Nature-based solutions: delivering national-level adaptation and global goals

Many of the world’s vital natural ecosystems, and the communities reliant on them, are vulnerable to climate change. But there is increasing recognition that ecosystems — if sustainably restored and protected — can also form a strong line of defence against the direct impacts of climate change and support human adaptation over the long term. As the evidence base grows, ecosystems are increasingly prominent in climate change policy, especially in developing nations. Yet intentions rarely translate into robust and informed measurable targets, undermining action. As signatories to the Paris Agreement revise their Nationally Determined Contributions for 2020, we argue that nature-based solutions are a key tool for meeting global goals on climate change and sustainable development. We urge national policymakers to work with scientists to identify meaningful targets that benefit both people and the ecosystems on which they depend.

There is growing evidence and awareness that when nature-based (or ‘green’) solutions are applied strategically and equitably, the approach not only safeguards biodiversity and ecosystem services but also helps address climate change.¹,² In this briefing, we define nature-based solutions (NbS) in the context of climate change adaptation; give an overview of their effectiveness; and highlight their prominence in the climate pledges of the Paris Agreement signatories. We then set out the need for policymakers to show increased ambition for nature as they revise national climate policies, by including robust and measurable targets for NbS. We present a policy platform to support this process.

Defining ‘nature-based solutions’

NbS are actions that work with and enhance nature to address societal challenges (see Figure 1). Effectively restored and protected ecosystems produce a wide range of goods and services on which human wellbeing depends, from storing carbon, controlling floods, stabilising shorelines and slopes, to providing clean air and water, food, fuel, medicines and genetic resources.³ According to the European Commission: “Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.”³,⁴ (see Box 1 for examples).

In this briefing, ‘nature-based solutions’ encompass work that may also be defined as ‘ecosystem-based adaptation’ (EbA) — a term widely used to describe NbS that are specifically targeted at helping people adapt to the impacts and hazards of climate change and form part of an overall adaption strategy.⁵ NbS covers...
interventions that focus on delivering direct positive adaptation outcomes for people as well as those purely centred on conservation outcomes.

**In contrast to engineered approaches, nature-based solutions can protect us against multiple hazards**

**Why adaptation should go ‘green’**

NbS are often defined as being an alternative to ‘grey’ engineering, such as sea walls and irrigation infrastructure; in reality there is a spectrum of interventions that include components of both (hybrid or ‘grey-green’ approaches). While the evidence base is still developing, it is clear that nature-based and hybrid solutions often provide low-risk low-cost solutions to many climate change-related hazards and offer advantages over engineered solutions. For example, while the latter have immediate, measurable effects on reducing specific impacts, they can be expensive and deliver few if any co-benefits. In contrast, NbS tend to be affordable and, if properly implemented, bring many co-benefits (see Figure 1).

In contrast to engineered approaches, NbS can protect us against multiple hazards; this is vital as these seldom occur in isolation. For example, natural coastal forests can protect against flooding, strong winds and high temperatures, whilst also providing a range of ecosystem services and supporting more diverse livelihoods7 (see further examples of multiple benefits in Box 1). There is also growing evidence of the economic benefits of maintaining natural habitats through avoided losses from climate change-related disasters. For example, the presence of coastal wetlands in northeast USA protected US$625 million worth of property from direct flood damage during Hurricane Sandy, reducing damages by 20–30% in 50% of affected areas. The greater the extent of intact wetland habitat, the greater the protection provided.6 Meanwhile, a recent international analysis revealed that annual expected damages from flooding would double and costs from frequent storms would triple in the absence of reefs globally.5

**Global recognition of ecosystems**

As evidence of the efficacy of NbS continues to grow, ecosystems are also receiving attention in the international policy fora. The Paris Agreement explicitly recognises nature's role in helping us deal with climate change, calling on all Parties to acknowledge “the importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth”; its Articles include several references to ecosystems, natural resources and forests.

This notion has translated into high-level national intent, as revealed in comparative analyses of the Nationally Determined Contributions (NDCs) submitted to UNFCCC by signatories of the Paris Agreement:10,11,12

- Two thirds state that ecosystems are important and vulnerable to climate change
- A similar proportion credit ecosystem protection as the motivation for their adaptation planning
- Ecosystem protection is the fifth most frequently noted intended outcome of adaptation planning, ranked below disaster risk reduction and food or water security, but above protection of the economy or human health.

