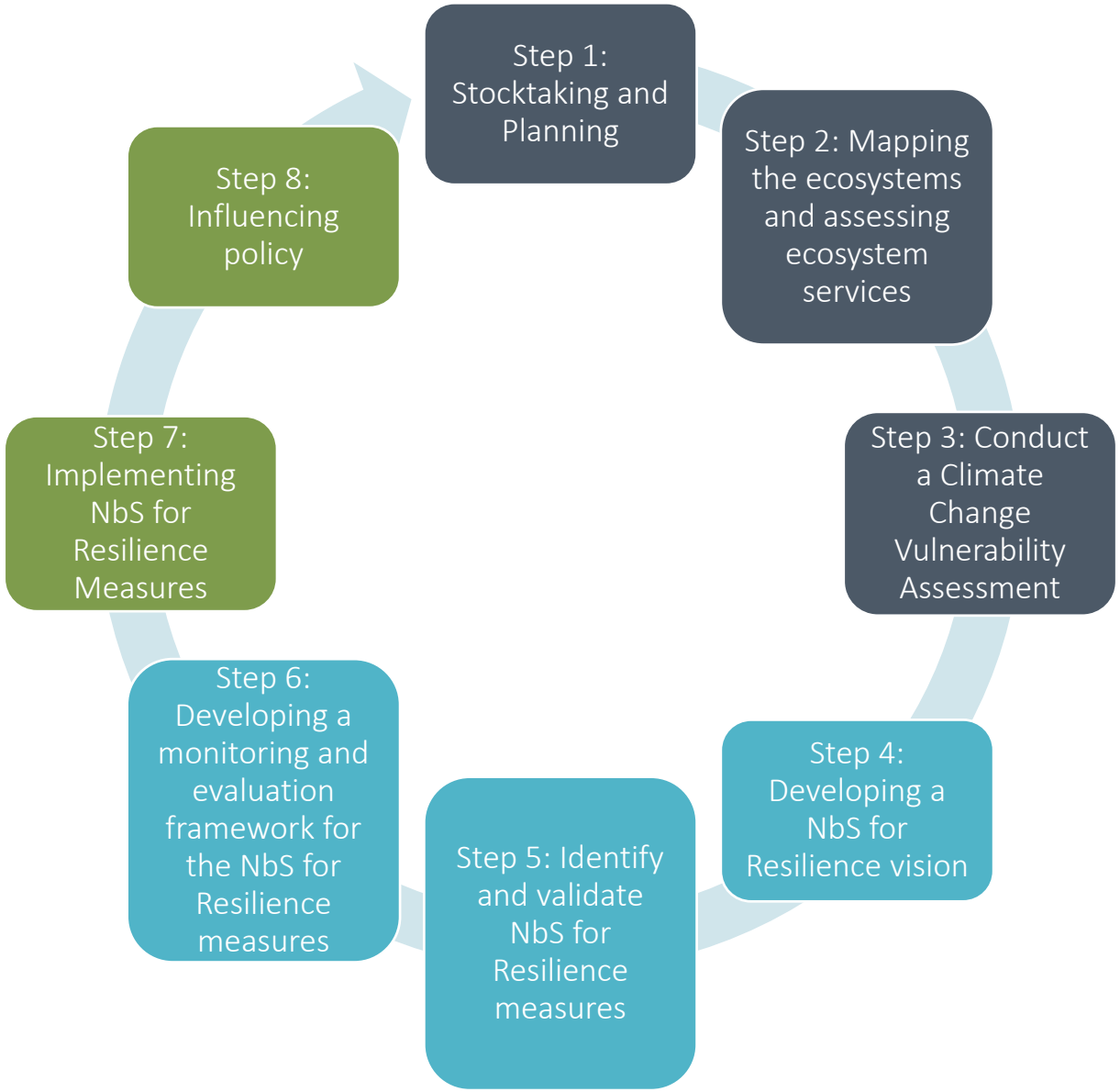
- NbS for Resilience uses biodiversity and ecosystem services to support communities in adapting to the impacts of climate change through the conservation, management and restoration of ecosystems, as part of a wider strategy.

To determine whether or not an action is a NbS for Resilience, the measure must meet (at minimum) the following three criteria:

- ☐ Is the approach focusing on tackling a climate induced threat and on providing adaptation benefits?
- ☐ Is the proposed/implemented solution to climate threats based on (or include elements of) restoration/conservation/management of ecosystems to maintain/ enhance ecosystems services?
- ☐ Does this approach provide biodiversity benefits?

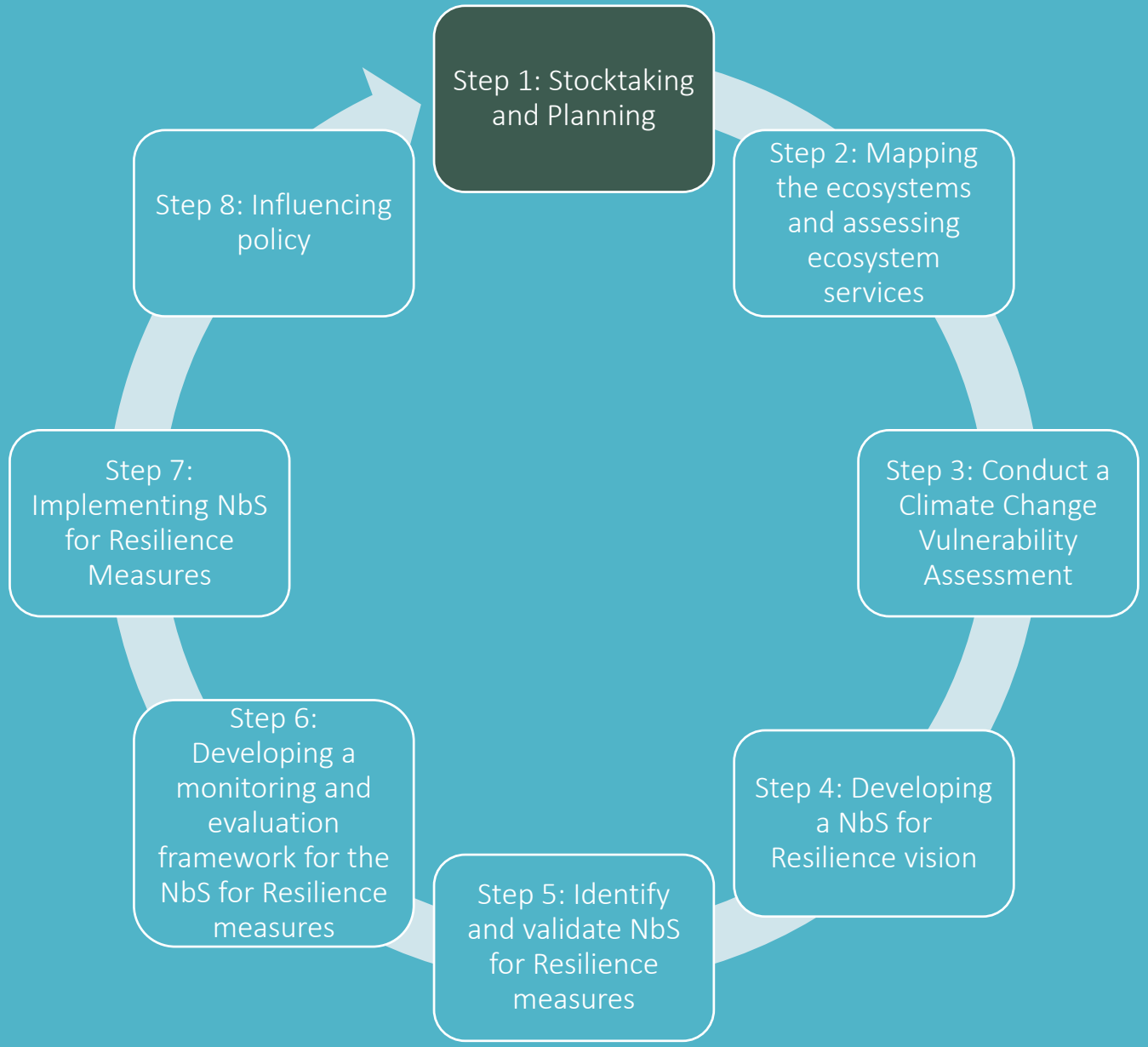
NbS for Resilience Planning: An Overview

- The NbS for Resilience planning process has eight key steps, which aim to ensure that the measures are based on the best available data and include local stakeholders throughout the entire process
- The process will take a minimum of 18 months



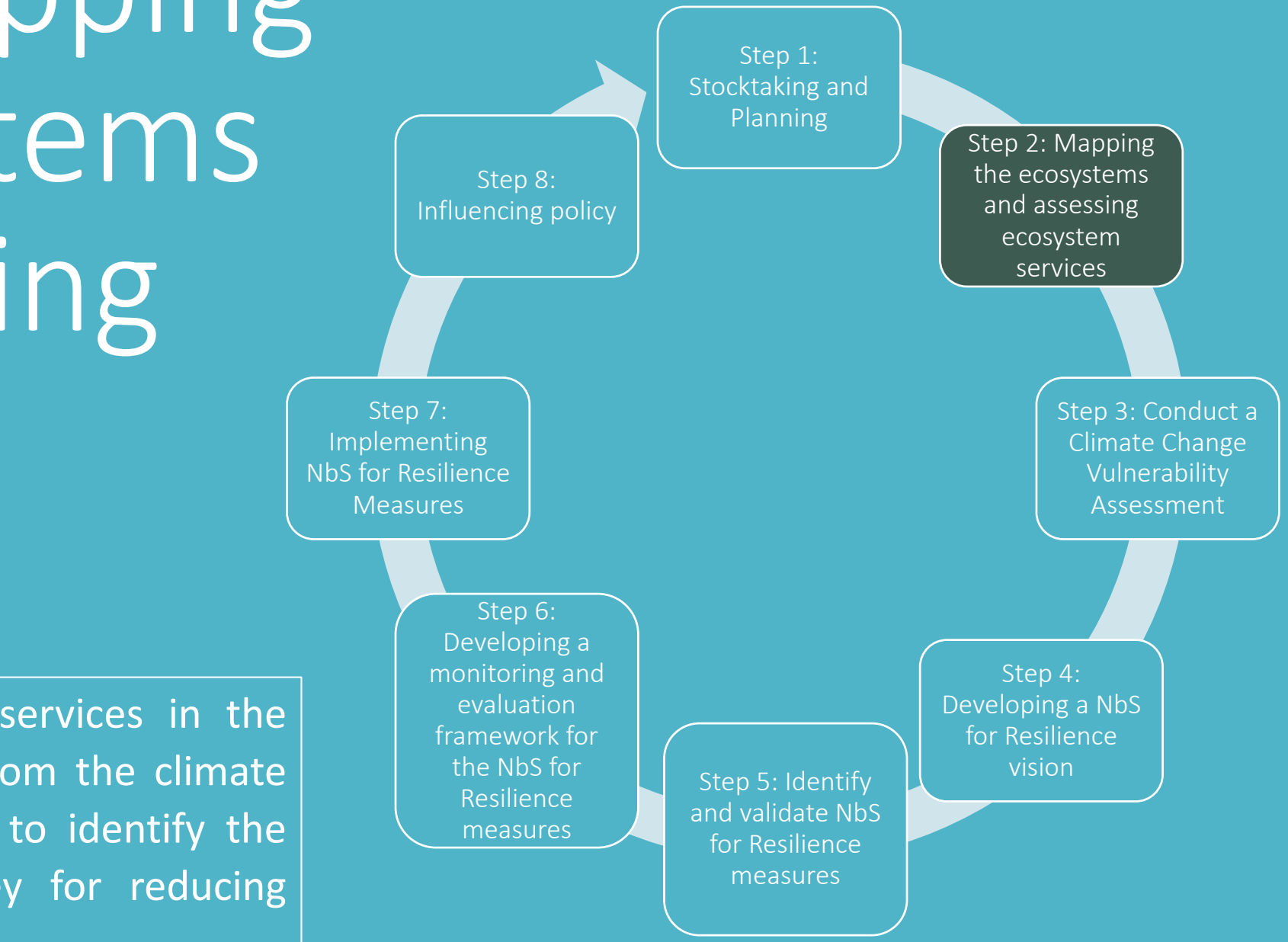
Step 1: Stocktaking and planning

Objective: This initial step aims to develop a preliminary understanding of the societal challenge to be addressed, to understand planned and ongoing measures in the focal area, and pre-assess whether NbS for Resilience can potentially address climate impacts at the site and possible approaches to be developed.



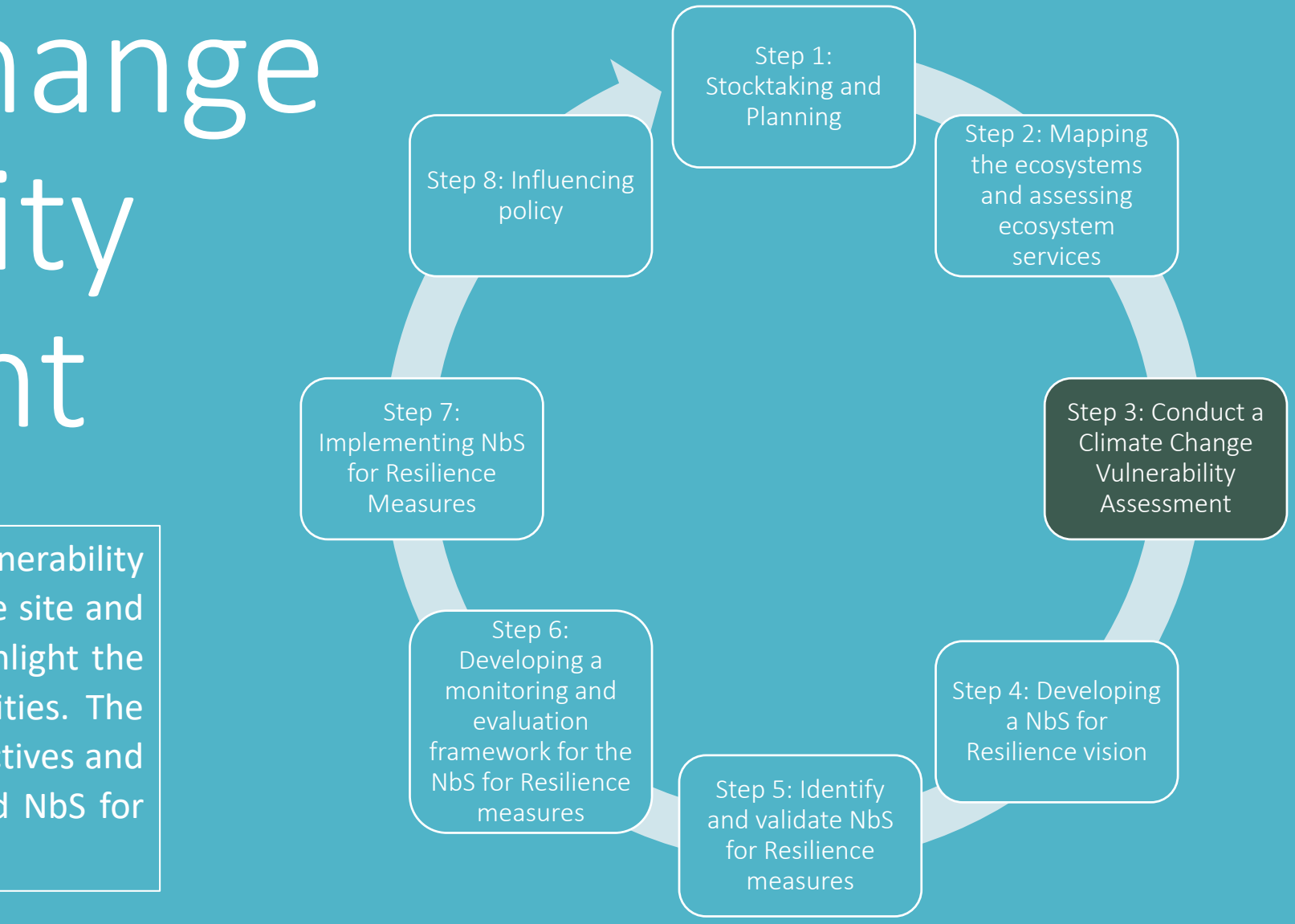
Step 2: Mapping the ecosystems and assessing ecosystem services

Objective: Map the ecosystem services in the focal area and use the results from the climate change vulnerability assessment to identify the ecosystem services that are key for reducing vulnerability.



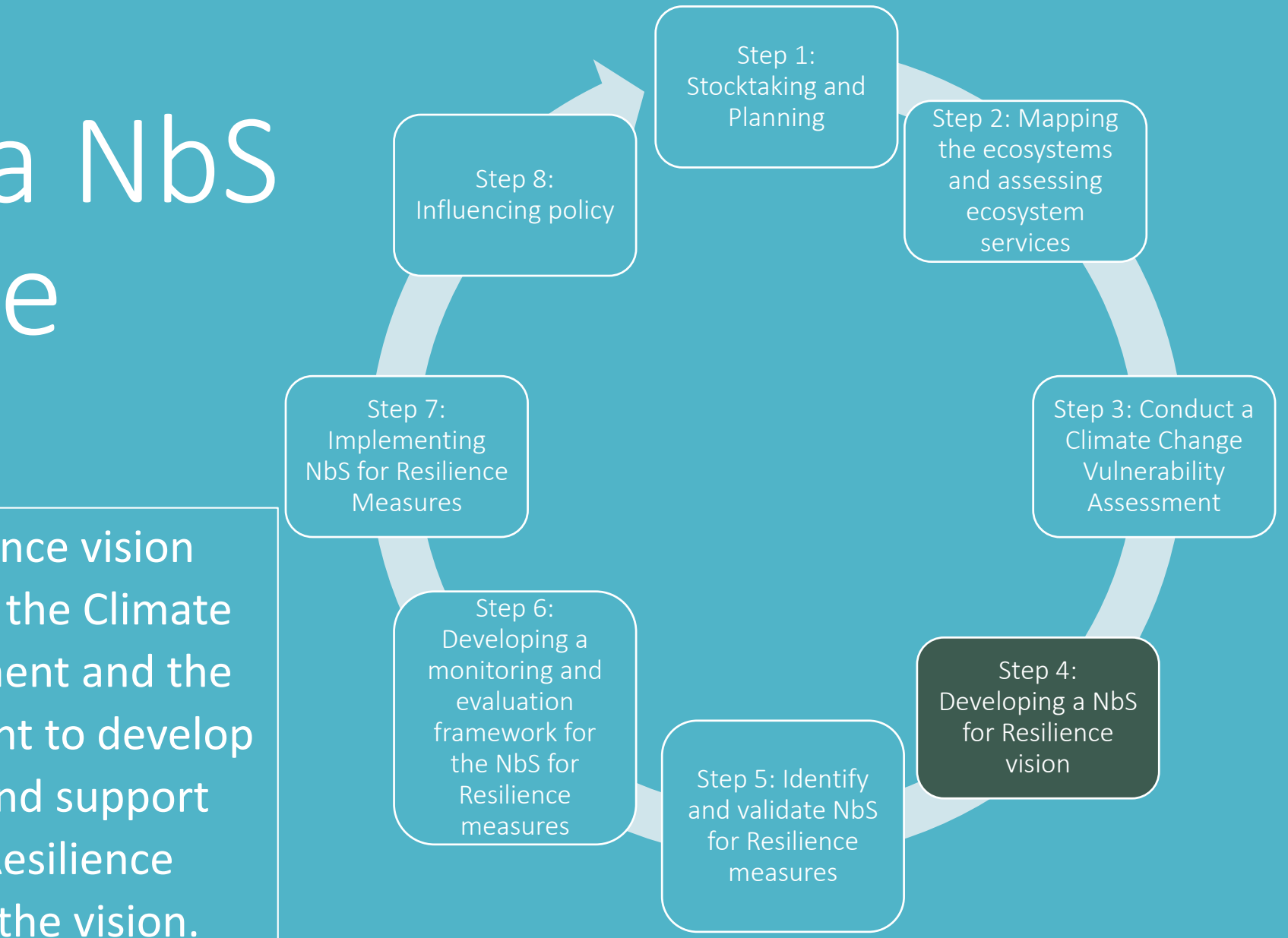
Step 3: Conduct a Climate Change Vulnerability Assessment

Objective: The Climate Change Vulnerability Assessment uses information about the site and climate projections and models to highlight the focal area's climate change vulnerabilities. The results will be used to inform the objectives and content of the adaptation strategy and NbS for Resilience measures.



Step 4: Developing a NbS for Resilience vision

Objective: The NbS for Resilience vision will use the key findings from the Climate Change Vulnerability Assessment and the ecosystem services assessment to develop an NbS for Resilience vision and support the identification of NbS for Resilience approaches that can support the vision.



