Biodiversity as a fundamental property and a valuable outcome of NbS

Key messages from NbS Digital Dialogues Panel 4

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You can watch the recording of the session on YouTube.

SUMMARY

1. Biodiversity – at the level of genes, species, functions and ecosystems - is a fundamental property of NbS, to ensure resilience in a rapidly changing world.
2. We need to use ecological knowledge, experiments and modelling to design resilient NbS.
3. NbS must support biodiversity – this must be balanced with other outcomes such as climate change mitigation and adaptation.
4. We must measure NbS biodiversity baselines and changes over time, using a range of metrics.
5. NbS must be incorporated into international agreements, critically including the CBD's Global Biodiversity Framework.

AN AGENDA FOR BETTER INTEGRATING BIODIVERSITY INTO NBS DESIGN AND IMPLEMENTATION:

1. Acknowledge

- Biodiversity as both a fundamental property of NbS that secures ecosystems functions and services as well as a key outcome that underpins human wellbeing and sustainable development.

2. Research needs

- Investigate how ecosystems respond to climate change, and how to protect, restore, manage and create resilient ecosystems.

- Assess risks and benefits of assisted migration or tolerance of non-native (but non-invasive) species for the resilience of ecosystem functioning.

- Develop better biodiversity indicators: refine existing ones and create new ones that assess elements of biodiversity that are currently difficult to capture (for example involving increased use of remote sensing)

3. Practice

- Set quantifiable targets for supporting biodiversity for the project area, accounting for spatial and temporal displacement of negative effects. This is imperative to ensure and improve the long-term social and ecological effectiveness of the NbS.

- Ensure human diversity in decision making processes. Procedural justice is critical to ensure the views of all stakeholders are considered, and improve the quality of decision making, in turn supporting non-human biodiversity.

4. Monitoring

Measure multiple complementary indicators of biodiversity and ecosystem health before and after implementation of an NbS, to assess the biodiversity baseline, change over time and to track progress towards targets. Multiple, complementary measures of biodiversity should be used to adhere to the IUCN Global Standard for NbS.

- Select appropriate biodiversity indicators. For example, ecological integrity may be an appropriate indicator of biodiversity and ecosystem service provision in natural landscapes, but arguably less so in managed lands or urban areas. In addition, recovering functional diversity and redundancy through ecosystem restoration may be more important than recovery of species diversity for some taxonomic groups.

- Measure genetic diversity where possible as this is critical to the adaptability and resilience of ecosystems.

5. Policy

- The UNFCCC and CBD would benefit from fully aligning their NbS targets, using those that minimise trade-offs between biodiversity goals and climate change mitigation and adaptation. Measures of ecological integrity are particularly useful in this context as they capture both carbon and biodiversity outcomes.

- NbS is a powerful mechanism that will enable governments to meet national and international targets for biodiversity in synchrony with targets for other sectors.

- NbS could be effectively used as part of green COVID-recovery schemes, with thorough ecological planning to ensure high biodiversity and resilience.

KEY MESSAGES

1. Biodiversity is essential for restoring and managing resilient landscapes

- When we talk about biodiversity of a habitat, we need to consider four different dimensions: species diversity, genetic diversity, functional diversity and ecological diversity. In the context of landscapes where people live and work, we also need to include human diversity (social, cultural and ethnic), because this determines our capacity to manage landscapes in ways that sustain the former four components of diversity.
    - These 5 components of biodiversity are essential for creating resilient landscapes.
    - Biodiversity is therefore a fundamental property of NbS, and its restoration and/or protection is a key outcome.
- Restored landscapes should have capacity to recover species, interactions between species, and ecosystem functions, and be able to withstand future disturbances. To achieve resilient restoration, we can:
    - Maintain spatial heterogeneity and diversity of land uses and habitats.
    - Foster ecological memory by protecting habitat fragments, providing potential for future reorganisation and recovery of ecosystems.
    - Allow disturbed ecosystems to self-organise as much as possible (where invasive species do not pose a threat to recovery).
    - Balance functional redundancy with diversity – we need a suitable suite of functions within an ecosystem, each performed by multiple species.
    - Adapt interventions to local, social and ecological conditions.
    - Embrace uncertainty – resilient systems are flexible, but with flexibility comes uncertainty. Therefore, we need to learn how to manage unpredicted risks and opportunities and not fear uncertainty.
- **Tree diversity is essential for successful reforestation/afforestation**
    - There has recently been a swell in interest and funding for growing trees, primarily to contribute to climate change mitigation. However, a lack of investment in selecting suitable tree species compromises the ability of reforestation and afforestation projects

to deliver the desired outcomes for climate change mitigation, biodiversity and human health, and of the ecosystem's ability to withstand future changes in climate.

