NATURAL SOLUTIONS

Protected areas helping people cope with climate change

Protected areas are an essential part of the global response to climate change. They are helping address the cause of climate change by protecting natural ecosystems and reducing greenhouse gas emissions through carbon storage and sequestration. They can also help society cope with climate change impacts by maintaining the essential ecosystem services upon which people depend. They are proven, "green" and cost-effective natural solutions to help address the climate crisis.

Protected areas can contribute to two main responses to climate change through:

Mitigation

Terrestrial and oceanic ecosystems play a significant role in the global carbon cycle, serving as major carbon stores and sinks, mitigating and reducing greenhouse gas (GHG) emissions from energy production and land use change.

Store: Protected areas conserve forests and other natural habitats, preventing the loss of carbon that is already present in vegetation and soils. At least 15% of the world's terrestrial carbon stock is stored in protected areas globally.

Capture: Natural ecosystems capture more than 4.7gigatonnes of carbon (GtC) annually, mitigating and reducing GHG emissions from energy production, transport and land conversion. In many regions protected areas contain the only remaining large areas of natural habitats; many are important carbon sinks, sequestering carbon dioxide from the atmosphere.

Adaptation

Protect: Protected areas maintain ecosystem integrity, buffer local climate, and reduce risks and impacts from extreme events such as storms, droughts and sea-level rise.

Provide: Protected areas also maintain essential ecosystem services that help people cope with changes in water supplies, fisheries, disease and agricultural productivity caused by climate change.

Protected areas are efficient and cost effective tools for ecosystem management, with associated laws and policies, management and governance institutions. Increased coverage and connectivity at the landscape level and more effective management will enhance the resilience of ecosystems to climate change and safeguard vital ecosystem services. Most countries have a protected area network but few value protected areas as integral parts of national and local climate response strategies, even though both the Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC) now recognize the importance of ecosystem-based approaches to climate change.

Protected areas help to reduce the impacts of climate change on vulnerable communities.

How protected areas can help to respond to the climate change challenge

Mitigation: Carbon Storage

Protected areas prevent the loss of carbon that is already present in vegetation and soils.

Challenge: Ecosystem loss and degradation are major causes of GHG emissions. The Intergovernmental Panel on Climate Change (IPCC) estimates that 20% of GHG emissions come from deforestation and other forms of land use change.

Role of protected areas: Protected areas cover a wide range of habitats with high carbon storage potential including forests,

Forests cover about 30% of total land area but store some 50% of terrestrial carbon.

wetlands, tropical and temperate grasslands and coastal habitats such as mangroves and sea grass beds. They are the most effective management strategy known to avoid conversion to other land uses and loss of carbon and to secure carbon in natural ecosystems. Data from the UNEP-World Conservation Monitoring Centre indicates that there are already 312 GtC stored in the global protected area network, an estimated 15% of the world's terrestrial carbon stock. Tropical protected areas, especially those established and managed by indigenous people, lose less forest than other management systems. As protected area coverage increases there are opportunities to protect additional "high carbon" ecosystems and to manage, and in some cases restore, habitats such as peat lands, for carbon retention.

Protected Areas and Carbon Storage

Madagascar: creation of 6 million hectares (ha) of new protected areas is expected to reduce emissions by 4 million tons of carbon (tC) a year.
Tanzania: the Eastern Arc Mountains store over 151 million tC, 60% of which is in existing forest reserves.
Belarus: on-going restoration and protection of degraded peat lands is leading to an annual reduction of greenhouse gas emissions from peat land fires and mineralization, equivalent to 448,000 t CO_2 .
Russian Federation: the protection of 1.63 million ha of virgin taiga forests and peat soils in the Komi Republic is maintaining carbon stores estimated at over 71.5 million tC.
Bolivia, Mexico and Venezuela: 25 million ha of forest protected areas store over 4 billion tC, estimated to be worth between US$39-$87 billion.
Canada: Over 4,000 million tC has been stored through the establishment and expansion of national parks.
Brazil: protected areas and indigenous lands in the Brazilian Amazon are likely to prevent an estimated 670,000 km² of deforestation by 2050, representing 8 billion tC of avoided emissions.

Implications: The role of protected areas in carbon storage provides strong arguments for increasing protected area coverage, especially in carbon-rich habitats, and for improving management to retain more carbon.

Mitigation: Carbon Capture

Protected areas sequester carbon dioxide from the atmosphere in natural ecosystems

Challenge: Most natural and semi-natural ecosystems sequester carbon dioxide, thus reducing atmospheric greenhouse gas levels. This important service is at risk due to habitat destruction and degradation; degraded forests can have less than half the carbon value of intact forests. If current trends persist, some ecosystems, especially peat lands, could switch from being carbon sinks to become carbon sources.

Role of protected areas: Evidence suggests that areas that are managed for biodiversity values will also secure more carbon. Protection of ecosystems secures their role as carbon sinks.

Implications: Management of some habitats, especially inland waters, estuaries and peat lands, may have to be tailored to maintain sequestration potential in addition to biodiversity values. Restoration will become an important management tool in some protected areas, in particular for forests, mangroves, wetlands and grasslands.

Adaptation: Protection

Protected areas maintain ecosystem integrity, buffer local climate, reduce risks and impacts from extreme climatic events such as storms, droughts and sea-level rise.