Developing a NbS for Resilience Vision

Baseline

- Climate vulnerability
- Societal challenge
  - People affected
- Ecosystem services
- Biodiversity

Future Goals

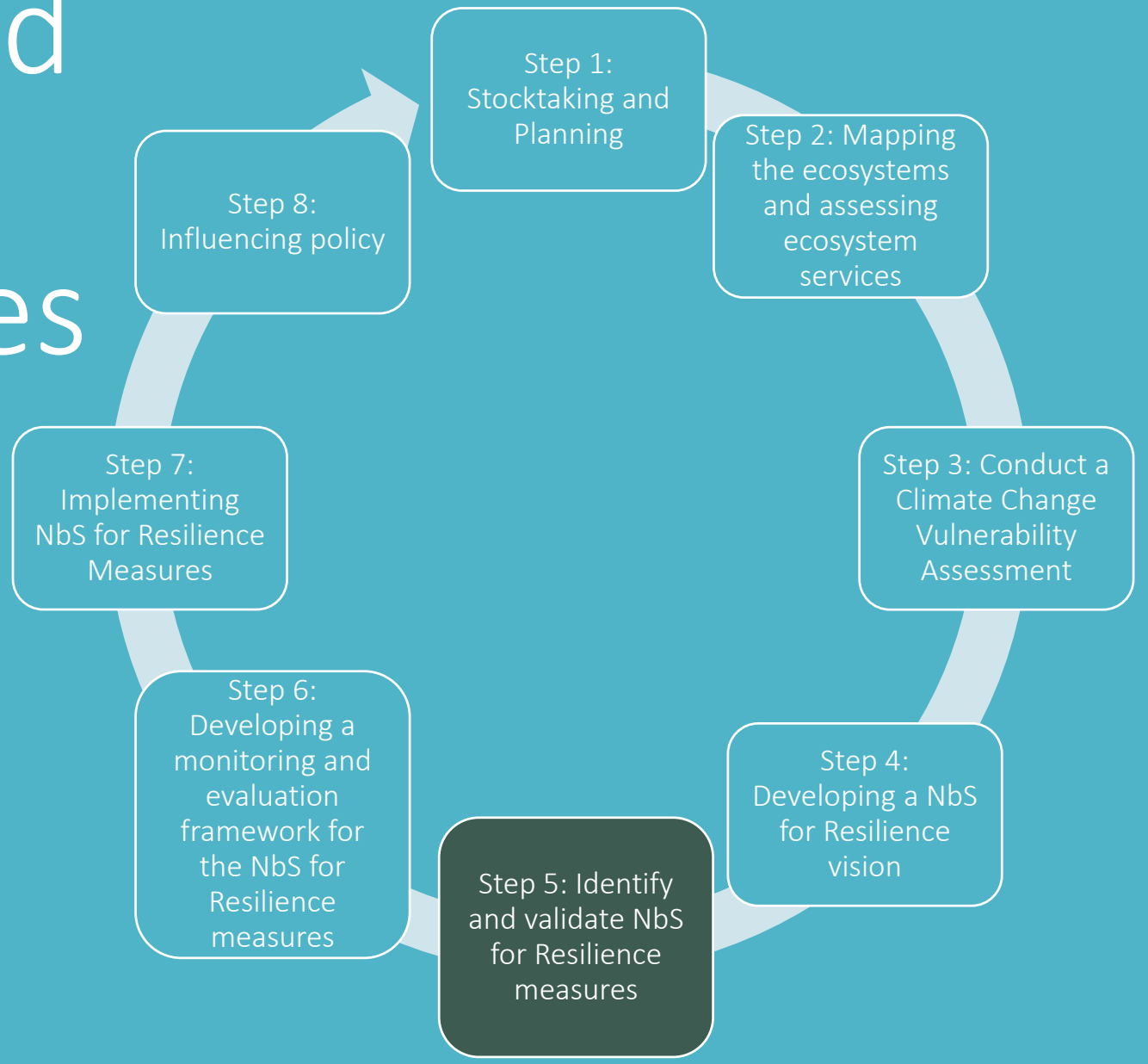
- Climate adaptation outcome
- Number of people benefitting
- Biodiversity outcomes

NbS for Resilience Approach

- NbS for Resilience vision
- Governance
- Funding

Step 5: Identify and validate NbS for Resilience measures

Objective: This step aims to guide project implementers in identifying, describing and assessing the NbS for Resilience measures based on the vision and approaches developed in Step 4, and then validating them. The measures selected will aim to reduce climate risks and vulnerabilities and maximise benefits for local stakeholders and biodiversity.

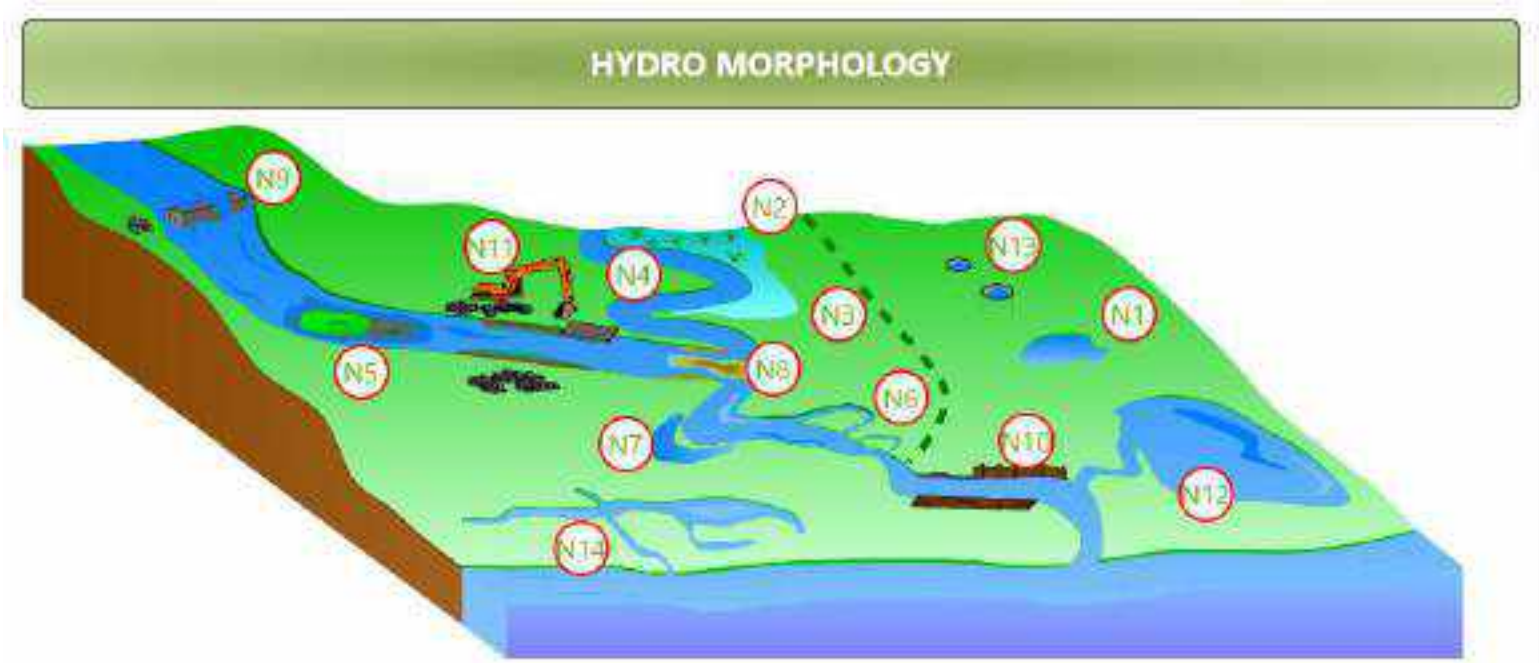


Step 5: Identify and validate NbS for Resilience measures

Using the vision from Step 4, select NbS for Resilience measures to support the achievement of the vision

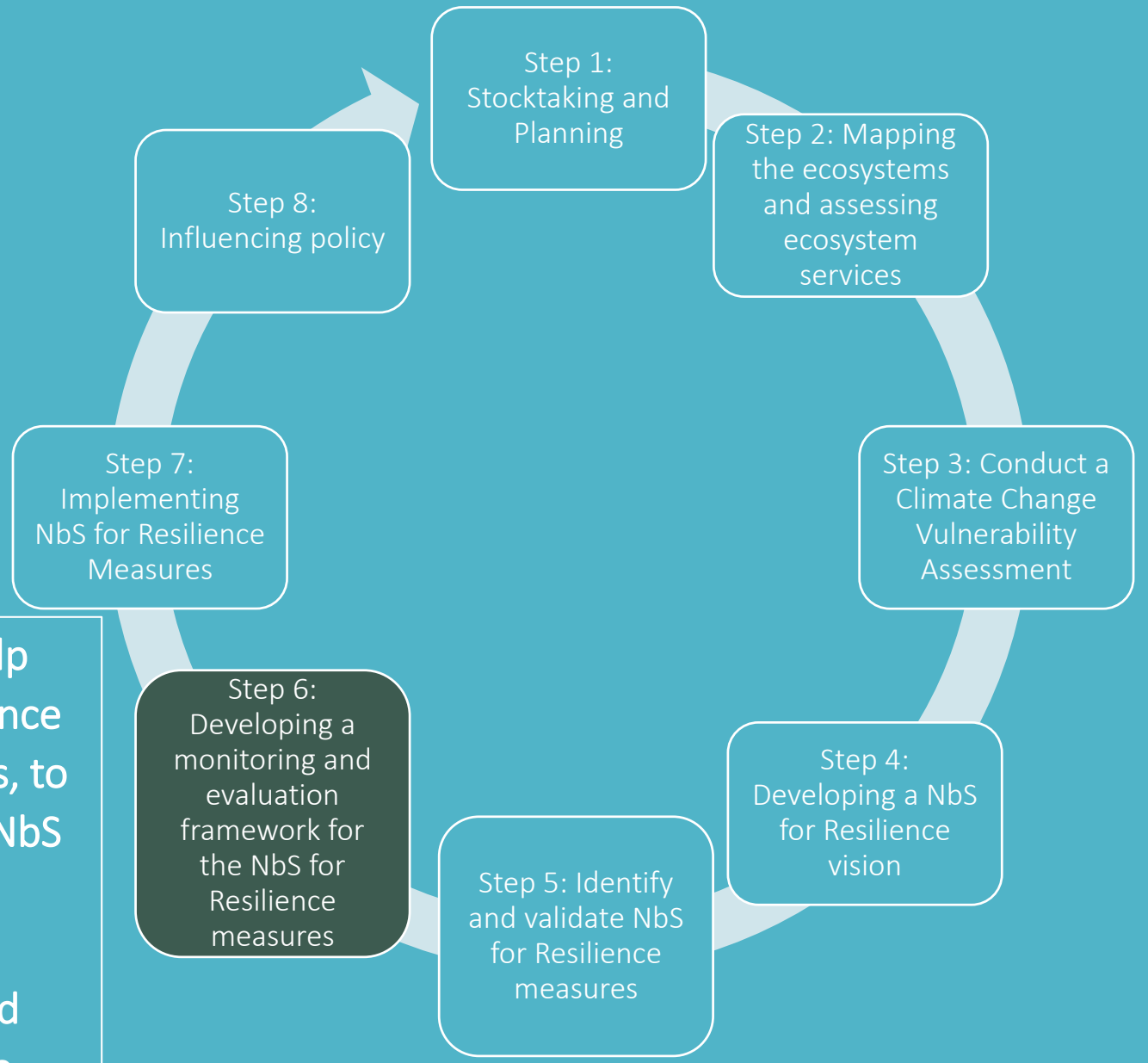
Natural Water Retention Measures (www. nwrm.eu) has detailed descriptions of NbS for Resilience measures divided into agriculture, forest, hydromorphology and urban

In this step, project teams will describe the measures in detail and to ensure that they can be implemented effectively



Step 6: Developing a monitoring and evaluation framework for the NbS for Resilience measures

Objective: This step aims to develop a framework to help understand the change that the selected NbS for Resilience measures have had on the communities and ecosystems, to gauge their effectiveness, and whether or not and why NbS for Resilience measures are having the desired effect. Monitoring and evaluation (M&E) is part of an ongoing process, and measures should be continuously evaluated throughout their lifetime, and adjusted as needed as the ecosystem or socio-economic conditions in the area change.



Step 6: Developing a monitoring and evaluation framework for the NbS for Resilience measures

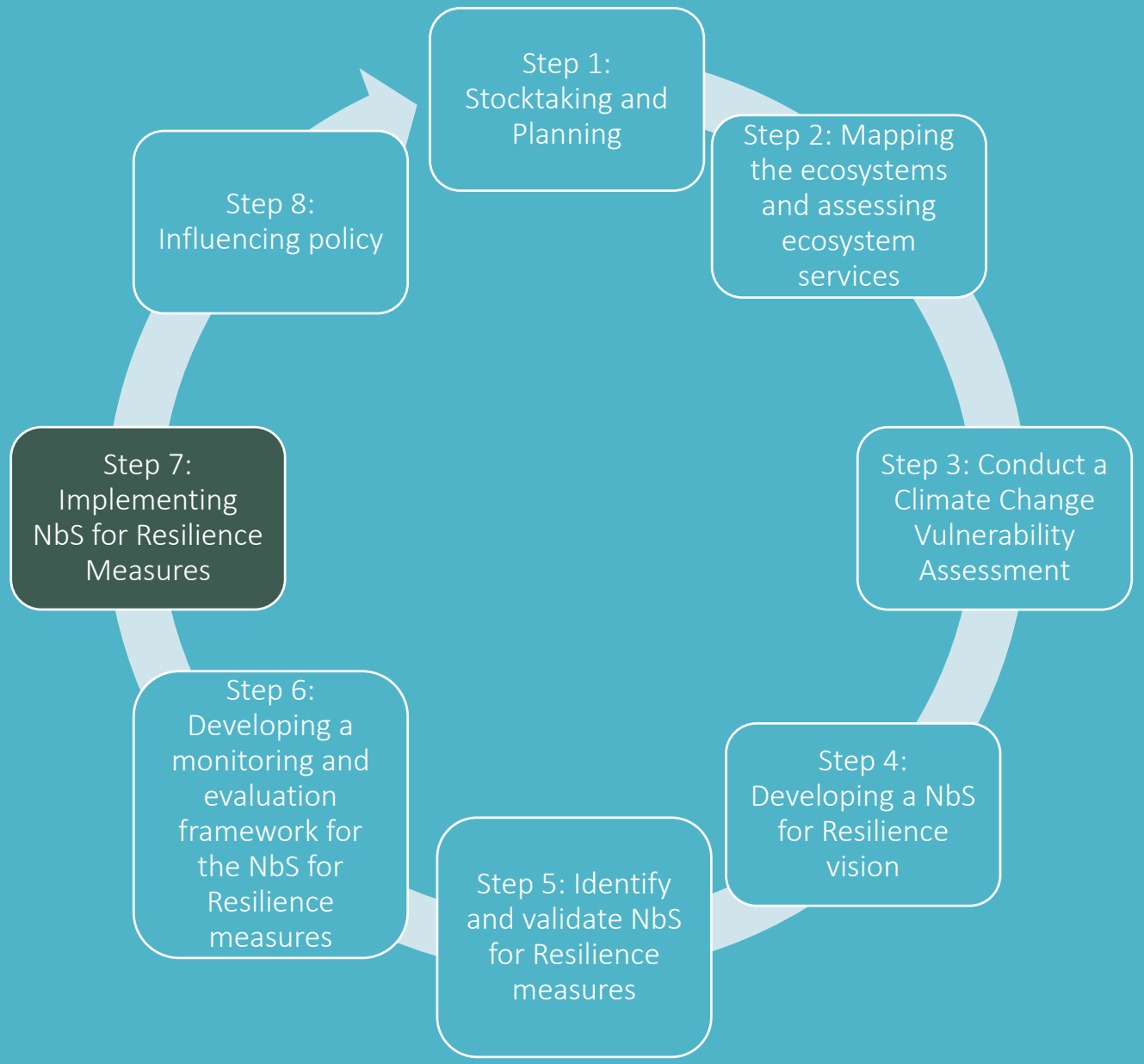
Develop indicators and identify monitoring methods

Develop an M&E plan and provide capacity building on M&E

Implement adaptive management to strengthen the NbS for Resilience measure and provide the intended outcomes

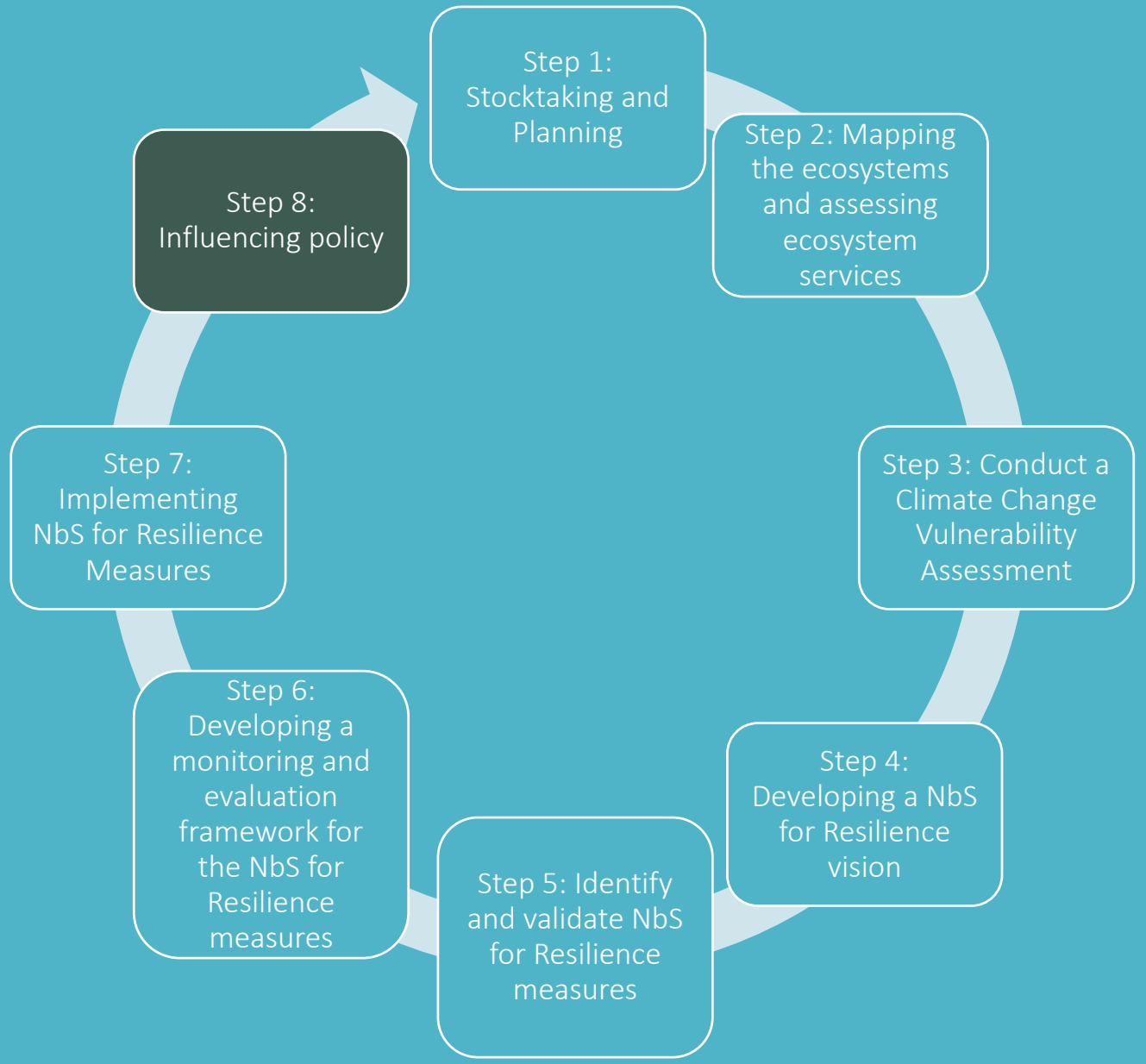
Step 7: Implementing NbS for Resilience Measures

Objective: Work with local stakeholders to implement the identified NbS for Resilience measures in the focal area.



Step 8: Influencing policy

Objective: Identify and document the key lessons learned from the implementation of the NbS for Resilience measure, and share them with relevant government agencies to trigger policy change.



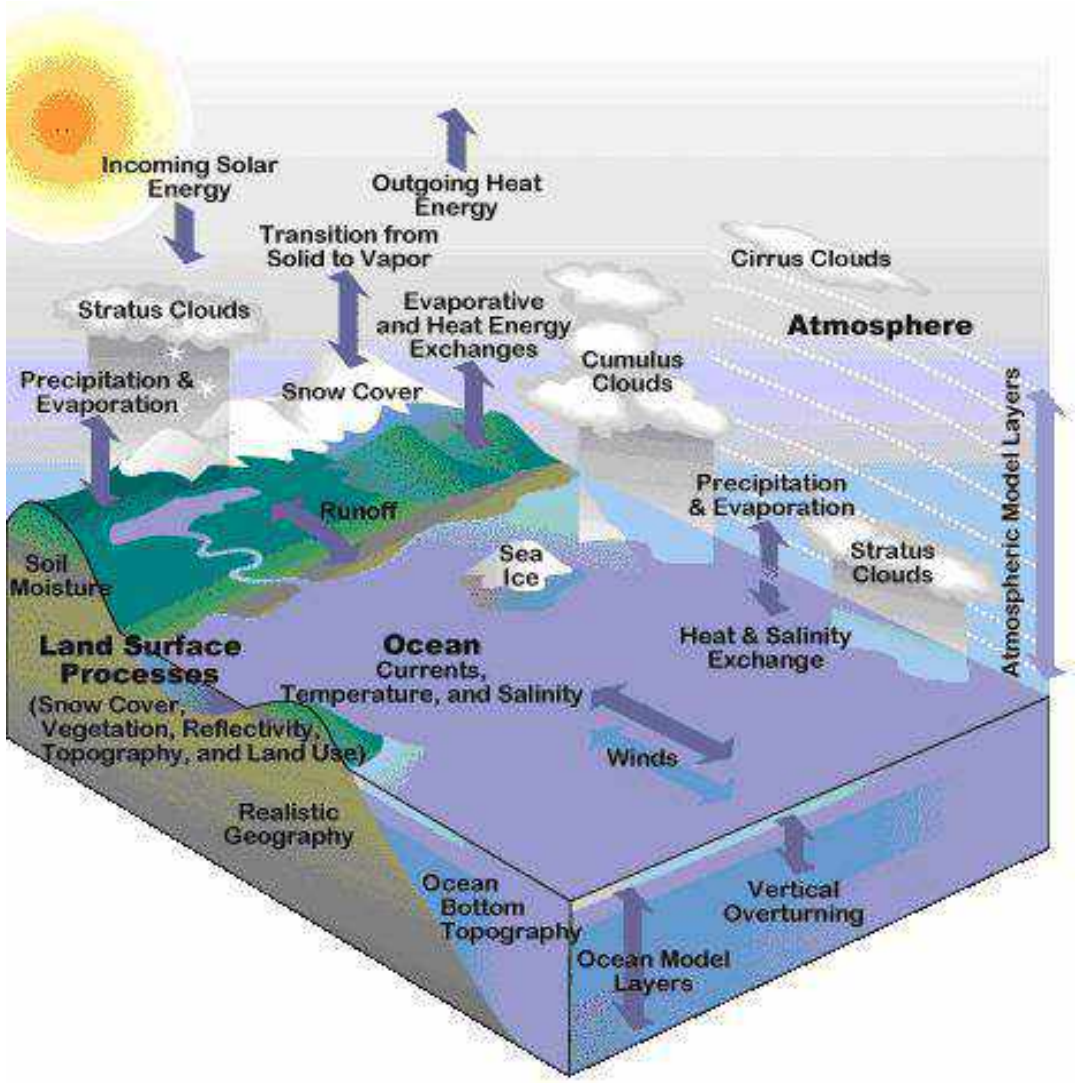
Climate Change Projections, their understanding and impact assessment

Regional Online Training and Dialogue on NbS for the Resilient Water Sector in South Asia

16-18 Jan 2023

Understanding the Climate Models

Climate System



The animals and plants
(the Biosphere)

The oceans, lakes, and rivers
(the Hydrosphere)

Icebergs, glaciers and ice sheets
(the Cryosphere)

Air
(the Atmosphere)

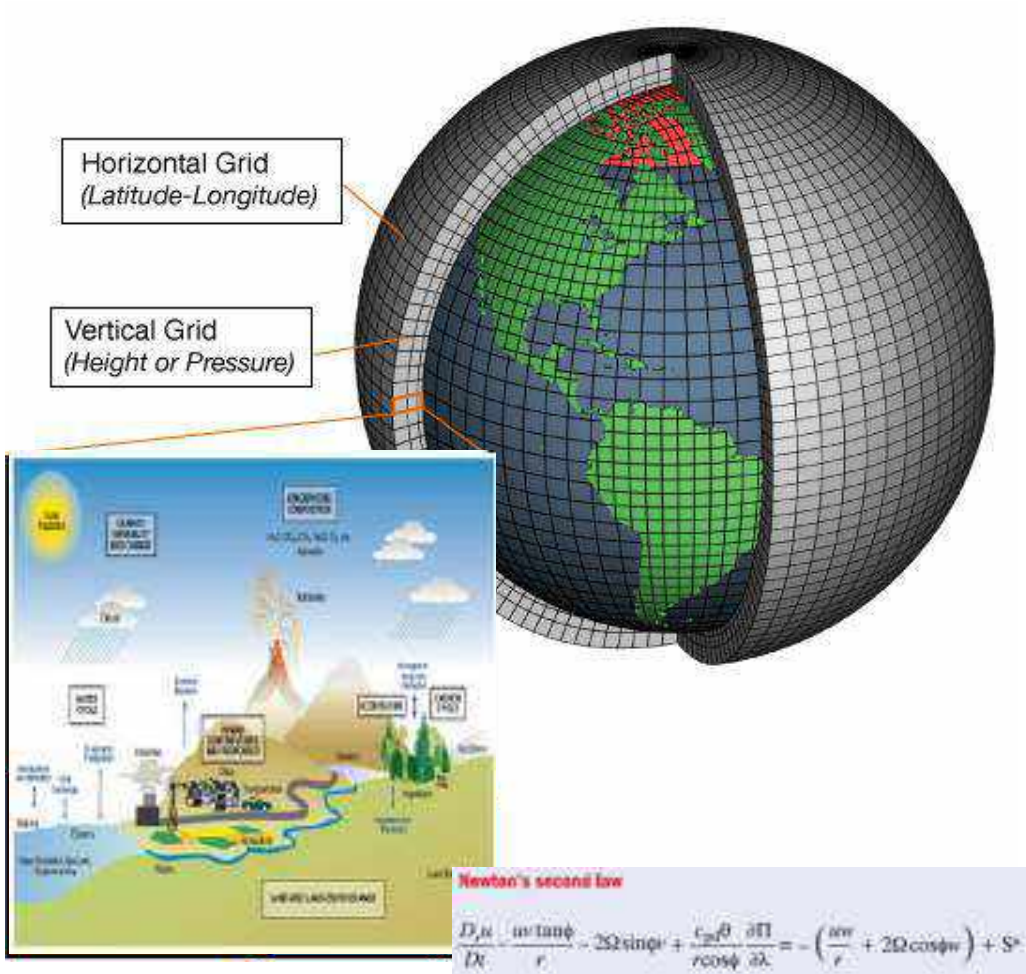
Mountains, Volcanoes and moving continents
(the Geosphere)

A complex system which is difficult to understand

Climate Model

Climate model is a computer-based simulation that use mathematical formulas to re-create the chemical and physical processes that drive Earth's climate system. To "run" a model, scientists divide the planet into a 3-dimensional grid, apply the basic laws of physics, fluid motion, and chemistry and then valuate the results.