- Selecting suitable tree species for reforestation/afforestation determines outcomes because:

- Trees are foundational species – they define the structure of ecosystems, control the biodiversity of associated species and modulate ecosystem processes – hence they affect the suite of ecosystem services that an NbS can generate for years to come.

- Genetic diversity both between and within species is central to ecosystem resilience – genetic resources enable trees to adapt to future environmental change and confer resistance to pests and diseases.

- Management implications:

  - Managers of reforestation/afforestation projects need information to be readily available to allow them to make informed choices of tree species, including a suitable proportion of native diversity and sufficiently high genetic diversity.

  - Where natural regeneration doesn't provide sufficient diversity, it may be appropriate to supplement natural regeneration with assisted migration of individuals and species from elsewhere to boost genetic variety.

2. Future effects of climate change on NbS ecosystems need to be factored into NbS planning

- Natural ecosystems will be subject to changing climatic conditions over the coming decades; if the response of ecosystems to these changes are not taken into account in NbS planning and implementation, then it could compromise the long-term effectiveness of NbS

- We need to understand how species will respond to climate change, in order to prepare for its effects. This involves, for example:

    - Mapping regional networks of forest genetic resources, now and in the future, to inform threat analyses for different tree species.

    - Understanding how tree distributions, the location of important tree species, and the location of conservation hotspots will change in the future, to help us identify conservation priorities and improve decision-making on how we use genetic diversity in restoration and NbS.

    - Creation of decision-support tools, to help policymakers and practitioners to make informed decisions in NbS planning.

      For example: Diversity for Restoration is a spatially-explicit tool available in Latin America, South-East Asia and Africa, which provides suggestions on tree species to use in restoration projects to ensure that a decision maker's objectives are fulfilled, in addition to ensuring a diversity of seed sources and increasing the capacity of the restored ecosystem to adapt to future climatic change.

3. Biodiversity indicators are needed to measure and monitor the success of NbS

- Since biodiversity is key to effective and resilient NbS, assessing biodiversity outcomes of NbS is an important indicator of success. Indeed, biodiversity indicators will be instrumental for governments assessing the quality of NbS schemes, and for companies to see the impacts of their investments.

- Measuring biodiversity outcomes is challenging, but management often requires fine grain, easy-to-update information about biodiversity.

    - A range of tools are being developed that will allow assessments of various important components of biodiversity at the landscape-scale.

- Biodiversity in agricultural systems is difficult to assess as there is high spatial variability:

    - ICRAF are developing a tool that uses remote sensing data on variables such as aboveground biomass and spectral diversity (which can correspond to habitat or species diversity), calibrated by data from the ground, as a low cost method to frequently update information about agricultural biodiversity.

    - This tool is still being refined, and has limitations such as not recognising extinction debts, and being unable to consider other drivers of biodiversity loss such as pesticide use and hunting.

    - Nonetheless, these predictive frameworks will be used to predict biodiversity at large scales using remote sensing data, and can quickly and cheaply generate Farmland Biodiversity Scores for agricultural landscapes.

- Ecological integrity is another indicator of biodiversity.

    - In general, ecosystems with high integrity provide disproportionate benefits in terms of species conservation, carbon sequestration and storage and other ecosystem services, including cultural values. Such ecosystems should therefore be a target of NbS. Using ecological integrity to inform placement of NbS will reduce habitat degradation, which is an overlooked source of biodiversity loss and greenhouse gas emissions (i.e. compared to habitat loss).

    - Two indicators of ecological integrity have already been developed - an index specifically for forests, and a larger-scale index for ecosystem integrity that will be regularly updated. Alternative or finer-scale biodiversity metrics may be needed for urban landscapes, however, because the scale of measurements is not fine enough for highly heterogeneous landscapes. Indices of ecological integrity will also need to be used alongside complementary metrics of production for NbS involving land management (e.g. agroforestry, timber extraction and agricultural landscapes), because the NbS objectives involve trade-offs between e.g. regulatory and provisioning services.

4. NbS must be fully incorporated into international agreements

- Ensuring the quality of NbS:
  NbS already have political traction; as momentum builds, parties will demand clarity on the NbS concept and will need to understand how the success of NbS is measured. Therefore, we need to agree on the main indicators that define the value of an NbS. The publication of IUCN Global Standard for NbS is a step towards assuring the quality of NbS. What are the next steps?