Many nations articulate a broadly ‘nature-based’ vision for adaptation in their NDCs and propose a range of ‘green’ actions to achieve these visions, involving the restoration and/or protection of natural ecosystems or agroforestry.10,12 For example, Ethiopia aims to ‘enhance the adaptive capacity of ecosystems, communities and infrastructure through an ecosystem rehabilitation approach’. In total, 103 nations highlight one or more NbS actions in the...
Box 1. Nature-based solutions to climate change adaptation

<table>
<thead>
<tr>
<th>Approach</th>
<th>Effects</th>
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<tr>
<td>Protecting forests and wetlands in catchment areas (for example, in headwaters and along rivers)</td>
<td>• Secures and regulates water supplies</td>
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<tr>
<td></td>
<td>• Protects communities from flooding, soil erosion and landslides (for example, Huang et al. (2012))</td>
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<tr>
<td>Restoring coastal ecosystems (for example, mangroves, reefs and salt marshes)</td>
<td>• Protects communities from storm surges, salt water intrusion and erosion (for example, Temmerman et al. (2013))</td>
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<tr>
<td>Planting trees among crops or crops within forest (that is, agroforestry)</td>
<td>• Maintains and enhances yields in drier, more variable climates (for example, Clough et al. (2011))</td>
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<tr>
<td>Creating green roofs and walls, and planting trees in and around urban centres</td>
<td>• Moderates impacts of heatwaves</td>
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<tr>
<td></td>
<td>• Captures storm water</td>
</tr>
<tr>
<td></td>
<td>• Decreases pollution (for example, Kabisch et al. (2016))</td>
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Without specific, measurable targets and suitable indicators, it is impossible to assess progress towards broad adaptation goals. For the adaptation needs of communities and ecosystems to be met by NbS, the design must be informed by the best available science and local knowledge. Applying both would help identify the most relevant NbS intervention for each context, maximising the capacity for adaptation and avoiding assumptions that set projects up to fail (see Box 3). Effective project design, target setting and implementation therefore requires detailed knowledge of:

- Climate impacts — on ecosystems and people
- The effectiveness of different forms of NbS in reducing climate impacts
- How far different forms of NbS provide positive outcomes for people and ecosystems.

To this end, the research community must consolidate and translate relevant knowledge and

Box 2. Nature-based Solutions Policy Platform

This free policy tool provides information about climate change adaptation planning. It aims to facilitate a global stocktake of the Paris Agreement and provide a baseline against which changes in ambition for NbS to climate change adaptation can be monitored and increased. At www nbspolicyplatform.org, users can:

- Explore policies and data in a global analysis or by country
- Understand and compare nations’ plans for adaptation and assess the role of NbS
- Link directly to the underlying evidence for the effectiveness of NbS to climate change hazards and impacts.
Box 3. Matching NbS interventions to local geographies and local need

Of the 103 NDCs that include NbS in adaptation plans, the most commonly planned or implemented actions involve management, protection and/or restoration of terrestrial forests or woodlands (appearing in 41%). This is followed by similar actions in coastal and marine habitats (28%) and river catchments including wetlands (28%), agroforestry appears in 23% of relevant NDCs (47% of African NDCs).

Far rarer are plans to work with montane habitats (4%) or grasslands and rangelands (10%). Almost all examples of the latter come from Africa, despite the extensive presence of grasslands and rangelands elsewhere. Yet there is evidence that these overlooked habitats can deliver adaptation benefits, offer significant carbon sequestration and are resilient to climate change impacts.

make it accessible to policymakers.12 This can be a virtuous cycle if policymakers simultaneously commit to scaling up research into what makes NbS effective for people and ecosystems, which will strengthen the scientific basis for future adaptation planning. Many NDCs already recognise that action plans addressing climate threats should be science-based and make high-level commitments to this, which could provide a helpful springboard to action.

Embedding NbS in the 2030 development agenda

Protecting and/or restoring natural ecosystems is central to the climate change ambition of many countries, yet nations often present a mismatch between high-level vision and on-the-ground action.1,2,13 In a handful of cases, detailed plans are not provided in NDCs but do appear in other national policy documents — this suggests the need for greater coherence among different national policy processes. For the majority, however, the mismatch indicates a lack of understanding of how best to integrate NbS within adaptation planning; it also highlights the need for policymakers and practitioners to be better supported as they translate theoretical NbS approaches into locally relevant actions.10,11

This support should include much greater involvement from the ecosystem and conservation science community, starting with the continuing development of National Adaptation Plans and the next iteration of NDCs. To address the mismatch between ambition and action, the science, practitioner and policy communities must work together to:

- Clarify and properly disseminate information on what makes NbS effective
- Build practitioners’ capacity to develop robust adaptation plans, fine-tuned to local socio-ecological contexts
- Access suitable levels of adaptation finance and/or technical support
- Ultimately implement effective NbS for the benefit of human societies and the ecosystems on which they depend.

With drivers including the Bonn Challenge, New York Declaration on Forests, Aichi Biodiversity Targets and the CBD post-2020 Biodiversity Framework, more and more countries are pledging to protect and restore their natural ecosystems. NbS represent a powerful way of allowing nations to deliver on international commitments, meet the Sustainable Development Goals with limited finance, and ultimately achieve sustainable and equitable development in a warming world.

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Notes