The models calculate winds, heat transfer, radiation, relative humidity, and surface



Newton's second law

$$\frac{D_s u}{Dt} - \frac{uv\tan\phi}{r} - 2\Omega\sin\phi v + \frac{c_{pd}\theta}{r\cos\phi}\frac{\partial\Pi}{\partial\lambda} = -\left(\frac{uw}{r} + 2\Omega\cos\phi w\right) + S^u$$

$$\frac{D_s v}{Dt} + \frac{u^2\tan\phi}{r} + 2\Omega\sin\phi u + \frac{c_{pd}\theta}{r}\frac{\partial\Pi}{\partial\phi} = -\left(\frac{vw}{r}\right) + S^v$$

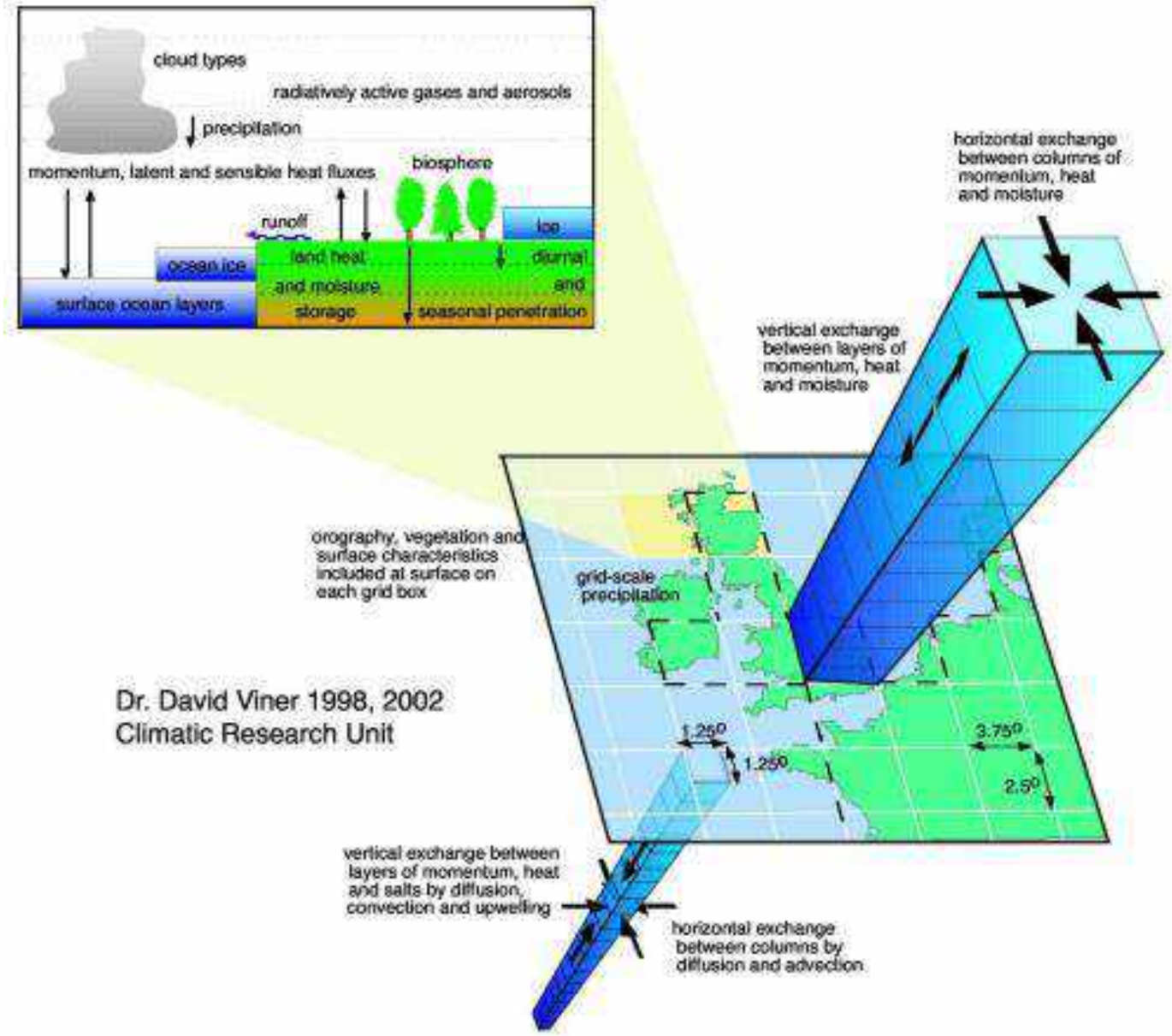
$$\frac{D_s w}{Dt} + c_{pd}\theta\frac{\partial\Pi}{\partial r} + \frac{\partial\Pi}{\partial r} = \left(\frac{u^2+v^2}{r}\right) + 2\Omega\cos\phi u + S^w$$

mass continuity

$$\frac{D_s}{Dt}\left(\rho_d r^2\cos\phi\right) + \rho_d r^2\cos\phi\left[\frac{\partial}{\partial\lambda}\left(\frac{u}{r\cos\phi}\right) + \frac{\partial}{\partial\phi}\left(\frac{v}{r}\right) + \frac{\partial w}{\partial r}\right] = 0$$

thermodynamics

$$\frac{D_s\theta}{Dt} = S^\theta$$



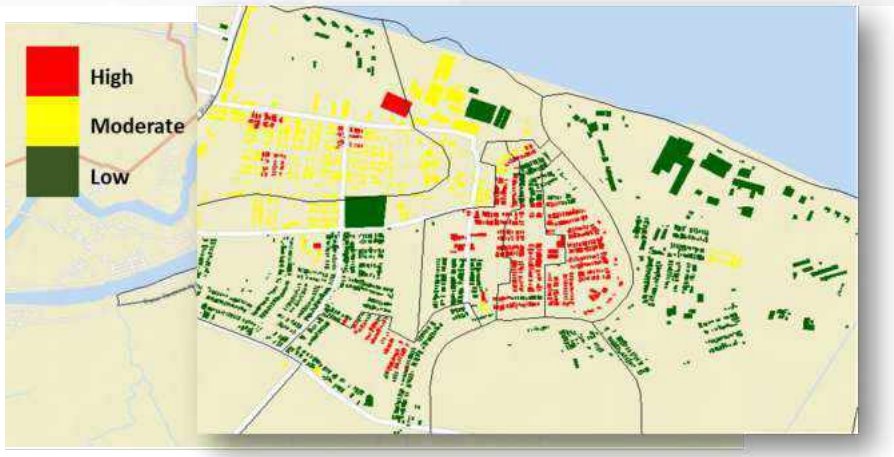
GCM typical horizontal resolution of between 100 and 300 km, 10 to 20 vertical

layers in the atmosphere and sometimes as many as 30 layers

Why use climate Change Scenarios?

- We are unsure exactly how regional/national climate will change
- Scenarios are plausible combinations of variables consistent with what we know about human-induced climate change
- One can think of them as the prediction of a model, contingent upon the GHG emissions scenario
- Since estimates of regional change by models differ substantially, an individual model estimate should be treated more as a scenario
- Scenarios are fed into GCMs in order to understand how the climate might respond to different possible pathways and climate drivers

Climate Risk and Vulnerability Assessment



Global Climate Model (GCM)

General Circulation Models (GCMs) are a class of computer-driven models for weather forecasting, understanding climate and projecting climate change, where they are commonly called Global Climate Models.

Thousands of climate researchers use global climate models to better understand how global changes such as increasing greenhouses gases or decreasing Arctic sea ice will affect the Earth. The models are used to look hundreds of years into the future, so that we can predict how our planet's climate will likely change.

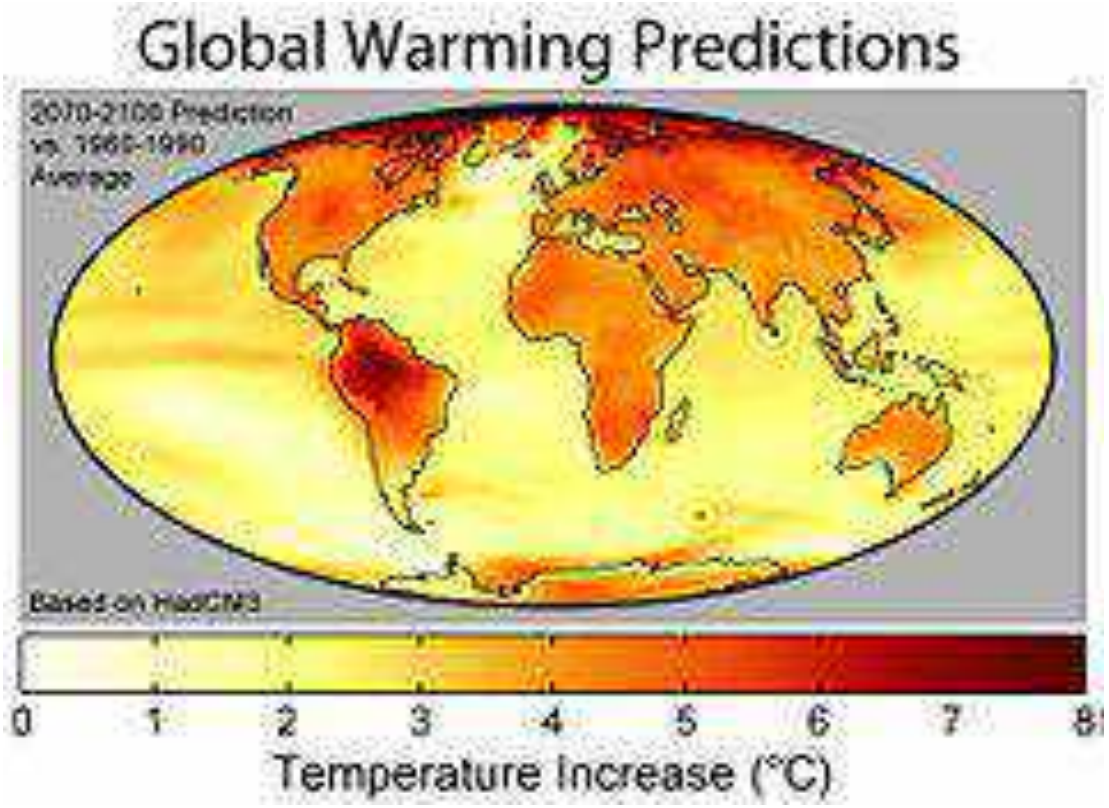
There are various types of climate models. Some focus on certain things that affect climate such as the atmosphere or the oceans. Some models take into account many factors of the atmosphere, biosphere, geosphere, hydrosphere, and cryosphere to model the entire Earth system

HadCM – Hadley Center, UK
ECHAM – Max Planck Institute, Germany
CCSM – National Center for Atmospheric Research (NCAR), USA
GFDL – National Oceanic and Atmospheric Administration (NOAA), USA

Climate Model Simulations

Prediction of Global Warming

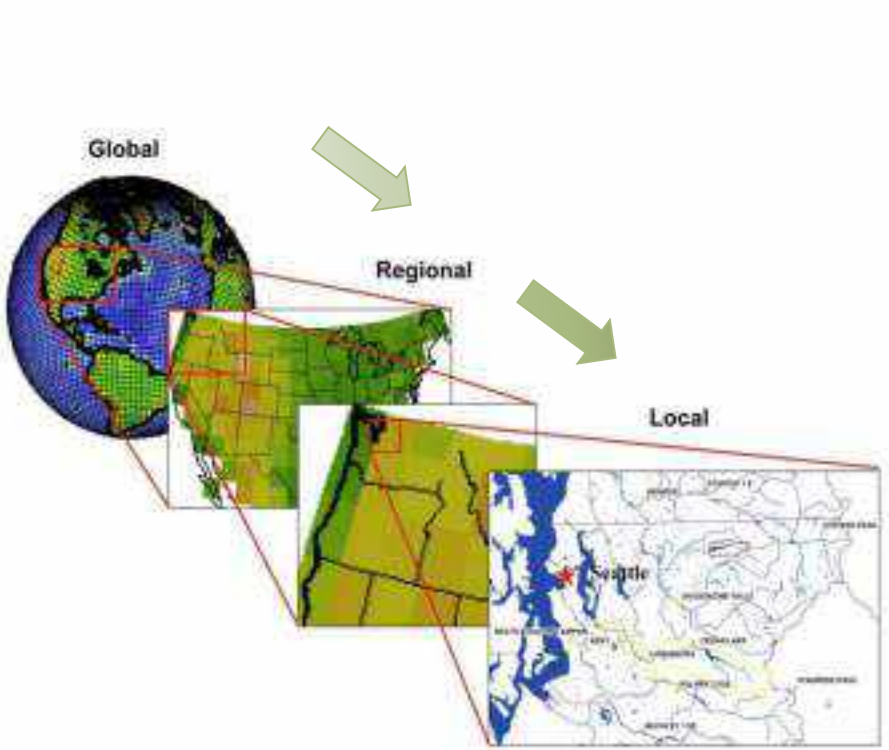
Figure shows the distribution of warming during the late 21st century predicted by the HadCM3 climate model. The average warming predicted by this model is 3.0 °C.



Downscaling of GCM

As a result, the global scale assessments of climate variables that are simulated by the GCMs are not generally appropriate for assessing the impact of climate change at the regional and local levels for decision-making processes in such sectors as agriculture, health, transportation, energy and water resource management. Scientists have therefore taken steps to address this; to translate the global-scale data from GCM into the finer resolutions for use in regional and local impacts analysis. This process is known as '**downscaling**'.

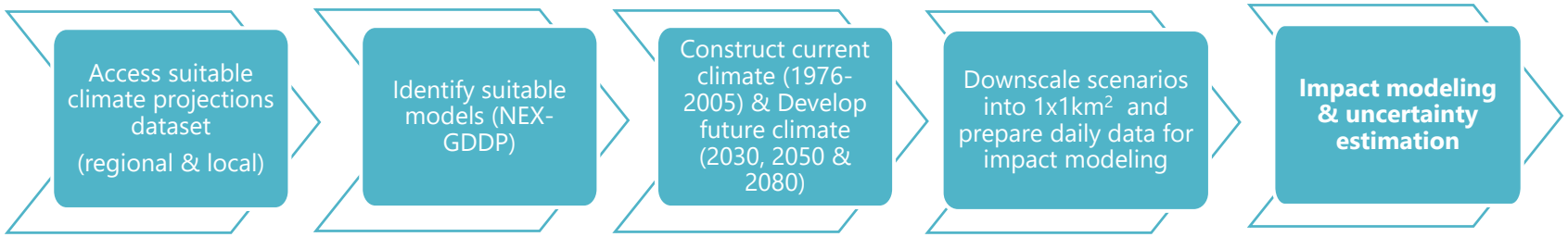
There are two general downscaling approaches: statistical and dynamic downscaling.



Select suitable models and identify the hotspots for impact assessment/How to address the uncertainty

Climate Change Projections for Nepal
(as an example)

Climate Scenarios

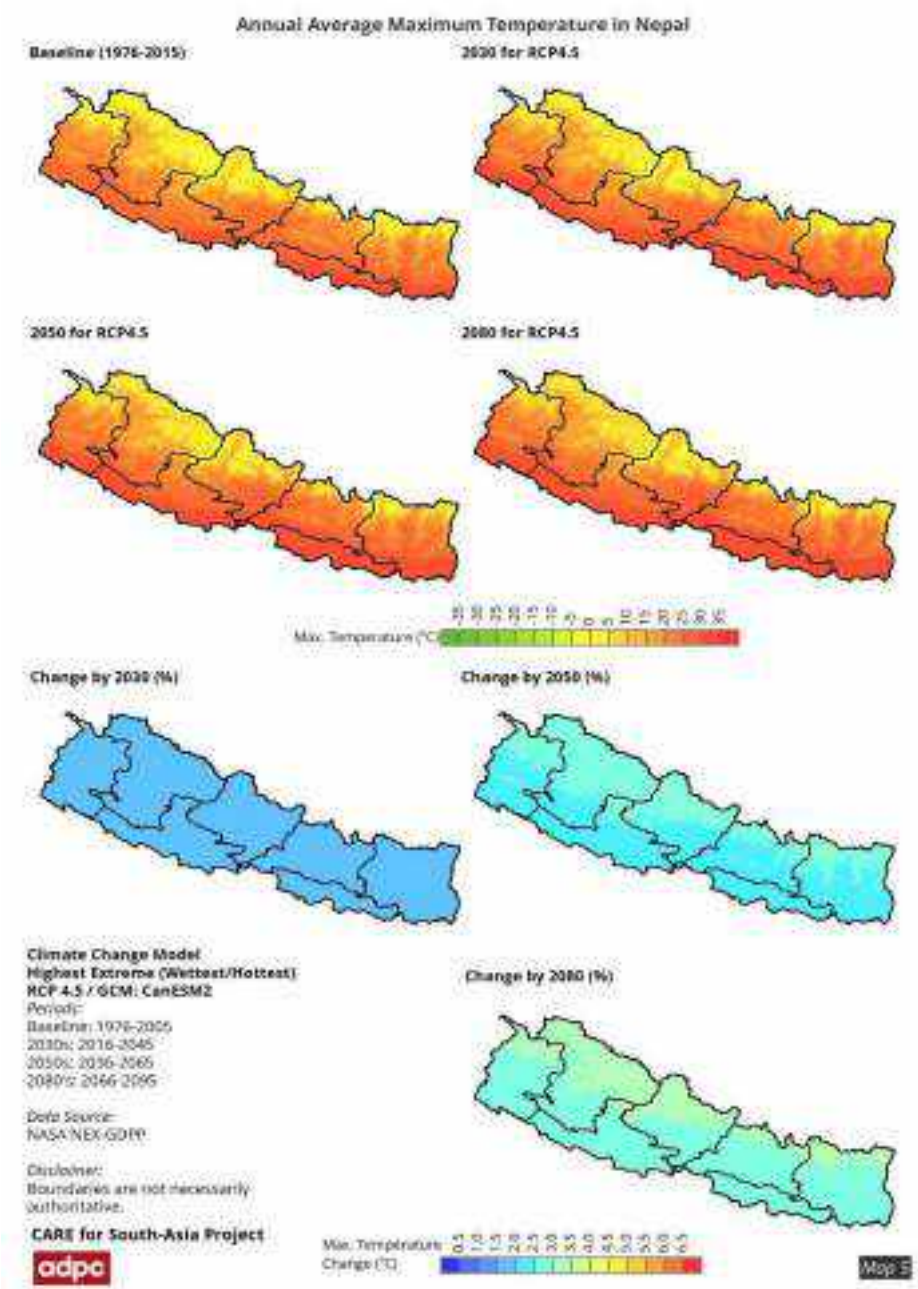


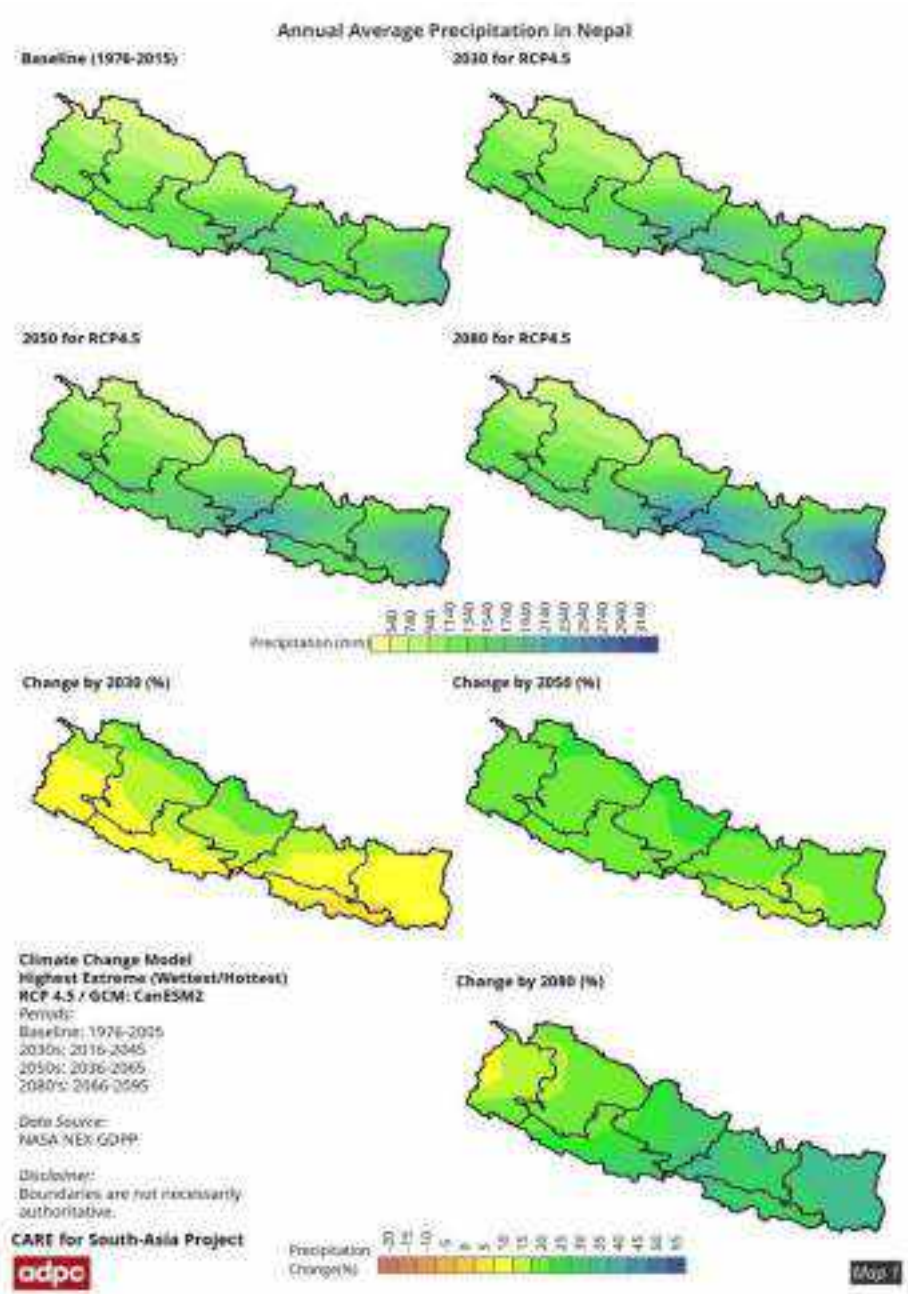
- Climate projection data source: NEX – GDDP: NASA Earth Exchange – Global Daily Downscaled Projections. 25km res, 21 GCMs, 2 RCPs
- Identify Suitable CMIP5/CMIP6 GCMs for the local context which shows extreme conditions
- Downscaled / resampled into 1x1km^2 using a robust regression approach (Evans, J.S. & Ram, K. (2016) with DEM (1x1km^2) as the independent variable to build a bivariate (or even multivariate) regression model.