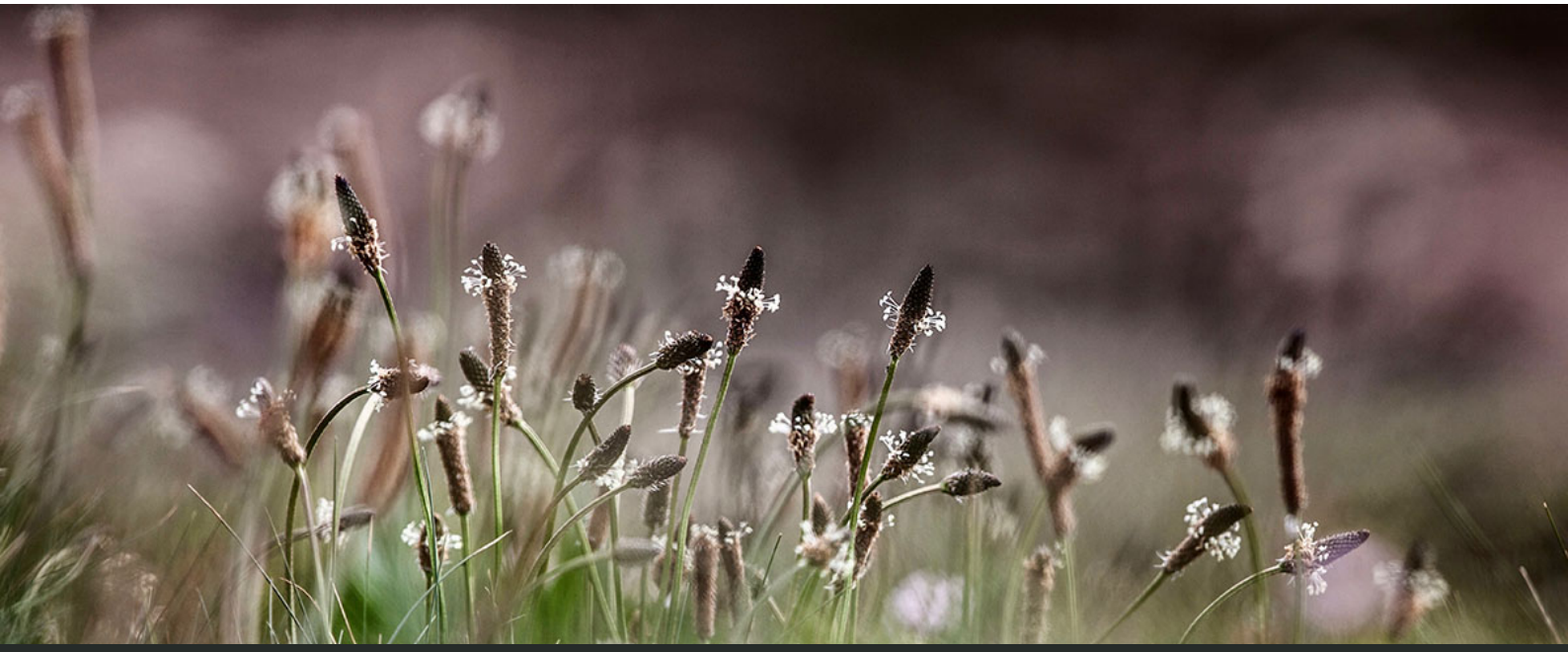
- Coherence in international agreements:
  The UNFCCC has incorporated NbS into strategy and reports, since NbS have well documented benefits for both climate change mitigation and adaptation. For mitigation, in particular, the contribution of NbS to the quantitative target of limiting warming to 1.5-2˚C can be measured - this aids incorporation into models and policymaking. In order for NbS to gain the same standing with the CBD, it is vital to:

  - Agree on how we measure and communicate the value of NbS for biodiversity.

  - Ensure that NbS do not undermine biodiversity and that positive biodiversity outcomes are incorporated as a standard measure of success for NbS.

  - Showcase the benefits of NbS for biodiversity, and show that they can catalyse a switch in paradigm from defensive conservation to proactive approaches.

  - Integration of NbS within both the UNFCCC and the CBD would increase coherence of policymaking and agreements between the two conventions, in turn strengthening commitments and standards for NbS.



- Green COVID-19 recovery:
  NbS can play an important role in a green pandemic recovery through job creation. However, there is a danger of NbS projects being implemented rapidly without sufficient planning, which could lead to a number of negative consequences including poor ecological planning, damage to biodiversity and NbS lacking resilience. Hence, it is the role of the NbS community to simultaneously demonstrate:

  - The role of biodiversity in creating successful, resilient NbS.
  - How NbS can contribute to biodiversity and climate change targets.
  - The immediate benefits of NbS for COVID-19 recovery in terms of economics and wellbeing.

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