RCP	Projection	model
RCP4.5	Cold, Dry	NOAA_GFDL_GFDL-ESM2M_r1i1p1
		inmcm4_r1i1p1
		CCSM4_r1i1p1
		CCSM4_r2i1p1
	Cold, wet	bcc-csm1-1_r1i1p1
		MRI-CGCM3_r1i1p1
	Warm, Dry	MIROC-ESM-CHEM_r1i1p1
		CMCC-CMS_r1i1p1
		MPI-ESM-LR_r3i1p1
		MPI-ESM-LR_r1i1p1
	Warm, wet	CanESM2_r2i1p1
		CanESM2_r3i1p1
		CSIRO-Mk3-6-0_r2i1p1

RCP	Projection	model
RCP8.5	Cold, Dry	EC-EARTH_r2i1p1
		NOAA_GFDL_GFDL-ESM2M_r1i1p1
	Cold, wet	bcc-csm1-1_r1i1p1
		CNRM-CM5_r1i1p1
		CSIRO-Mk3-6-0_r7i1p1
	Warm, Dry	CSIRO-Mk3-6-0_r1i1p1
		MIROC-ESM-CHEM_r1i1p1
		MPI-ESM-LR_r2i1p1
		MPI-ESM-LR_r1i1p1
	Warm, wet	CanESM2_r2i1p1
		CanESM2_r5i1p1
		CanESM2_r1i1p1
		CanESM2_r3i1p1
		CSIRO-Mk3-6-0_r10i1p1

Nepal NAP, 2019


Annual Average Maximum Temperature in Nepal
Baseline (1976-2015)
2030 for RCP4.5
2050 for RCP4.5
2080 for RCP4.5
Max. Temperature (°C)
Change by 2030 (%)
Change by 2050 (%)
Change by 2080 (%)
Climate Change Model
Highest Extreme (Wettest/Hottest)
RCP 4.5 / GCM: CanESM2
Periods:
Baseline: 1976-2005
2030s: 2016-2045
2050s: 2036-2065
2080's: 2066-2095
Data Source:
NASA NEX-GDPP
Disclaimer:
Boundaries are not necessarily authoritative.
CARE for South-Asia Project
adpc
Max. Temperature Change (°C)
Map 5


Annual Average Precipitation in Nepal
Baseline (1976-2015)
2030 for RCP4.5
2050 for RCP4.5
2080 for RCP4.5
Precipitation (mm)
Change by 2030 (%)
Change by 2050 (%)
Change by 2080 (%)
Climate Change Model
Highest Extreme (Wettest/Hottest)
RCP 4.5 / GCM: CanESM2
Periods:
Baseline: 1976-2005
2030s: 2016-2045
2050s: 2036-2065
2080's: 2066-2095
Data Source:
NASA NEX-GDPP
Disclaimer:
Boundaries are not necessarily authoritative.
CARE for South-Asia Project
adpc
Precipitation Change(%)
Map 1

Thank You for Your Attention!

REGIONAL DIALOGUE ON

NATURE BASED SOLUTIONS FOR WATER SECTOR

PRESENTED BY: DR. HEERA LAL, IAS

VIRTUAL MEETING DATED 17 JANUARY 2023

Dr. Heera Lal IAS
AMD-NHM UP
APD-UP SACS

model गाव
'मॉडल गाँव' बनायेंगे
घर-घर खुशहाली लायेंगे

Honorary Mentor/Advisor

9532998213
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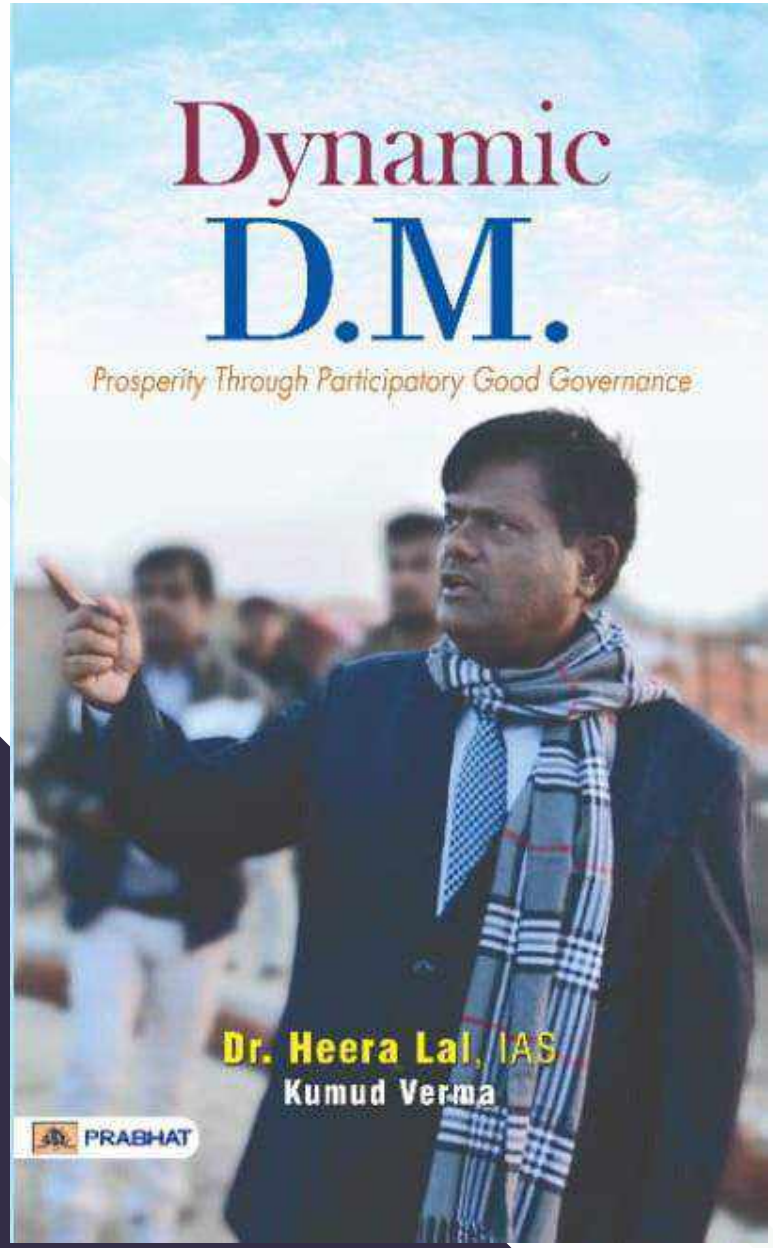
www.makingyouhappy.org



BANDA

RESEARCH & STUDY

BANDA WATER STRESS

Migration from conserving natural water bodies to artificial sources of water.

NO WATER IN CAPETOWN

Rationing of water - a consequence of ignorance and indifference.

MAJOR CHALLENGES

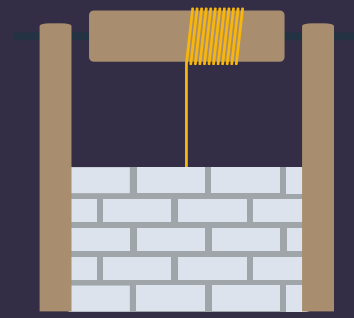
DEFEATIST MINDSET

INADEQUATE RESOURCES

HIGH RUN-OFF RATE

LOW RECHARGE RATE

INNOVATIVE APPROACH



DIG/RECHARGE WATER SOURCES

UNIQUE PEOPLE ENGAGEMENT

THE **SOLUTION**

THE DANGEROUS DISCONNECT

STRATEGIC PARTNERS

WaterAid

INSPIRING PEOPLE TO MIGRATE FROM ARTIFICAL SOURCES OF WATER TO CONSERVING AND NURTURING NATURAL WATER SOURCES.

Steps to Success

- Inter-departmental
- Jal Choupal (Water Meetings) + Water Budgeting
- Trench digging - **Campaign 1**
- Rejuvenation of old water resources - **Campaign 2**
- Creation of new ponds
- Rain Water Harvesting
- River Ken, Bage & Yamuna Aarti
- Jal March (Water March)
- Deep Daan (Auspicious light lamp donation to develop respect towards water bodies)
- Tree Plantation & Bedbandi (Edging)
- Jal Par Kavita & Mushaira (Poetry recitation on water theme)
- Jal Hasya Charcha (StandUp comedy on water)
- Oath ceremony (to create a moral attachment towards success of water conservation efforts)

JAL JAN

BHOOJAL BADHAO.
PEYJAL BACHAO.
(INCREASE GROUNDWATER
SAVE DRINKING WATER)

IMPLEMENTATION

2605

2443

oct 2018

JAN 2019

BHOOJAL BADHAO.
PEYJAL BACHAO.
(INCREASE GROUNDWATER SAVE DRINKING WATER)

IMPLEMENTATION

471 gram panchayats

3930 k.l.

110001 k.l.

34732

JAL SE JAN AANDOLAN

KUWAAN TAALAB JIAO ABHIYAAN

(REVIVE WELLS AND PONDS CAMPAIGN)

IMPLEMENTATION

REJUVENATION OF PUBLIC & PRIVATE PONDS + MEDBANDI

MAY 2019

ONGOING BASIS

IDENTIFICATION OF DRIED PONDS & WELLS

572 old ponds revived
2233 new ponds created
Medbandi at 1311 locations

REGULAR FEEDBACK & IMPROVEMENTS

KUWAAN TAALAB JIAO ABHIYAAN
(REVIVE WELLS AND PONDS CAMPAIGN)

IMPLEMENTATION

10K+ people participated in the march & Oath for 'Water Care' resonated across Banda.

DEEP DAAN + PAANI POOJAN

Unique outreach - Raju Srivastava & Poetry

JULY 2019

JAL MARCH + JAL SURAKSHA

KEN AARTI + MUSHAIRA

INTERVENTIONS

471

15 lakh

2605

572

82

1536

IMPACT

34732

2443

2233

1311

130 villages

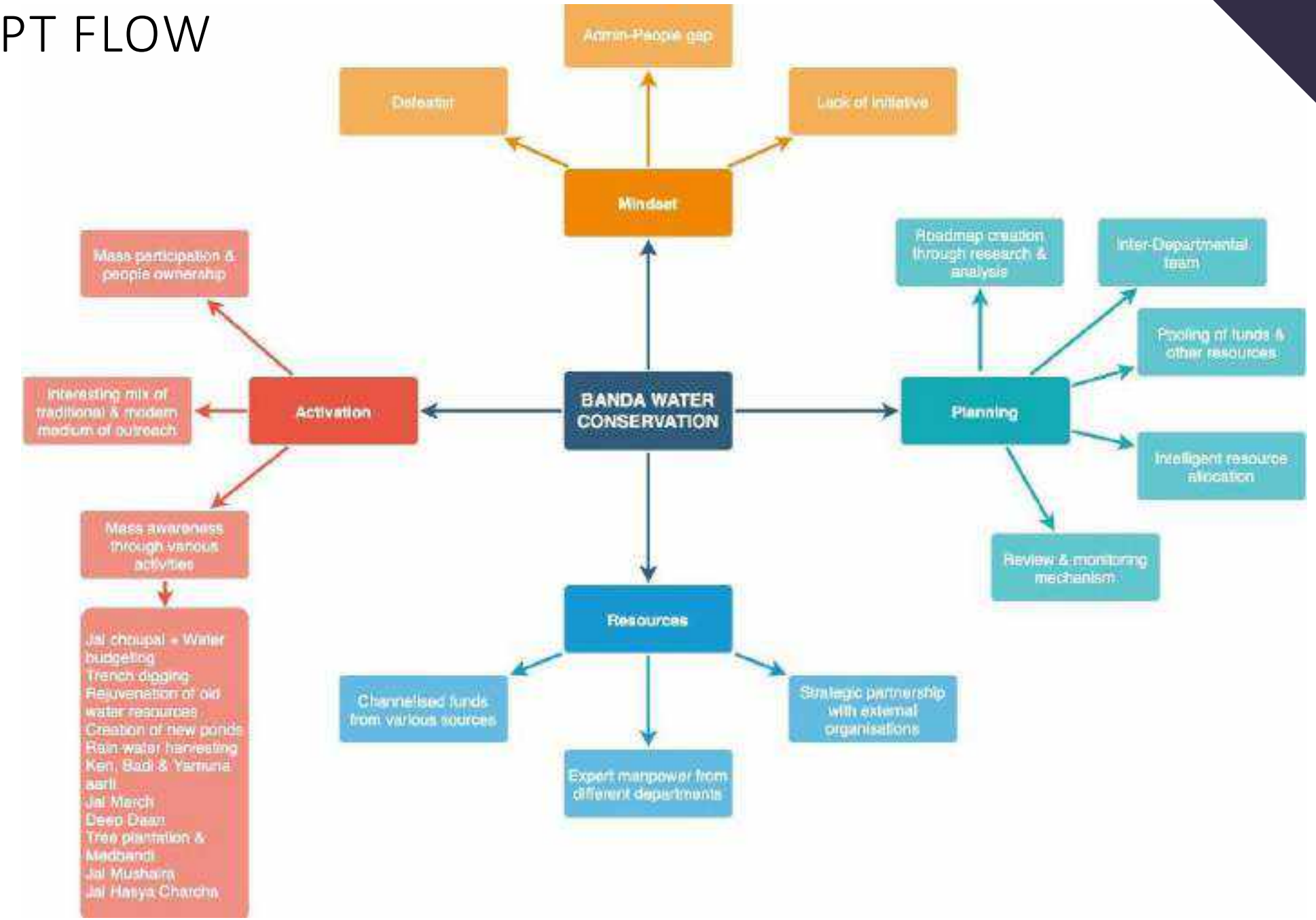
6,50,000

Ken, Yamuna & Bage.

+1.88 m
-0.22 m
+1.67 m
-1.30 m
+2.69 m
+2.01 m
+1.92 m
+2.12 m

Net average increase in water table -

CONCEPT FLOW



MINDSET
Bridging the people-administration gap.

RESOURCES
Strategic pooling of resources in a channelised manner.

basic knowledge
Revisiting childhood life experiences to explore optimum solutions.

APPROACH
Don't limit your challenges. challenge your limits.

MULTIPLE ROLES
Officially I was the DM. Unofficially, I played multiple roles.

hierarchy divide
Valuing ideas & hard work. Not designations.

THE HUMAN TOUCH
This was not an administrative campaign. It was a people's movement.

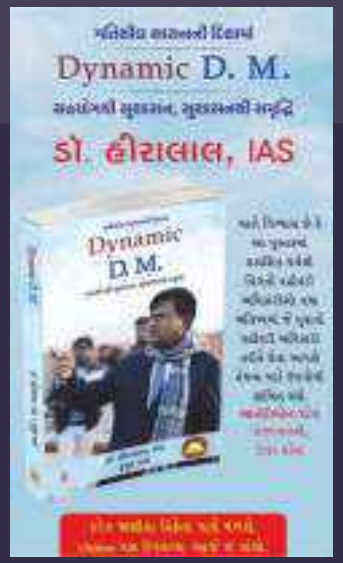
DIFFERENTIATORS

WATER GOVERNANCE | WATER MANAGEMENT | CREATING A GLO-CAL MODEL

WATER IS A PUBLIC PROBLEM.
NO SOLUTION WITHOUT PUBLIC PARTICIPATION!

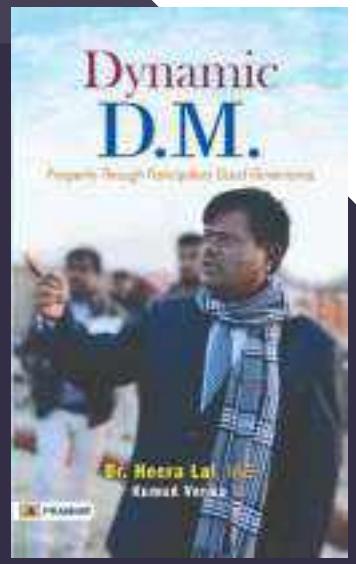
WHAT CAN BE THE FUTURE OF WATER?

CONNECT



GUJARATI

COMM



ENGLISH

HINDI

AN IDEA LIKE MODEL GAON (HINDI FOR VILLAGE) WHICH PROMOTES PEOPLE PARTICIPATION FOR PROBLEM SOLVING.

www.modelgaon.org

AWARDS &
RECOGNITION

22 CRORE

PHYSICALLY AUDITED & ENCOURAGED BY:

Start of Water Conservation campaign


Officer & Panchayat level training


Jal choupals across district


Pond & other water body inspection


Trench-digging around water body


Deep Daan by Sh. U.P.Singh, IAS
Sec. Jal Shakti Min., GoI


Jal March - Sh. Bhoosreddy, IAS
Addl. Ch. Sec. to GoUP


Innovative Water Budgeting by villagers


Raju Srivastav performing for water conservation awareness


Oath taking by Sh. U.P.Singh, IAS
Sec. Jal Shakti Min., GoI


Before-after of a well during our campaign


Artist performing during Jal Mushaira


New pond digging & Old pond rejuvenation


Jal Deepawali at river Yamuna/Bage/Ken


Accolades & Recognition

THANK YOU

Restoring wetlands to enhance biodiversity and ecosystem services in Hail Haor (Bangladesh)

NbS for the resilience of the water sector in South Asia

Regional Online Training and Dialogue on NbS for the Resilient Water Sector in South Asia

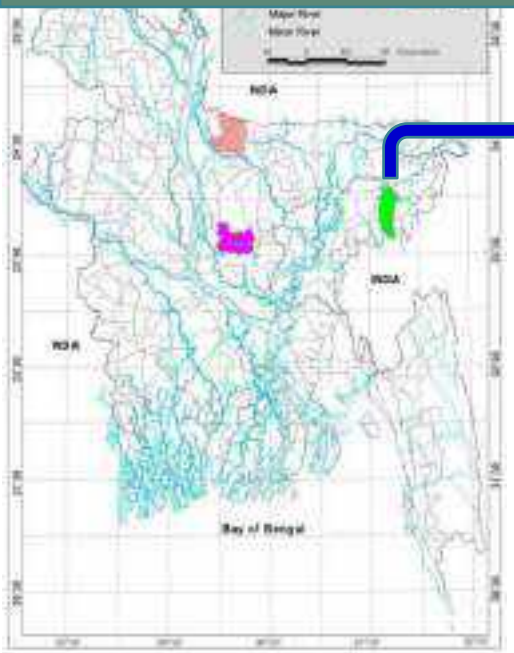
17 January 2023

By

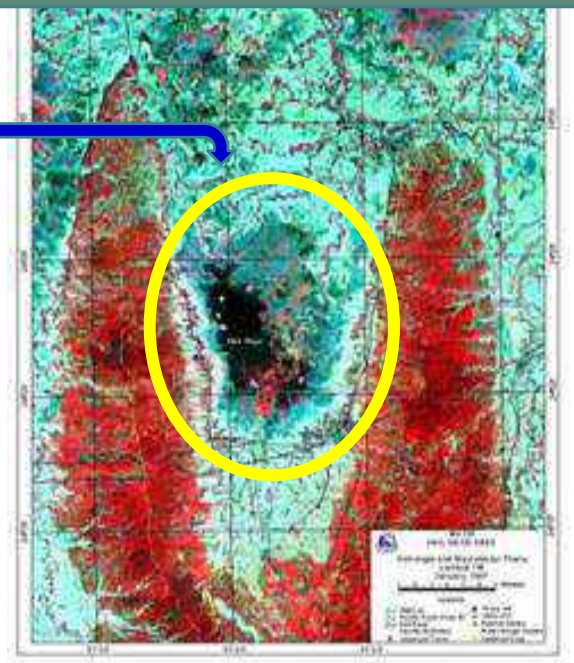
M. Mokhlesur Rahman *PhD*

Executive Director, Center for Natural Resource Studies (CNRS)

NbS - Steps 1 & 2 (stocktaking, mapping ecosystems)



Bangladesh



Hail Haor

fish vegetables wildlife

water honey

medicine grasses

grazing

Hail Haor

ducks

crops

fuel wild birds

mollusks crabs

Reeds water fruits manure

- Located in Meghna Basin in Moulvibazar district
- Dry season 3,500ha and wet season - 12,500 ha
- Use to provide diversified ecosystem services for human and nature – fishing, farming, collecting various wetland products
- However, the Hail Haor was rapidly degrading due to multiple problems – reduced its capacity to provide ecosystem services

Source: Group works

Participatory Planning Sessions

NbS - Steps 3 (Social-Ecological Vulnerability assessment)

Drivers of Vulnerability

- Habitat degradation /conversions
- Lack of dry-season water
- Overfishing /Destructive fishing
- Unsustainable land use /high siltation
- The leasing system is not pro-poor / Lacks awareness







Problem/solution matrix…in Participatory Planning Sessions

NbS – Steps 4&5 (NbS plans finalized for Building Resilience)




Solutions

- Habitat restoration/ enhancement
- Wetland sanctuary
- Re-introduction of lost/rare species
- Watershed/ riparian veg. restoration
- Crop diversification/ AIGA/Awareness / policy linkages

NbS: Step 6- Developed monitoring systems

Fish catch monitoring

Household protein consumption monitoring

Household census

Wildlife survey

Vegetation survey

Hydrology study

NbS: Step 7 (NbS plan implementing for resilience)

Jethua Beel in dry season –2000 (before rehabilitation)

Habitat Rehabilitation - 2001

Jethua Beel in dry season – 2003 (after rehabilitation)

Restoring degraded wetlands: dry season habitats, protect biodiversity, increase fish yields.

Wetland sanctuary: Biodiversity conservation, increased fish yield, ecotourism, increased income

NbS: Step 7 (NbS plan implementing for resilience)

NbS at the watershed of Hail Haor Wetland

Riparian Vegetation restoration: wildfire corridor, arrest soil erosion, protect wetland

Contour farming of hill slopes: Reduce soil erosion, Retain fertile topsoil, wetland protection downstream

Contour pineapple planting reduces sedimentation of Hail Haor – protects habitat for fish and other aquatic biotas (integrating watershed in wetland management)

NbS: Step 7 (NbS plan implementing for resilience)

Re-introduction of locally lost/rare species: services/benefits

Biodiversity of flora - Re-introduction of native plants and reeds and protection of existing species

Enhanced habitat area and diversity – native plants and reeds created new habitats/restored lost habitats

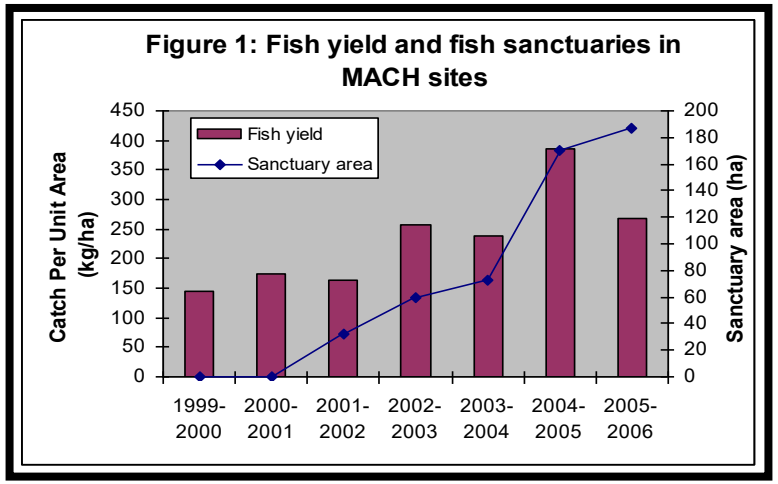
Biodiversity of fauna - Re-introduction of locally lost fish species with increased biodiversity

Livelihood security - *Increased fish yield and incomes from higher catches*

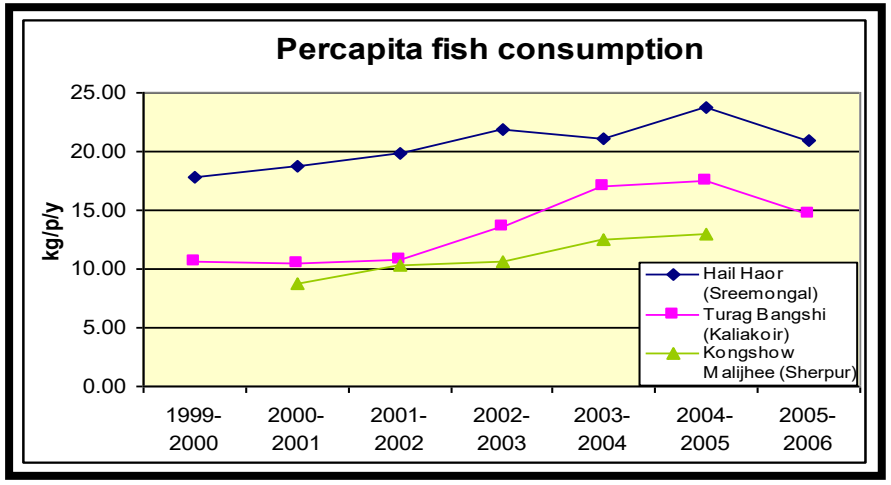
Protect critical fish habitats - Protection of fish breeding sites - *chital* fish (feather back) breeding location

NbS: Step 8 (evidence for influencing policies)

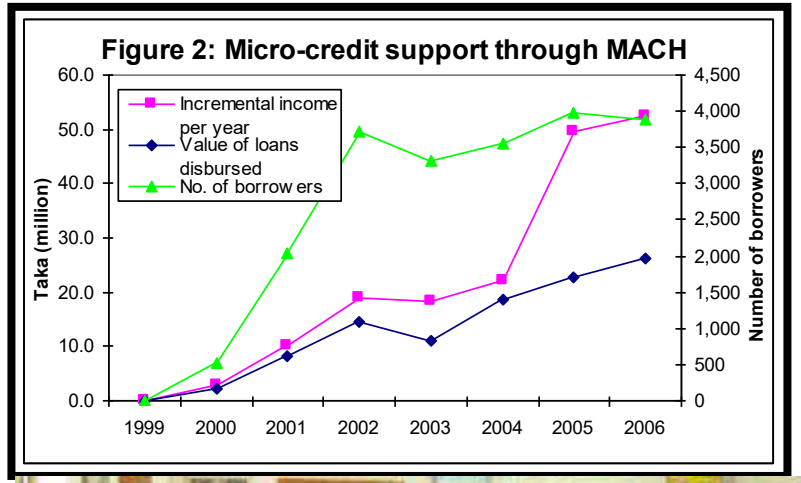
Fish Production



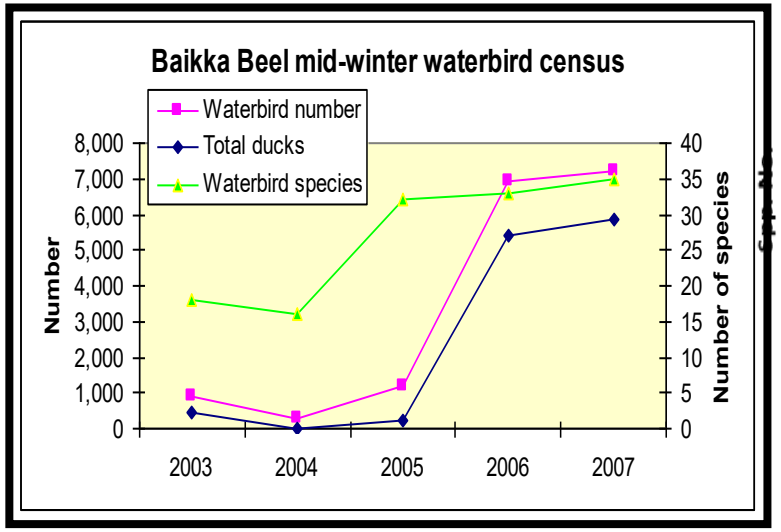
Fish consumption

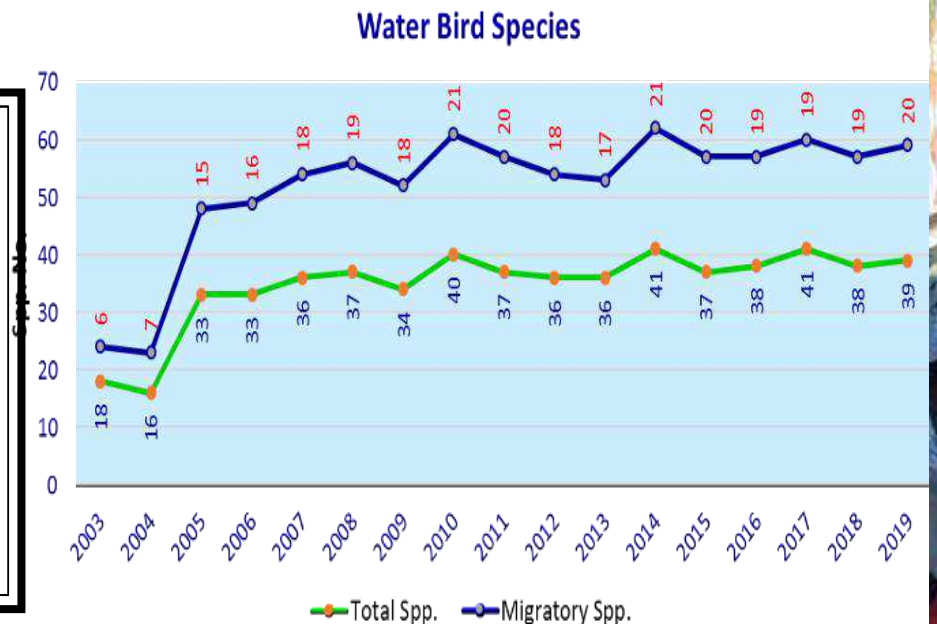


Income increases



Biodiversity Impacts



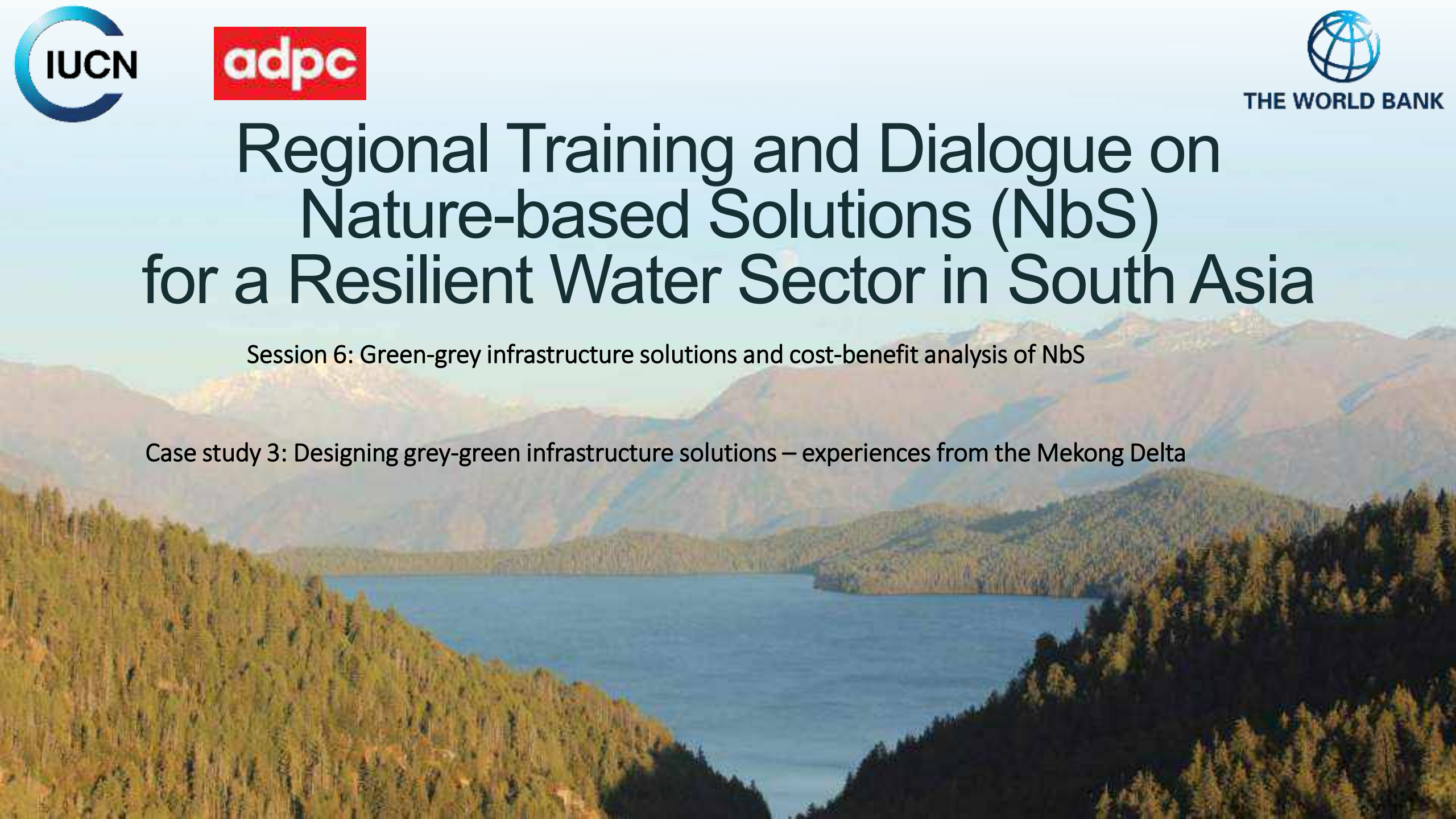


Thanks

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

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

Case study 3: Designing grey-green infrastructure solutions – experiences from the Mekong Delta



IUCN Nature based Solutions
The nature of progress

Case study 3: Designing grey-green infrastructure solutions: Experiences from the Mekong Delta

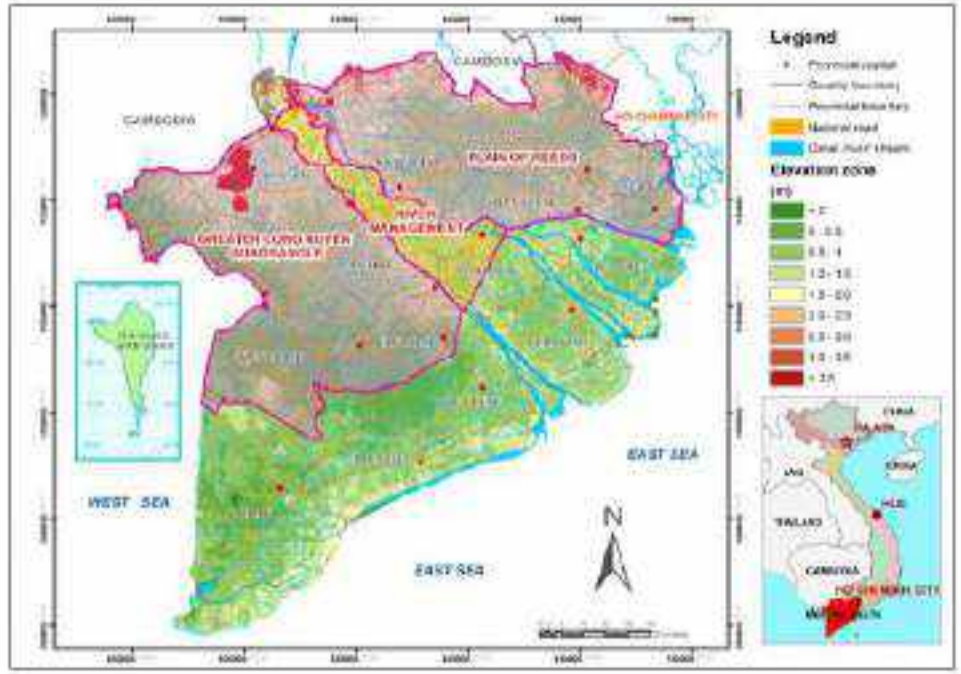
SITE DESCRIPTION AND ISSUES

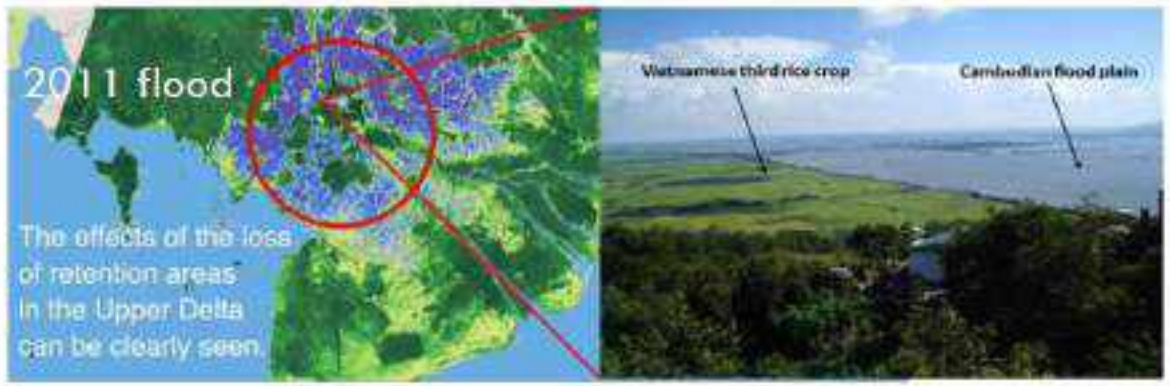
- The upper Mekong Delta is 1.4 million hectare freshwater seasonal flood plain that grows more than 60% of Vietnam's rice exports

- Habitat for over 100 aquatic species; many are important commercial species (eg. snakeheads, Pangasius sps, giant freshwater prawns)

- Poldering to grow third rice crop has caused loss of more than half the seasonal floodplain in the Mekong Delta

- Continuing pressure from farmers and local governments for more polders in remaining floodplain area



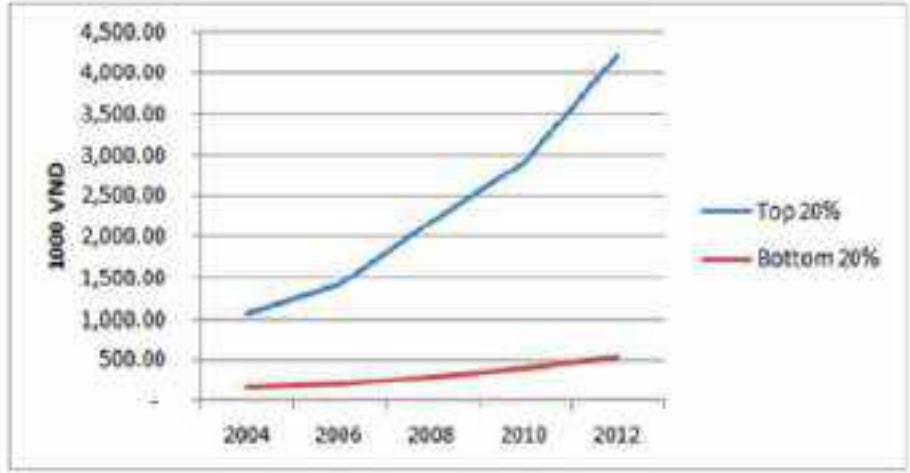


Societal challenges in the Upper Mekong Delta floodplain of Vietnam

Vỡ đê xã Vĩnh Trung, H.Tịnh Biên, An Giang, 2011
Nguồn: Báo Thanh Niên (9/2011)

- Growing socio-economic inequality as rice profits decline with increasing input costs to compensate for lost sediment/fertility, and lost fisheries
- Increased pesticide use with resulting accumulation of POPs in ecosystems and food chains
- Reduced flood absorption capacity has increased disaster risks: CC projections of a doubling in the flood pulse volume by 2050

The growing gap in monthly incomes in the Mekong Delta (Source: GSO, 2014).



PROJECT BACKGROUND

- A 10 year program of work since 2011 in the Mekong Delta: multiple technical assistance and demonstration projects funded by the IKI, The Coca Cola Foundation, the World Bank, cooperation with range of DPs, and engagement from farmers to Prime Minister.

- Goal of the program: Profitable, low-risk, flood-based cropping systems are a viable alternative to the third rice crop that addresses the societal challenges of:
  - reducing inequality by increasing farmer incomes of lower quintile
  - restoring aquatic habitats for commercially important fish species:
    - conserve the remaining seasonal flood plain area
    - restore lost flood plain areas inside the polders

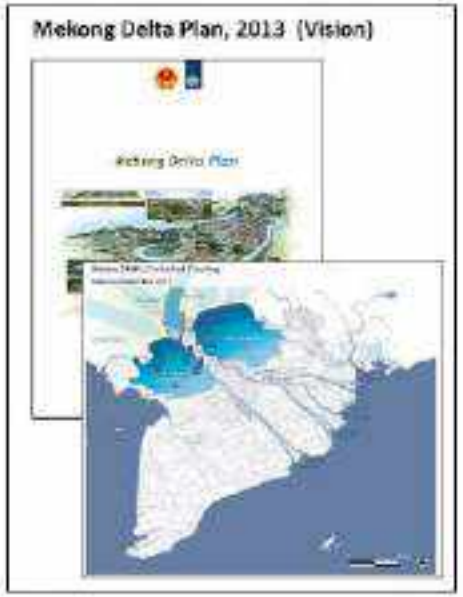
- Main activities:
  - Technical advice and facilitation of the Dutch Mekong Delta Plan (2011-2013) on rice issue
  - CBA analysis and documentation of various flood-based crops practiced by farmers: environmental and social impacts of upscaling
  - Small scale demonstrations (2016-2021) implemented by farmers and local governments to improve livelihood designs and address risks
  - Co-organising high level dialogues with the government on policy change
  - Working with the government and World Bank to design investment projects to upscale flood-based agriculture

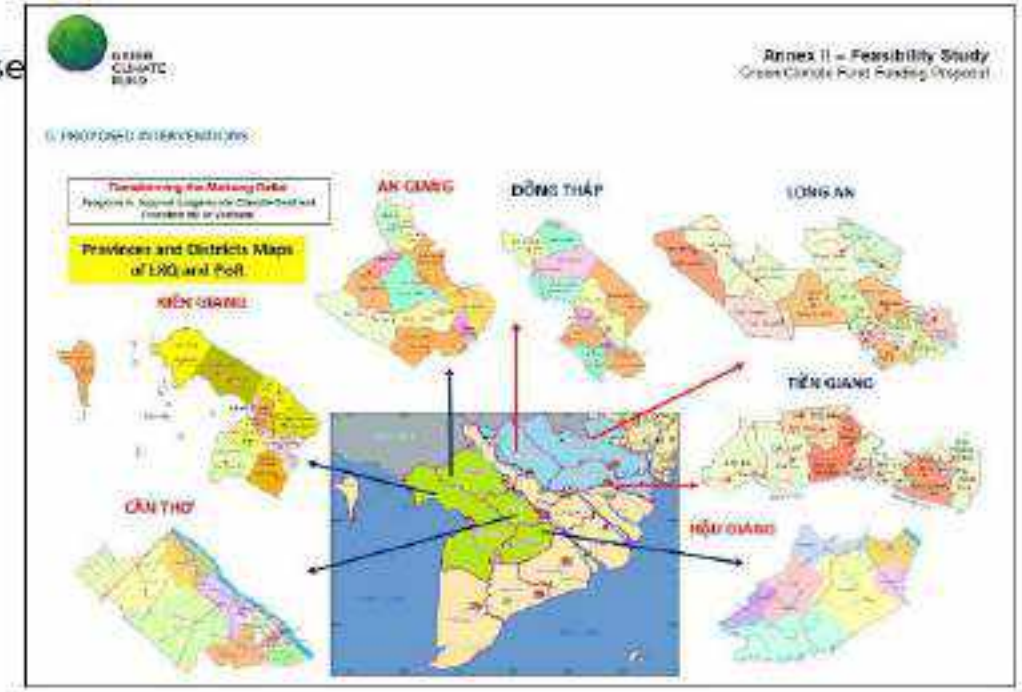
Mekong Delta Plan, 2013 (Vision)

World Bank ICRSL project, 2016

KEY RESULTS

- 2013 Mekong Delta Plan included advice to trade-off rice intensification for increased climate resilience by adapting to the floods with higher value crops including flood-based crops
- Policy change in 2017 – National Resolution 120 stipulated a deintensification of rice growing and adoption of nature based solutions
- Over 500 hectares of farmer implemented profitable flood-base cropping demonstrations (2016-2021)
- Investment projects to upscale flood based agriculture:
  - WB ICRSL (20 million USD, 2020-2023)
  - GCF (40 million USD, 2024-2029)
  - WB IBRD loan (?? USD, 2024 – 2030)



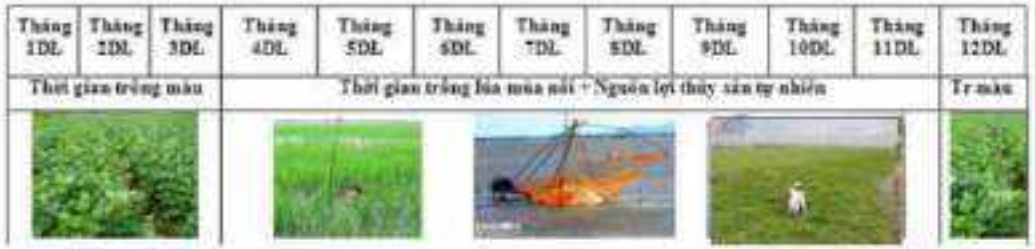


Conserving water retention area (existing flood area)

Rice-aquaculture systems

Lotus farming systems (lotus-rice, lotus-fish, lotus-ecotourism)

Floating rice–upland crop systems



Melaleuca timber plantations

Restoring water retention area (inside high dykes)

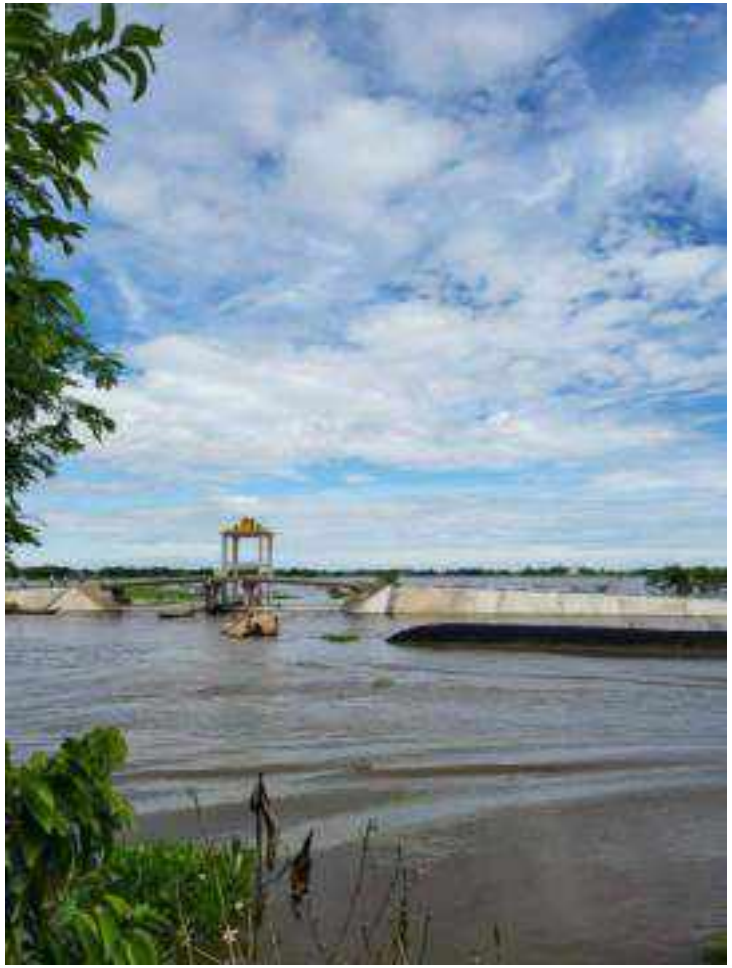
Intensive lotus inside high dykes

Floating crops, eg, water caltrops

Floating vegetable gardens. Business models:

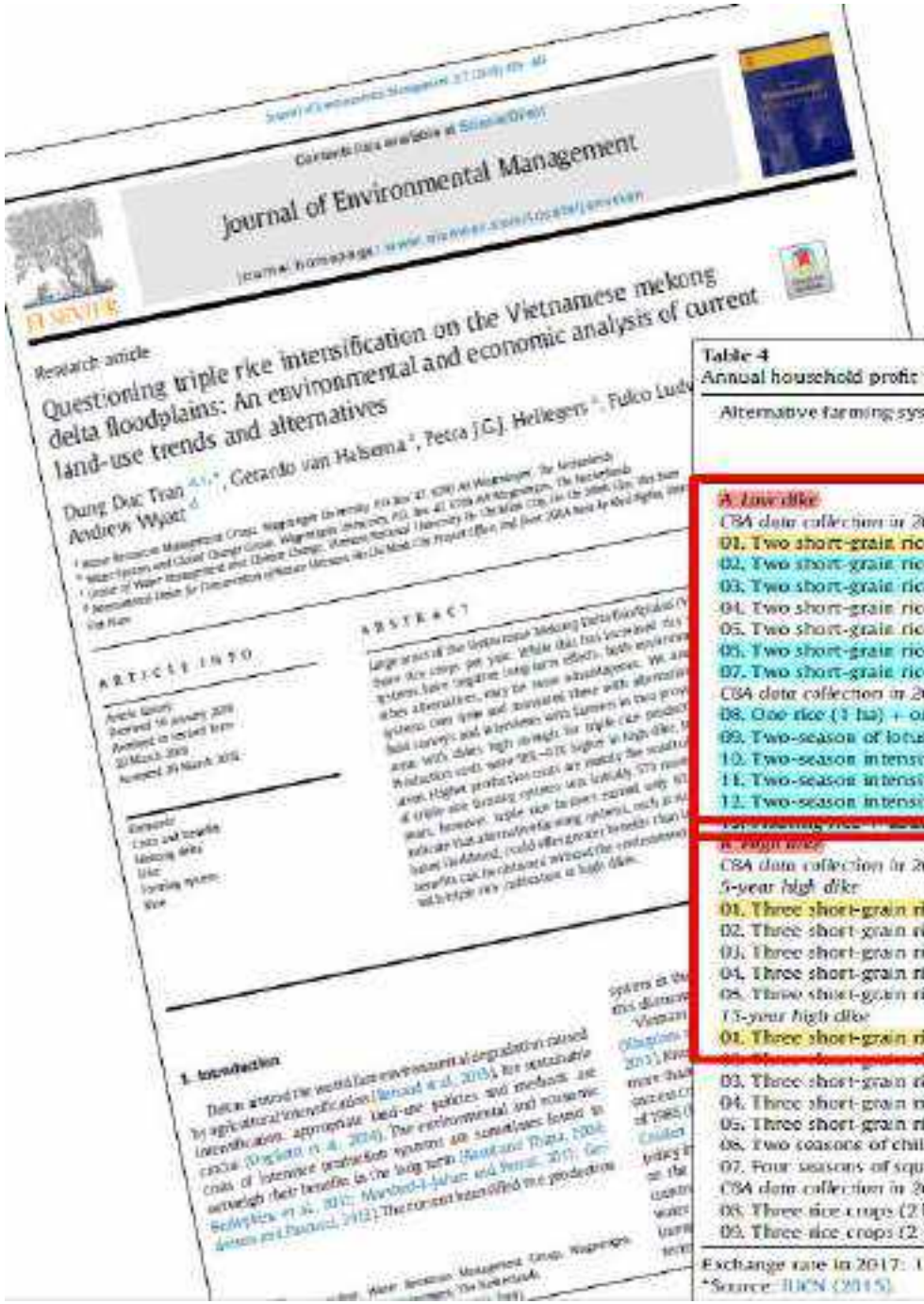
1. Seasonal vegetables (soy beans, etc)
2. Vegetable seedlings

Grey infrastructure to support flood-based cropping systems



FLOATING RICE DEMONSTRATION INSIDE A 150 HECTARE HIGH DYKE DURING 2021 FLOOD SEASON = GENERATED PROFITS OF ALMOST 200% FOR FULL CROPPING CYCLE

PROFITING FROM THE FLOODS: FLOOD-BASED CROPPING SYSTEMS ARE UP TO 5 TIMES MORE PROFITABLE THAN DOUBLE AND TRIPLE RICE CROPPING



Journal of Environmental Management

Research article

Questioning triple rice intensification on the Vietnamese mekong delta floodplains: An environmental and economic analysis of current land-use trends and alternatives

Dung Duc Tran, Gerardo van Halsema, Petra J.G.J. Hellegers, Fulco Ludw, Andrew Wyatt

ARTICLE INFO

ABSTRACT

1. Introduction

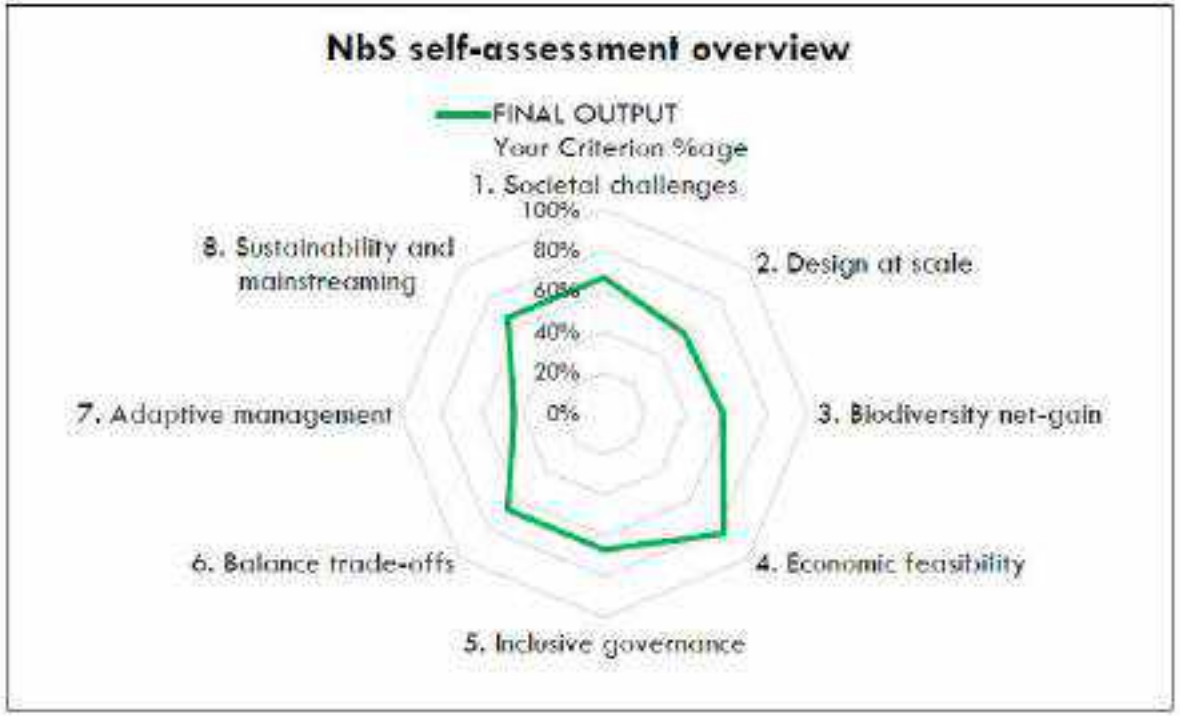
Table 4
Annual household profit under alternative farming systems.

Alternative farming system/household	ID number	Annual profit per household	
		x10³ VND	US $
A. Low dike			
CSA data collection in 2014			
01. Two short-grain rice crops (2 ha)	L4	92,800	4088
02. Two short-grain rice crops (2 ha) + flood-based giant freshwater prawn (0.1 ha)	L4+L5	104,100	4586
03. Two short-grain rice crops (2 ha) + flood-based snake-head fish (32.79 m²)	L4+L6	114,900	5062
04. Two short-grain rice crops (2 ha) + two seasons chili (0.2 ha)	L4+L7	147,400	6493
05. Two short-grain rice crops (2 ha) + four seasons squash (0.25 ha)	L4+L8	239,400	10,546
06. Two short-grain rice crops (2 ha) + wild fish (flood season)	L4f	105,900	4665
07. Two short-grain rice crops (2 ha) + Neptunia oleracea (0.5 ha) + wild fish (flood season)	L4+L9	157,400	6934
*CSA data collection in 2015**			
08. One rice (1 ha) + one lotus (1 ha)	H11+L10	79,350	3496
09. Two-season of lotus (2 ha)	L10	113,800	5013
10. Two-season intensive lotus (1 ha)	L11	117,600	5181
11. Two-season intensive lotus + ecotourism (1 ha)	L12	292,000	12,863
12. Two-season intensive lotus + fish (1 ha)	L13	130,400	5744
B. High dike			
CSA data collection in 2014			
5-year high dike			
01. Three short-grain rice crops (2 ha)	H4	72,200	3181
02. Three short-grain rice crops (2 ha) + eel (10 m²)	H4+H7	112,200	4943
03. Three short-grain rice crops (2 ha) + fish pond (50 m²)	H4+H8	102,200	4502
04. Three short-grain rice crops (2 ha) + two seasons chili (0.2 ha)	H4+H9	126,800	5586
05. Three short-grain rice crops (2 ha) + four seasons squash (0.25 ha)	H4+H10	218,800	9639
15-year high dike			
01. Three short-grain rice crops (2 ha)	H45	48,400	2132
03. Three short-grain rice crops (2 ha) + fish pond (50 m²)	H45+H8	78,400	3454
04. Three short-grain rice crops (2 ha) + two season chili (0.2 ha)	H45+H9	103,000	4537
05. Three short-grain rice crops (2 ha) + four seasons squash (0.25 ha)	H45+H10	195,000	8590
06. Two seasons of chili (0.5 ha)	H9	136,500	6013
07. Four seasons of squash (0.5 ha)	H10	293,100	12,912
*CSA data collection in 2015**			
08. Three rice crops (2 ha)	H11	89,800	3958
09. Three rice crops (2 ha) + three sesame (0.2 ha)	H11+H12	110,850	4884

Exchange rate in 2017: 1 US dollar = 22,700 VND
*Source: IUCN (2015).

SELF-ASSESSMENT RESULTS

- No one organization could have addressed the rice issue – evidence-based policy change required
- Decade long collaboration between DPs was key (MDWG) – consensus and funding resources
- Dependence on partners including the government means some outcomes sub-optimal, eg. adaptive management



Criterion	Your Criterion Score	Maximum Criterion Score	Normalised criterion	FINAL OUTPUT Your Criterion %age
1. Societal challenges	6	9	0.67	0.7
2. Design at scale	5	9	0.56	0.6
3. Biodiversity net-gain	7	12	0.58	0.6
4. Economic feasibility	10	12	0.83	0.8
5. Inclusive governance	10	15	0.67	0.7
6. Balance trade-offs	6	9	0.67	0.7
7. Adaptive management	4	9	0.44	0.4
8. Sustainability and mainstreaming	6	9	0.67	0.7
Total			5.08	0.6

Thank You

Contact: Dr. Andrew Wyatt

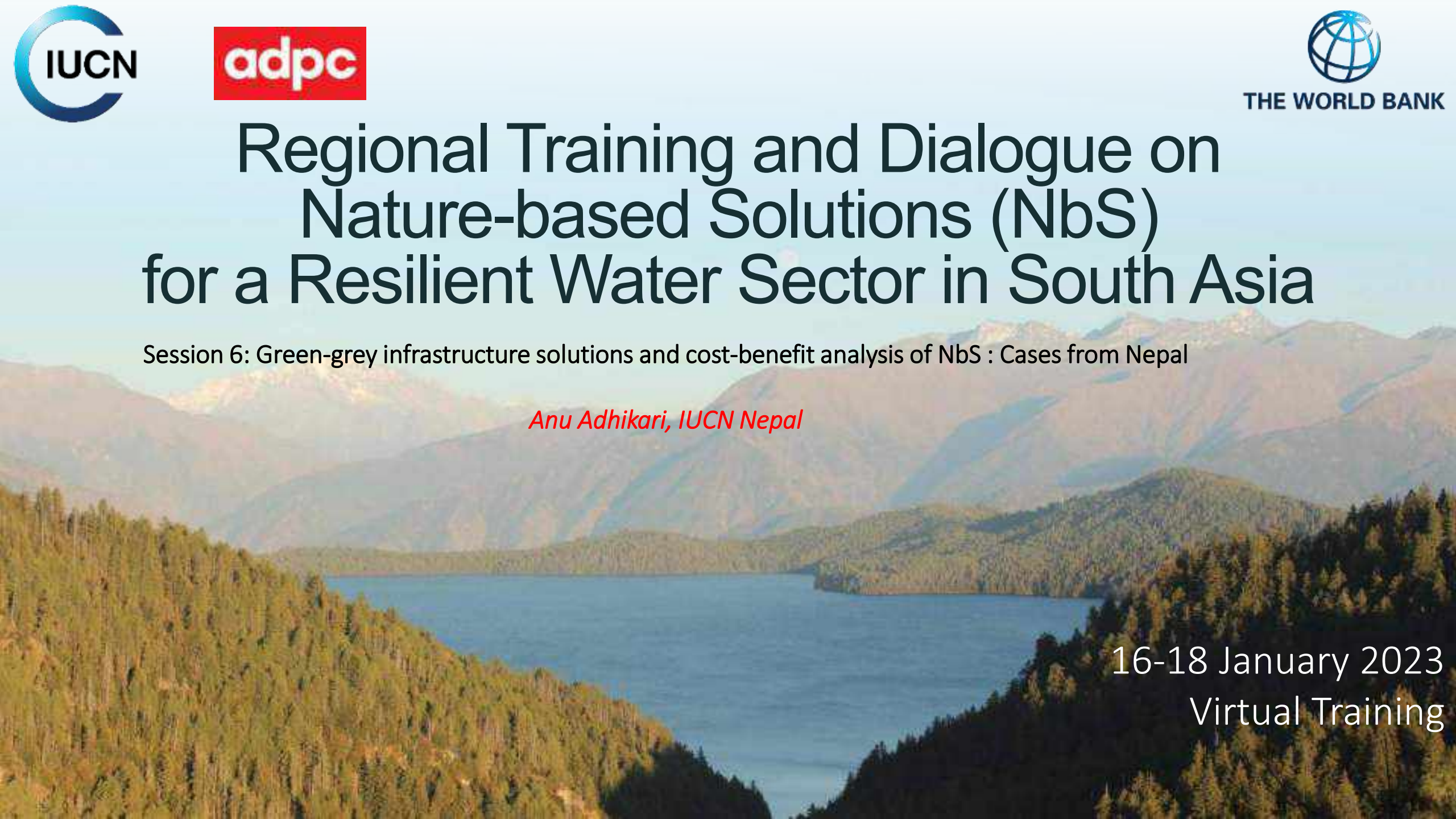
Deputy Head Lower Mekong Sub-Region

Andrew.Wyatt@iucn.org

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

Session 6: Green-grey infrastructure solutions and cost-benefit analysis of NbS : Cases from Nepal

Anu Adhikari, IUCN Nepal



16-18 January 2023
Virtual Training

Introduction

- The fragile mountains and hill-slope landscape of Nepal are highly vulnerable & climate-sensitive;
- The impacts of climate change increased over the period; (Water sector)
- Flash Flood, Soil Erosion, and shallow landslides are some of the common but deeply rooted problems of Nepal often damaging lives and livelihoods;
- The common problems are more pronounced more recently because of climate change & unplanned development of infrastructures (e. g. rural roads);

Conservative yield losses due to damaged agricultural land adjacent to rural roads (12,000 NPR per year per km)

Highly degraded overgrazing land

High maintenance cost- The average yearly maintenance cost for grey roads (50,600 NPR compared to 8,500 NPR for the “eco-safe roads”)

Approach and Methodologies

- Both Primary and Secondary data (cost-benefit and effectiveness)
- **Cost- Benefit analysis:** Present Value (PV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR)
  - Money is dynamic and its value changes yearly
  - We must adjust this value into a single monetary value so we can compare costs or Net Present Value
  - We can choose different annual rates: i.e., 5%, 10% or 20%
  - The World Bank uses 10%, so all our scenarios use this value

The **cash flow** for the given period is **discounted** to reflect in **present value (PV**). The present value of costs and benefits of interventions are estimated using the **empirical formula;**

The internal rate of return (IRR) is the annual rate of growth that an investment is expected to generate or the measure of the profitability of investments

- Present Value (PV): $PV = \frac{FV}{(1+r)^t}$

Where, t is the time of the cash flow, r is the discount rate, and FV it the net cash flow (future value)

Benefit-Cost Ratio (BCR): $BCR = \frac{PV_b}{PV_c}$

Where, PVb is present value benefit and PVc is present value of cost

Net Present Value (NPV): $NPV = PV_b - PV_c$

Net Present Value (NPV) is the difference between the present value of benefits (PVb) **and Present Value Cost (PVc)**

- Internal Rate of Return (IRR): $NPV = \sum_{n=0}^{N} \frac{C_n}{(1+r)^n}$

Where , NPV is **Net Present Value**, N is total number of periods, n is non negative integer, c_n is the cash flow and r is the internal rate of return

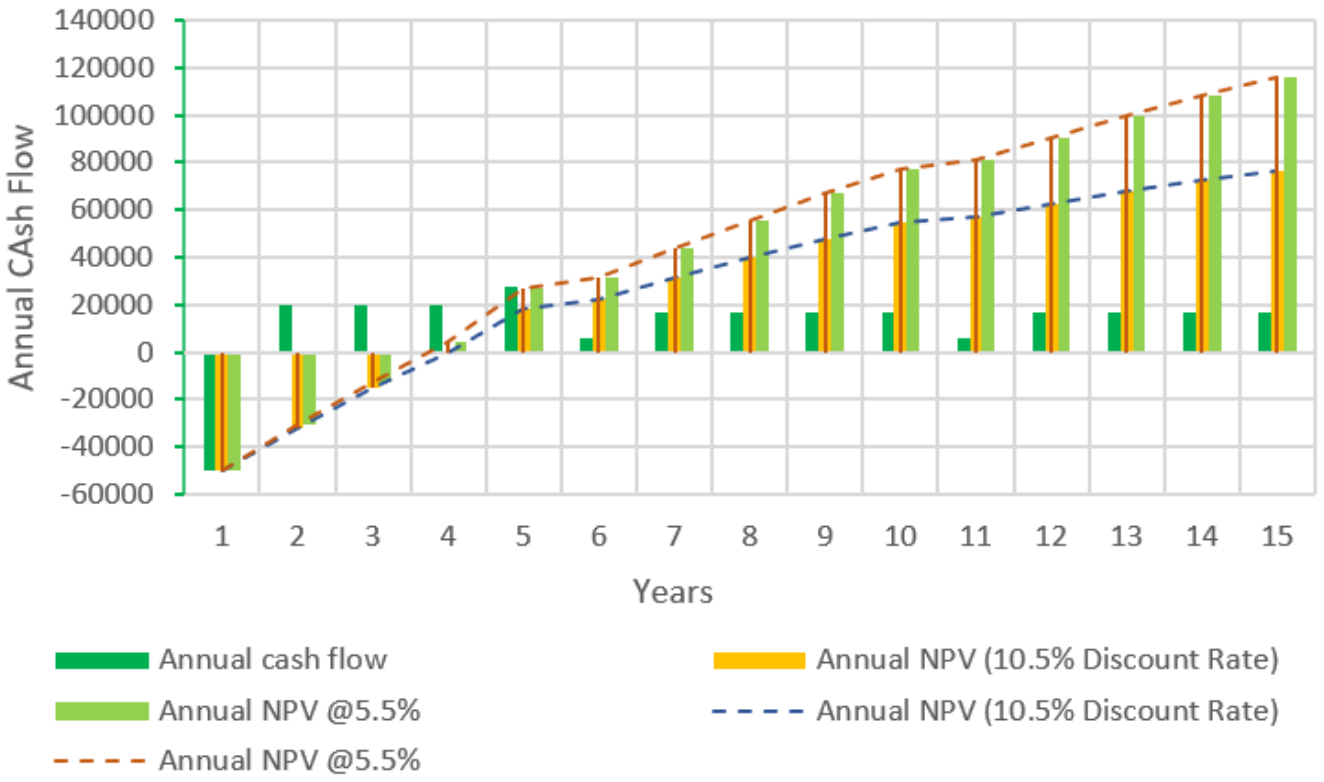
Case: Water Source Protection

Water sources are a place within or from which water is or may be developed such as spring and groundwater body or other source of water body or related combination thereof, that are potentially useful for humans,

Cost Benefit Analysis of Water Source Protection

Year	Annual cash flow	Annual NPV (10.5% Discount Rate)	Annual NPV @5.5%
1	-50000	-50000	-50000
2	20150	-31765	-30900
3	20150	-15262	-12797
4	20150	-328	4363
5	27900	**18386**	**26885**
6	**6200**	**22149**	**31629**
7	17050	31515	43994
8	17050	39991	55715
9	17050	47662	66825
10	17049	54603	77354
11	**6198**	**56886**	**80983**
12	17047	62571	90443
13	17046	67714	99408
14	17045	72369	107906
15	17044	76581	115961

One source/Community (maintenance at every 5th)



Cost Benefit Analysis Results

EbA Measures	Years of Analysis	Scale of Analysis	Discount Rate @5.5%				
			PV Costs (Rs)	PV benefits (Rs)	NPV (Rs)	Benefit-Cost Ratio	IRR
Pond conservation	15	One pond/community	140,211	357,471	217,260	2.55	26%
Water source conservation	15	One water-source/community	234,729	350,690	115,961	1.49	**38%**

EbA Measures	Years of Analysis	Scale of Analysis	Discount Rate @10.5%				
			PV Costs (Rs)	PV benefits (Rs)	NPV (Rs)	Benefit-cost ratio	IRR
Pond conservation	15	One pond/community	123,427	264,785	141,358	2.15	26%
Water source conservation	15	One water-source/community	182,159	258,740	76,581	1.42	**38%**

- Both **pond conservation** and **water source protection** are **cost-effective** at both 5.5 and 10.5 discount rate
- Pond conservation is most efficient , IRR is higher in water source protection but **BCR** is higher in Pond conservation

Interpretation

- **Benefit Cost Ratio**
  - Ratio **lower than 1** means the benefit is lower than the cost; which means that the intervention is financially not beneficial;
  - Ratio higher than 1 means the benefit exceed the cost and higher the ratio better the intervention.
  - The intervention having the highest BCR is the most efficient
- **NPV**
  - NPV **greater** than **0** means the benefit exceed the **cost**
  - **Higher** the value of NPV, better the intervention
- **Internal rate of return (IRR):** is the measure of the profitability of investments. This is a return rate that makes net present value (NPV) zero (i. e. difference between PV of benefits and PV of costs, of all cash flows in the given time period equal to zero!

Conclusions

The **benefits** from these interventions are **underestimated** since many **indirect benefits** are not accounted in the estimation These benefits includes;

- Water recharge benefits and water provided to wild animals of pond conservation;
- Water used by trekkers and water recharge by water conservation activities;
- Landslide/flash flood protection function of pond;

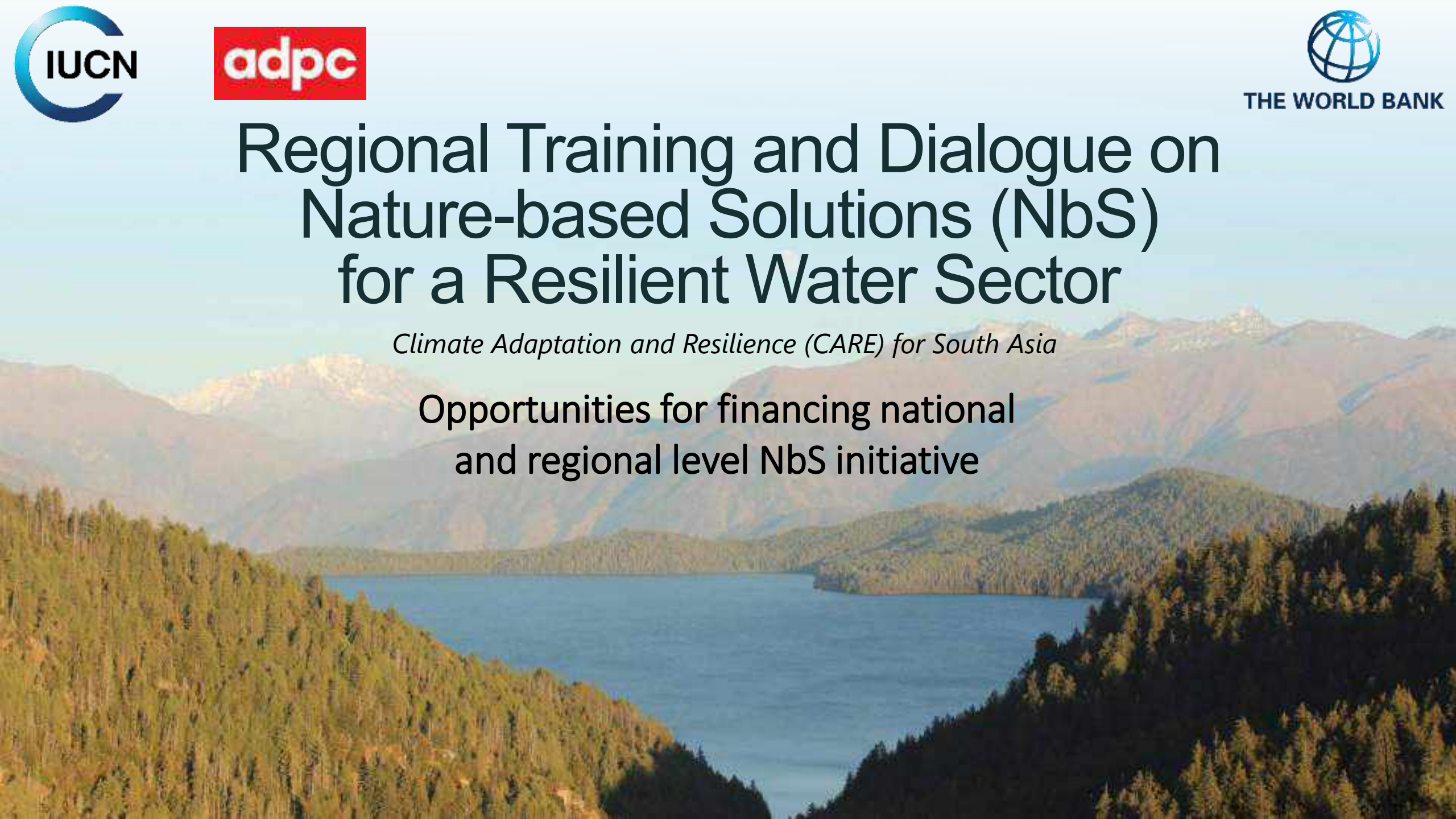
- Both **pond conservation** and **water source protection** are cost effective investment if we follow NbS approach
- The results indicate that **BCR and NPV** of all interventions **decrease** with the **increasing discount rate, t**his means a change in **fiscal policy**, particularly the **bank interest** rate, may influence the benefits from NbS interventions
- Iinvesting in "**eco-safe roads**" is cost-effective investment in DRR and it is imperative that eco-safe roads(**roadside soil bio-engineering)**, **proper drainage and design become** standard practice rather than the highly costly **heavy equipment**, and post monsoon clean up approach for conventional **"grey"** unplanned rural roads
- The **losses** and **repair costs** are often not taken into account by policy makers and communities when considering how to use funds for **constructing roads**
- NbS interventions are **long-term activities** and may **not produce or improve** targeted **ecosystem services** immediately

Thank You

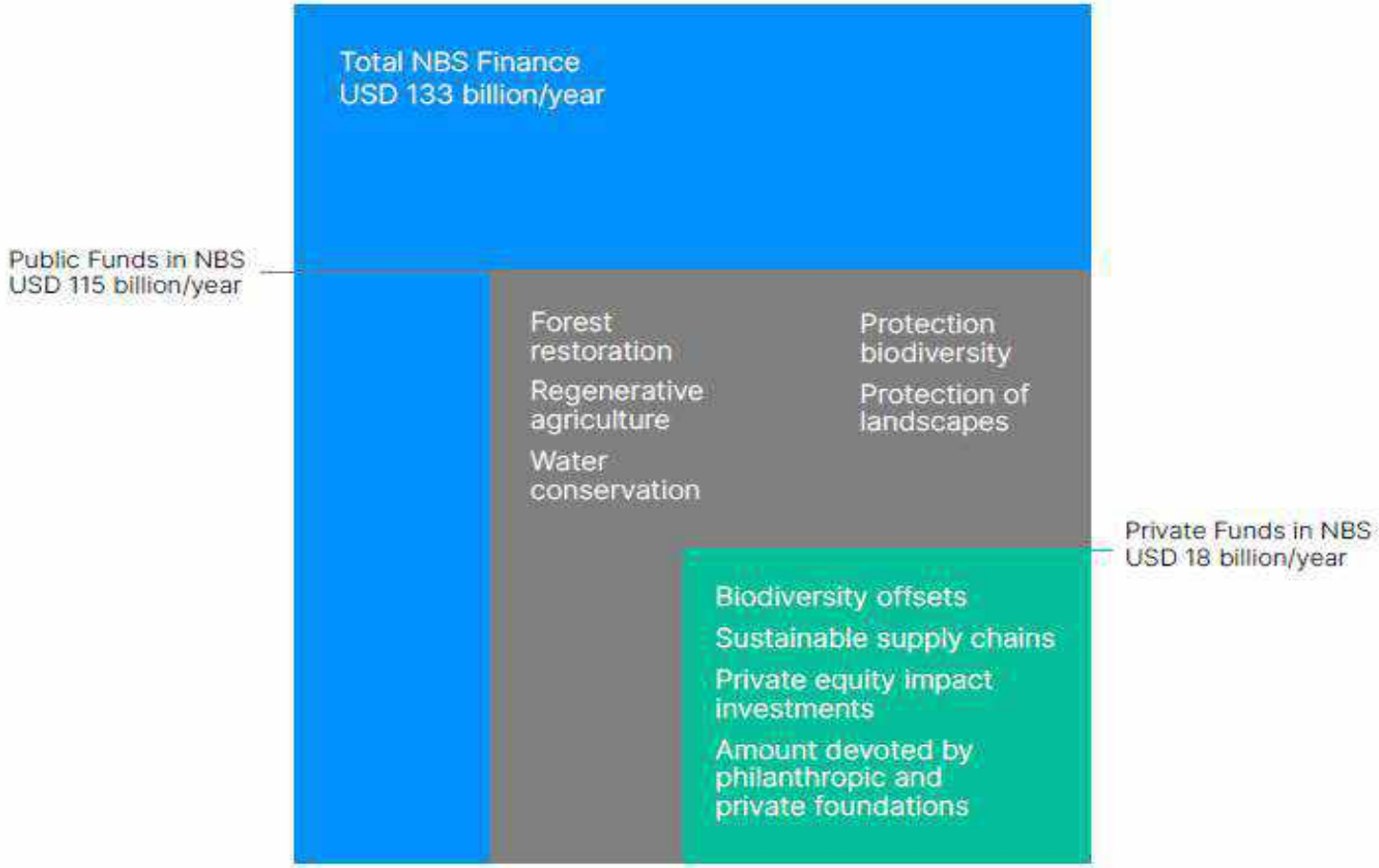
Regional Training and Dialogue on Nature-based Solutions (NbS) for a Resilient Water Sector

Climate Adaptation and Resilience (CARE) for South Asia

Opportunities for financing national and regional level NbS initiative



Nature–based Solutions: Financing Needs and Sources



Public funds dominate global NbS financing (86.46%) whilst private fund contribution remains minimal at (13.53%)

Source: Deutz et. al., 2020[75]

-NbS/SDGs linkages

-UN Decade of Ecosystem Restoration (2021 – 2030)

-G7 2030 Nature Compact (Net-zero and nature positive)

-Developed country commitments to support developed country in climate adaption

Gap – *"Investments in NbS needs to triple by 2030 (4 time by 2050)"*

Source: UNEP State of Finance of Nature, 2021

Potential funding sources

Multilateral Funding Mechanisms and Country Led Thematic Initiative

1. GEF
2. GCF
3. IKI (Thematic and Adaptation Fund)
4. Global EbA Fund
5. AFD, SDC and SIDA…

1) The Global Environment Facility FOCAL AREAS

Biodiversity Conservation

Climate Change

Land Degradation

IMPACT PROGRAMS

International Waters

Chemicals & Waste

GLOBAL / REGIONAL PROGRAMS

STAR Allocation

(System for Transparent Allocation of Resources)

Non-STAR

(Projects given on first come first serve basis)

-39 Donors – Multilateral banks, Countries, and UN Agencies

-4.1 billion USD (Replenishment fund – GEF 7)

GEF 8 Goal and Focus (Contd.)

Strategy	GEF -8 Approach
Focal Areas	• 1) Biodiversity loss; 2) chemicals and waste; 3) climate change; 4) international waters, and 5) land degradation. • Increasing *flexibility* to mainstream integrated programming, support to *vulnerable countries*, improve *policy coherence*, encourage use of *blended finance*, creating a *competitive* space
Integrated Programming	• Food Systems • Landscape and Ecosystem Restoration • Sustainable Cities – Up-scaling / replication to GEF-7 Project • Amazon, Congo and Critical Forest Biomes (incl. Asia) • Circular solutions to Plastic Pollution • Blue and green islands • Clean and healthy oceans • Net zero accelerator • Wildlife Conservation and Development • Greening Transportation Infrastructure Development
Global Programmes	• Mobilizing private investment through blended finance • Maximizing the contribution of local actions, civil society • Expansion of the Small Grant Programme • Innovation and targeted research window

IP

Landscape Restoration Integrated Program

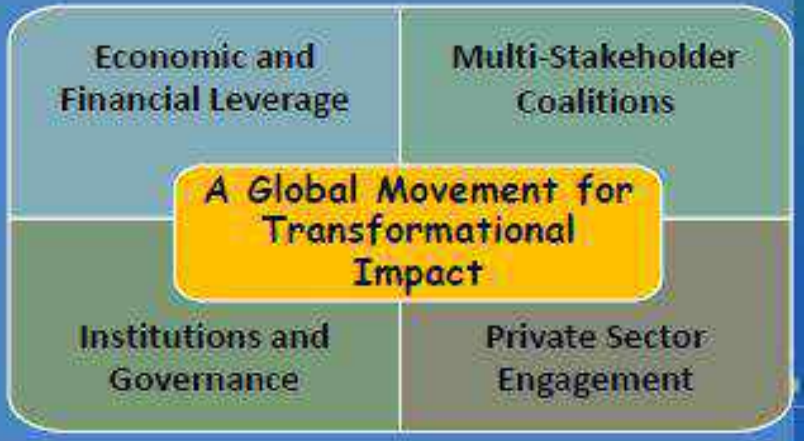
Goal: To restore healthy and resilient ecosystems to foster green recovery and secure livelihoods

Major objectives:

1. Generate multiple environmental and socio-economic benefits by applying restoring degraded land and ecosystems
2. Strengthen restoration policies, governance, institutional, and socio-economic structures for transformational impact

Major contributions to GEBs and MEAs:

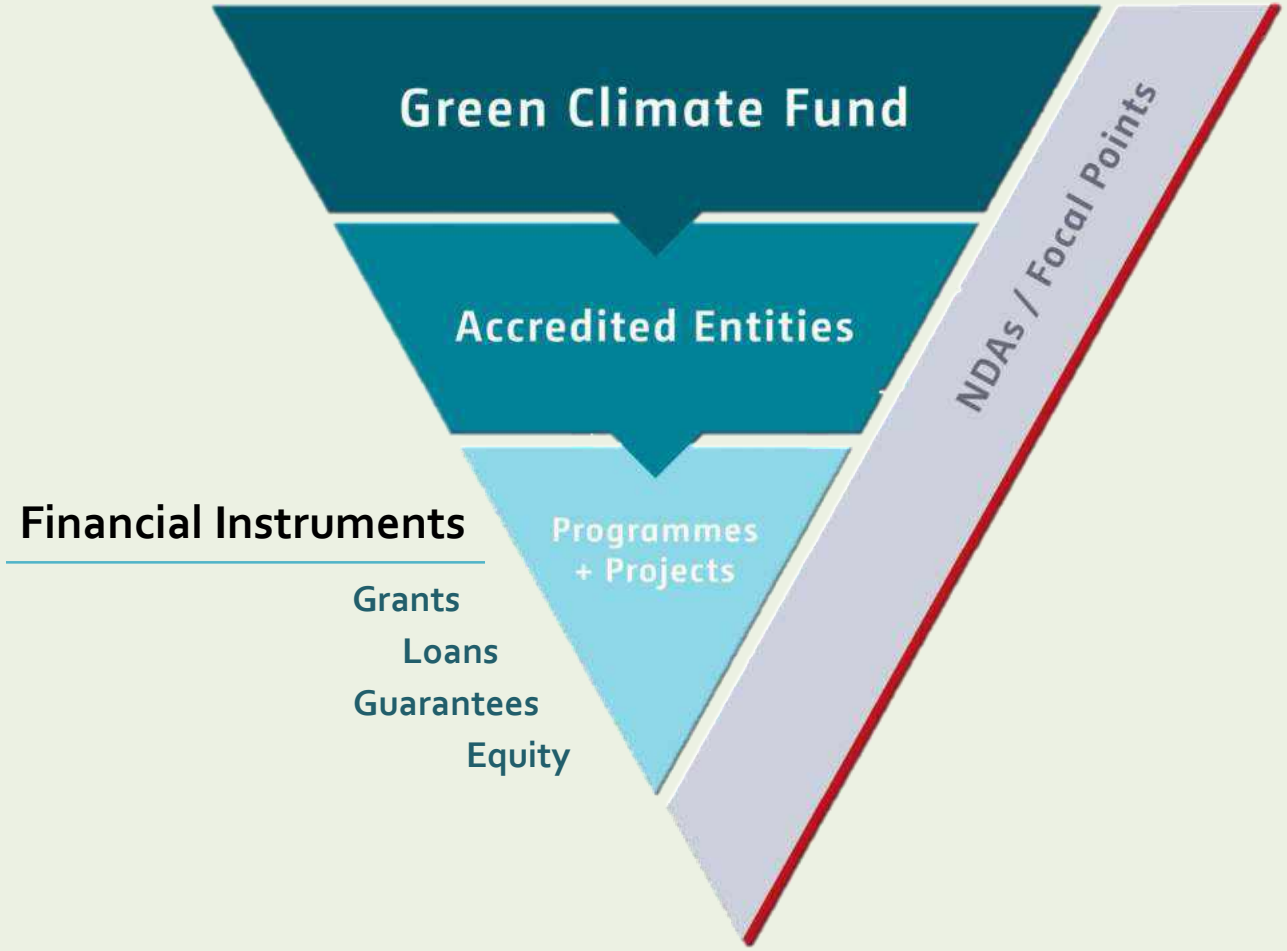
1. Contribute to reaching LDN targets
2. Support countries on NBSAP goals
3. Mitigation action via NDCs



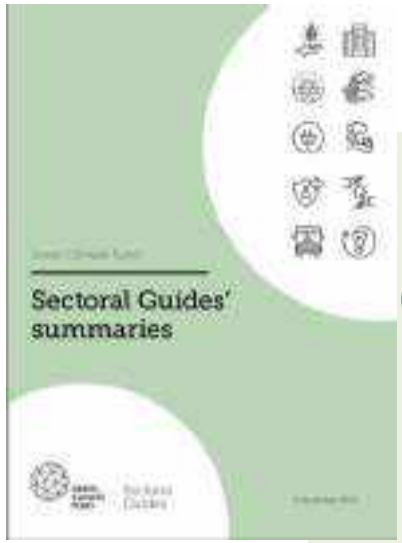
2) The Green Climate Fund Growing Portfolio

- Committed **USD 10bn** for 190 projects with total value including co-financing of **USD 37.1bn**
- Anticipated number people with increased resilience – **613mn**
- Anticipated tonnes of CO2 equivalent avoided – **2.0bn**
- Results Theme –
  - Ecosystem and Ecosystem Services - **USD 760.3mn** financing for 60 projects
  - Livelihoods of People and Communities – **USD 1.4bn** for 121 projects
  - Forests and Land Use – **USD 1.5bn** for 52 projects

GCF Approach



Six Investment Criteria and Sectoral Guidance



Impact potential	Potential to contribute to achievement of Fund's objectives and result areas
Paradigm shift potential	Long-term impact beyond a one-off investment
Sustainable development potential	Wider economic, environmental, social (gender) co-benefits
Country ownership	Country ownership and capacity to implement (policies, climate strategies and institutions)
Efficiency & effectiveness	Economic and, if appropriate, financial soundness, as well as cost-effectiveness and co-financing for mitigation
Responsive to needs of recipients	Vulnerability and financing needs of beneficiary in targeted group

Size of projects – less than 10 million to more than 100 million USD

3) IKI Mechanism

Supported by:

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

IKI INTERNATIONAL CLIMATE INITIATIVE

based on a decision of the German Bundestag

Fi

Here you can find information on all IKI calls for projects under the International Climate Initiative (IKI). Current calls are marked in green. In addition, the IKI develops and participates in other major funding programmes and global funds that offer their own funding calls and finance support.

Thematic Call

Thematic Call 2022 open Deadline 21.02.2023

How much funding is provided?

10 to 20 million Euros

Who receives funding?

Several organisations and/or companies in a consortium

Apply now

Basic information

- How long do the projects run for?
- How often is funding provided?
- Where is funding provided?

Country Call

Country Call Peru closed

How much funding is provided?

12 to 15 million Euros

Who receives funding?

Several organisations and/or companies in a consortium

Basic information

- How long do the projects run for?
- How often is funding provided?
- Where is funding provided?

Medium Grants

Medium Grants 2022 closed

How much funding is provided?

300,000 to 800,000 euros

Who receives funding?

Non-profit organisations and companies based in Germany by the time of the grant approval in cooperation with local organisations

Basic information

Small Grants

Small Grants 2023 open Deadline 15.03.2023

How much funding is provided?

60,000 to 200,000 euros

Who receives funding?

Regional, national and local organisations based in ODA countries

Apply now

ADAPTATION FUND

Helping developing countries build resilience and adapt to climate change

Projects & Programmes | Apply For Funding | Readiness | Knowledge & Learning | News & Events | Adaptation Fund at COP27

Recent Announcements

4) Global EbA Fund

The Global EbA Fund is a **catalytic funding mechanism** for supporting **innovative approaches to EbA** to create an enabling environment for its mainstreaming and scaling up

The Fund helps to overcome barriers to upscaling EbA, by addressing knowledge gaps, piloting innovative EbA approaches, engaging in strategic EbA policy mainstreaming, and incentivising innovative finance mechanisms and private sector EbA investment.

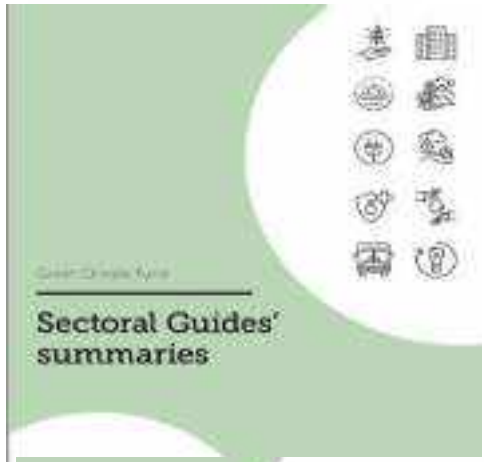
Grants from USD 50,000 to USD 250,000 – **up to 36 months**, projects that are either targeted to one or more ODA-eligible countries.

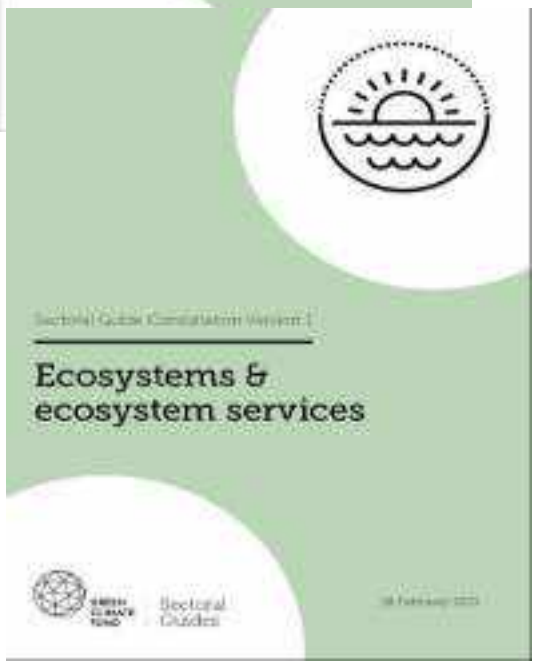
Eligible recipients:

Local NGOs and INGOs, community-based organisations, research organisations, think tanks, scientific communities, vulnerable communities & indigenous peoples, private sector.

In line with current IKI policies, the Fund will not grant directly to government partners but will provide grants to organisations working directly with national, sub-national and local governments to create an enabling environment for EbA.

Understanding Cross-sectoral Issues & Paradigm Shift Pathway





Sector	Actions across the drivers of the GCF Strategic Plan			
Ecosystems and ecosystem services	Transformational planning & programming	Catalysing climate innovation	Mobilising finance at scale	Coalitions & knowledge to scale up success
Ecosystem-based management of terrestrial and freshwater ecosystems	• Participatory multi-stakeholder processes and effective FPIC • Public policies, regulatory frameworks to promote green infrastructure investments • Land use and ecological-economic zoning to enhance ecological connectivity • Ecosystem-based solutions improving NDCs or projects by ecosystem type and geography • Insurance premiums linked to wildfires reflecting risks of ecosystem loss • Building with nature planning • Securing land tenure	• Pilot, test, and evaluate new methods for valuing and incorporating ecosystem services in national accounts • Develop technology-based traceability systems for ecosystem services maintenance and provision (e.g., water regulation) in PES schemes • Test block-chain and other technologies for traceability of certification for commodities in ecosystem and climate-friendly crops • Pilot the development of bio-businesses based on non-timber forest products' sustainable management and harvesting	• Next-generation green bonds • Debt-for-climate and nature swaps • Low-interest lending and guarantees • Blended finance for nature-based solutions • Community-based financing methods • Cash transfer schemes • Bottom of the pyramid micro-financing • Standardised climate accounting • Public-private financing • Upscaled PES schemes with strong M&E systems linked to water fees • Infrastructure investments to protect and enhance ecosystems • High recreational value investment • Private incentives and partnerships in ecosystem management	• Participatory monitoring, evaluation and learning • Reconciliation GHG accounting and nested jurisdictional approaches • Harmonised monitoring and assessment • Involving companies in shared (hybrid) data governance (e.g. enhanced hydro-met services) • Data centres for ecosystems • Enhanced ES valuation and internalisation methodologies • Exchange platforms, in particular, south-south • Incubation and acceleration of start-ups and early-stage ventures


THANK YOU
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Private sector engagement and resource mobilization for upscaling NBS

January 2023

pwc

Content

Current financing landscape and financing gap

50% of carbon dioxide emissions from human activities is absorbed by nature and it provides critical resources for economic development.

Despite the benefits of natural capital, there is a **significant underfunding** in the areas of NBS, particularly from private sectors.

Current public and private financial flows to NBS are estimated to be **US$154 billion** per year.

According to the UNEP report, **Generation Restoration**, half of the world's total GDP (approx. USD 50 trillion) is dependent on nature and every dollar invested in restoration of nature creates up to 30 dollars in economic benefits.

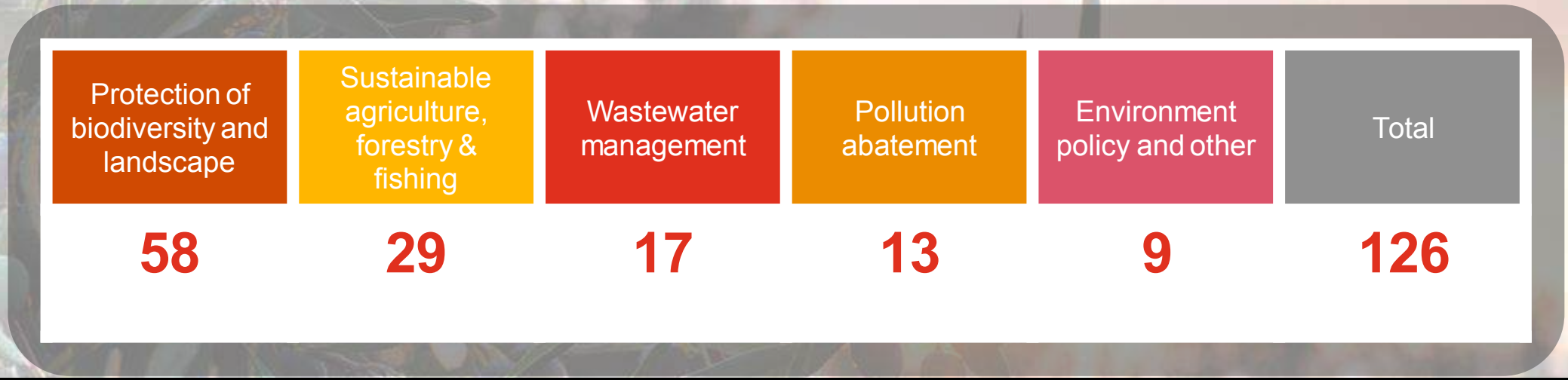
Public funds make up **83%** of the total, directing US$126 billion per year towards NBS through government domestic expenditure and US$ 2 billion per year through Official Development Assistance (ODA).

The private sector contributes approximately **17%** at US$26 billion per year (UNEP, 2022).

To limit global temperature below 1.5°C and halt biodiversity loss, annual investment in NBS needs to increase to **US$384 billion by 2025**, and to **US$ 674 billion by 2050**.

Current financing situation and financing gap

Public financial flows (in USD billion)



Private financial flows (in USD billion)

Challenges and opportunities for private sector to NBS financing

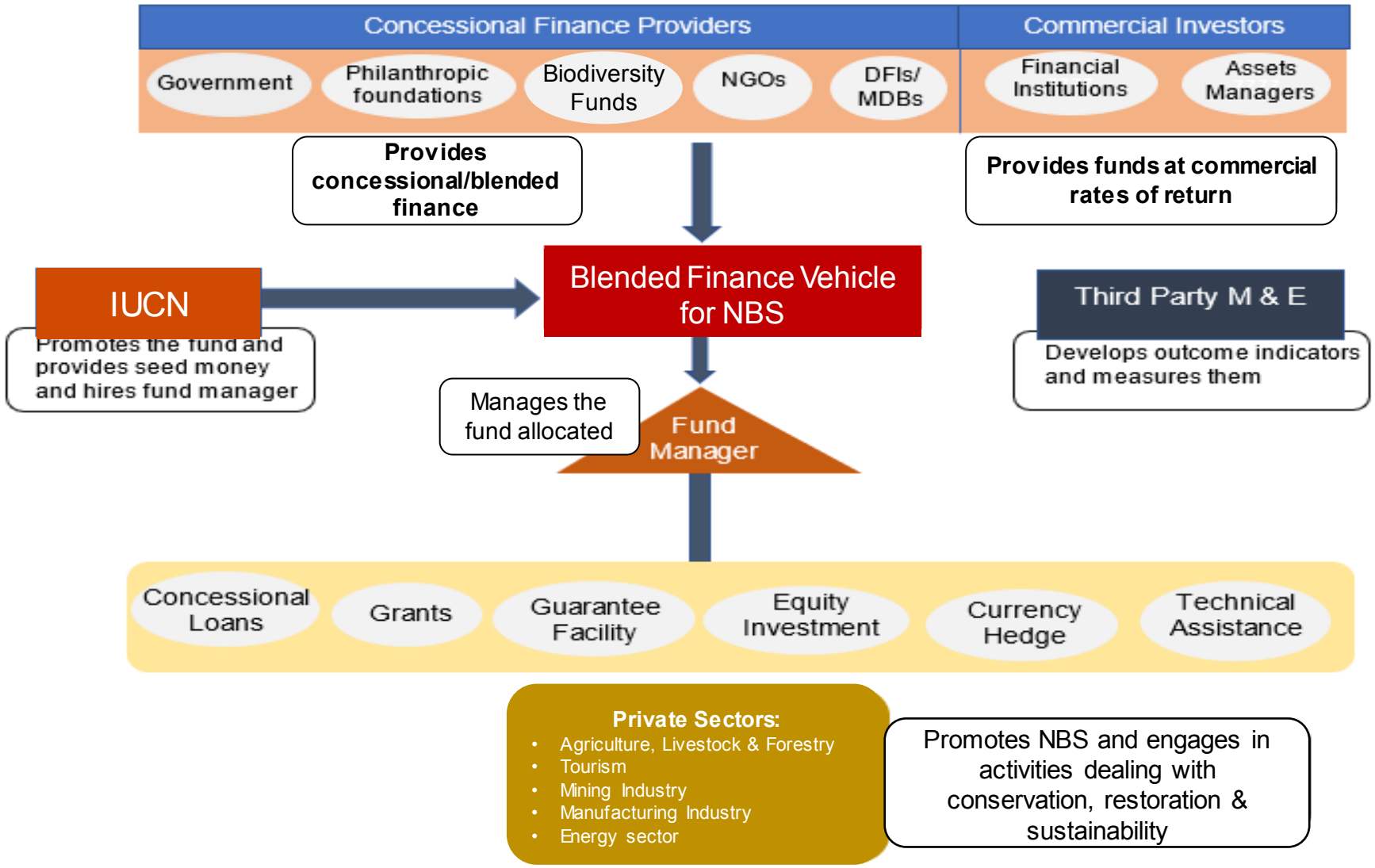
Challenges

1. Limited capacity of financial sector
2. High project level risks
3. Market failures

Opportunities

1. Enhance capacity of financial sector
2. Information on returns and impact
3. Standardisation and structures

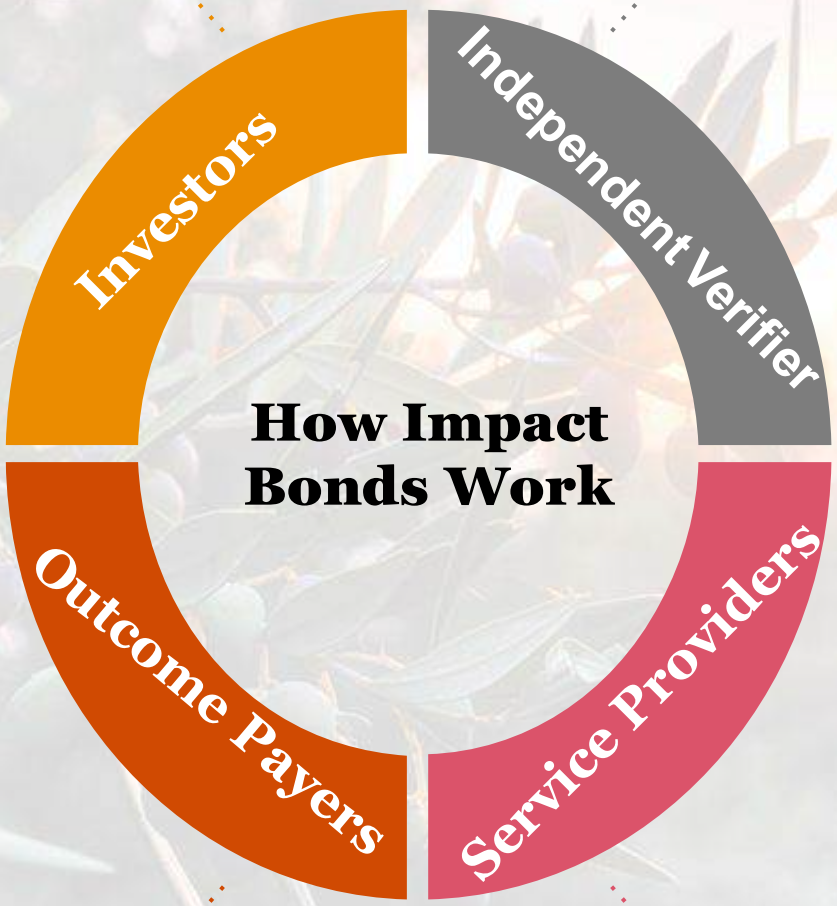
Financial tools to mobilise private sector investment - Blended Finance



Financial tools to mobilize private sector - Development Impact Bonds

Investors

- provide upfront funding for the service provider to finance the project, and are repaid based on specified outcomes being achieved.



Independent Verifier

- checks whether the goals that were agreed upon were met or not.

Outcome Payers

- are commissioners that identify biodiversity issues, specify payable outcomes that must be achieved to address these issues, and pay for achieved outcomes.

Service Providers

- work with the target group to achieve the outcomes specified by the outcome payer, and receive payments based on specified outcomes being achieved.

Case studies

In India, Indore Water-body Restoration developed artificial floating islands to purify water while also serving as a habitat for birds and improving the aesthetic quality of urban lakes. This was facilitated and funded by international non-profits & private developers and undertaken with the municipal government.

Volkswagen along with the Government of Mexico (private-public partnership) has taken long-term measures for reliable water supply in the region of Puebla-Tlaxcala Valley in Mexico. The measures include planting trees, digging pits, and developing earthen banks which enabled more than 1,300,000 cubic meters of additional water per year to be fed into the ground reserves.

Dow Chemical Company (DOW) in California constructed wetlands for wastewater treatment with lower capital, operations, and maintenance costs, as well as lessened energy and resources requirements. The natural infrastructure solution resulted in reduced construction and implementation time, along with other benefits of increased biodiversity as well as community educational opportunities.

Ambuja Cement Foundation's quarry rehabilitation of the mined out and surrounding areas have resulted in the capture and preservation of freshwater in artificial lakes (closed quarries). The Foundation is following a landscape approach that includes tree planting activities and improving degraded areas near Gir forest.

H&M group's sustainability-linked bond to scale recycled materials

H&M sustainability-linked bond raised EUR 500 million ($583 million) with a maturity of 8.5 years. The annual coupon rate is 0.25%. The bond generated great interest and was 7.6 times oversubscribed.

H&M's Sustainability-linked bonds are coupled to the company meeting several defined sustainability targets.

The targets* that H&M Group has committed to achieving by **2025** are:

- **Increase the share of recycled materials used to 30%.**
- **Reduce emissions from the Group's own operations by 20%.**
- **Reduce absolute Scope 3 emissions from fabric production, garment manufacturing, raw materials and upstream transport by 10%.**

Recommendations and Conclusion

Despite the benefits of natural capital, there is a significant underfunding in NBS particularly from private sector as it contributes about 17% of financing.

However, due to realization of benefits natural ecosystems offer in combating climate change, and enhancing biodiversity, many private sector stakeholders are indicating increasing interest in NBS.

Role of private businesses is important in NBS as they are considerably dependent on natural resources for their sustenance.

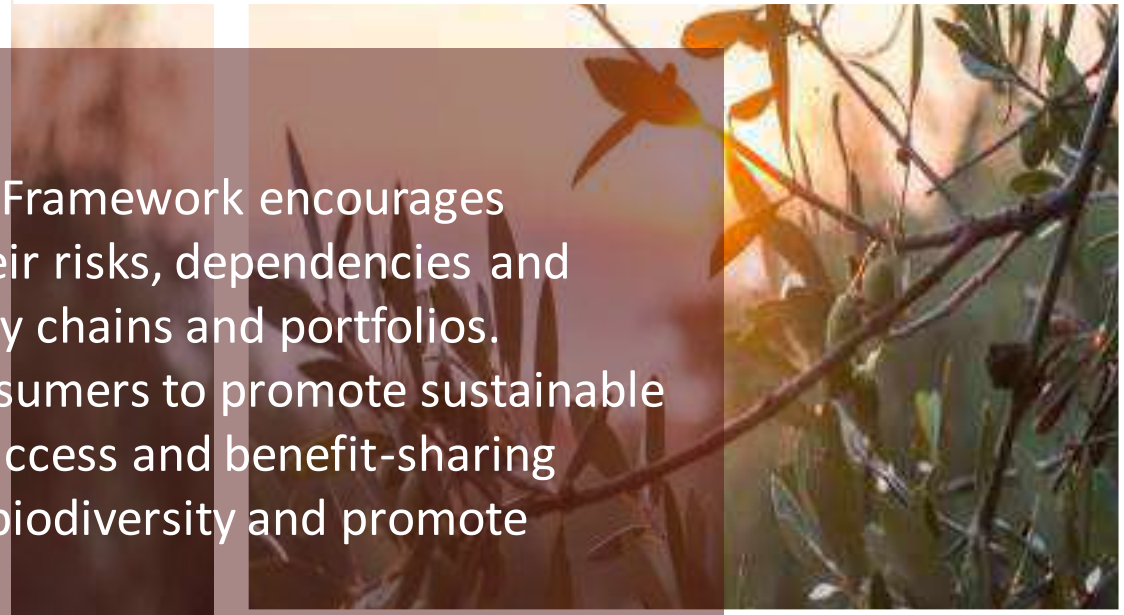
Moreover, they have resources and skills (technical knowledge, administrative, delivery and implementation) to mobilize investment in NBS which needs to increase to US$384 billion by 2025 (more than double the finance currently flowing to NBS, US$154 billion) to meet international commitments.

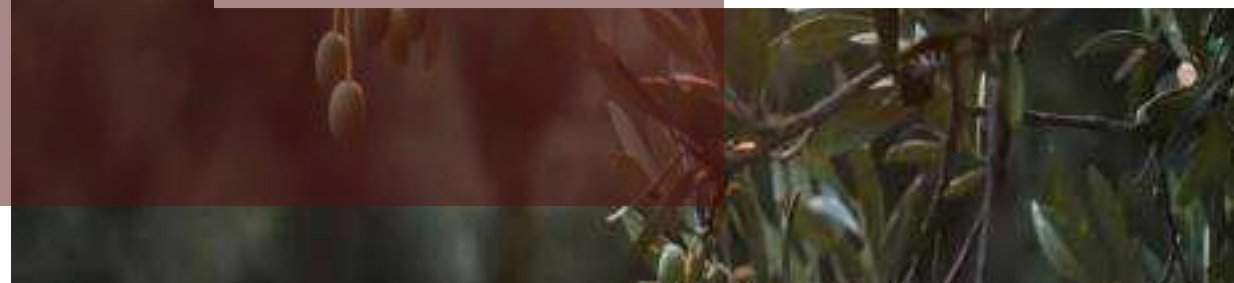
Governments and DFIs can only provide catalytic capital via blended finance to help private sector mobilize required funds in NBS.

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

- The development community is struggling to mobilise private finance
- Private investors seem increasingly keen but, for lack of consistent incentives, DFIs including MDFIs are failing to stimulate NBS-aligned private investment.
- Owners of DFIs and MDFIs need to implement significant reforms of their governance systems, to provide them with the right financial and political incentives.

Target 15 of the Kunming-Montreal Global Biodiversity Framework encourages businesses to regularly monitor, assess and disclose their risks, dependencies and impacts on biodiversity through their operations, supply chains and portfolios. Companies are expected to provide information to consumers to promote sustainable consumption patterns and report on compliance with access and benefit-sharing regulations. The goal is to reduce negative impacts on biodiversity and promote sustainable patterns of production.





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Thank you

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