Challenge: The Millennium Ecosystem Assessment estimated that 60% of global ecosystem services are degraded, reducing their ability to mitigate the impact of natural disasters. Economic losses from climate disasters have increased ten-fold in 50 years, and "natural" disasters from floods, storms, tidal surges, droughts and avalanches will continue to increase in frequency and intensity with climate change.

At least 15 per cent of the world's terrestrial carbon stock is stored in protected areas

Role of protected areas: Protected areas can help to protect vulnerable communities and reduce the impact of all but the largest natural disasters as follows:

- **Floods:** providing space for floodwaters to disperse and absorbing impacts with natural vegetation.
- **Landslides:** stabilizing soil and snow to stop slippage and slowing movement once a slip is underway.
- **Storm surges:** blocking surges with coral reefs, barrier islands, mangroves, dunes and marshes.
- **Drought and desertification:** reducing grazing pressure and maintaining watersheds and water retention in soil.
- **Fire:** limiting encroachment into fire-prone areas, maintaining traditional management systems.

Implications: The integrity of ecosystems and ecological processes confer resilience and reduce vulnerability to natural disasters and climatic extremes. Expansion of protected area networks should consider other vital ecosystem services in addition to biodiversity. Recognition of their role in disaster reduction provides justification for creating new protected areas, in particular for mountains, steep slopes and coastal and inland wetlands.

Marine protected areas conserve and restock fisheries, critical resources for coastal communities.

Adaptation: Provision

Protected areas maintain essential ecosystem services that help people cope with changes in water supplies, fisheries, incidence of disease and agricultural productivity caused by climate change.

Challenge: Climate change is likely to exacerbate shortages of food, potable water and traditional medicines and to increase the spread of certain disease vectors. Food and water resource shortages will likely be unpredictable and sometimes severe, increasing the costs of humanitarian assistance for the most vulnerable.

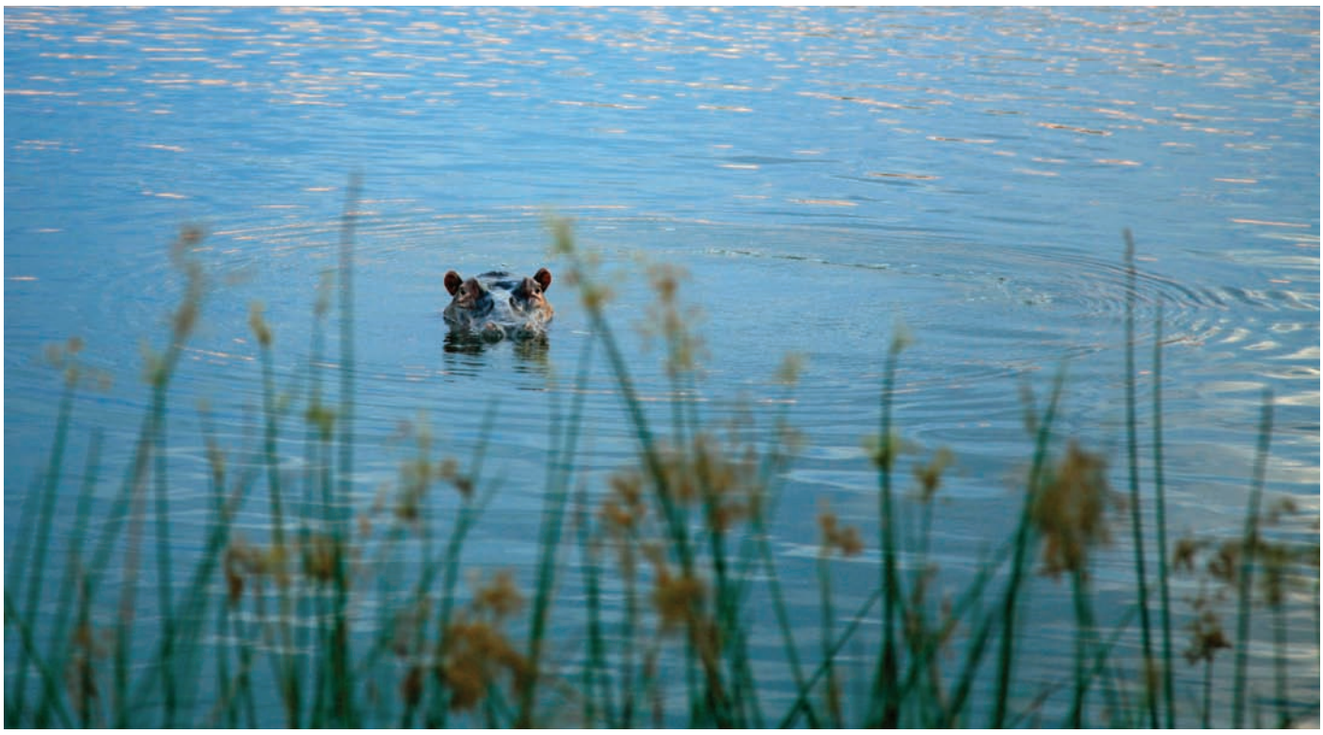
Role of protected areas: Protected areas are proven tools for maintaining essential natural resources and services, thereby reducing the vulnerability of communities to the impacts of climate change:

- **Water:** both purer water and (especially in tropical montane cloud forests) increased water flow.
- **Fish resources:** marine and freshwater protected areas conserve and rebuild fish stocks.
- **Food:** protected areas maintain water supplies for agriculture and protect pollination services and crop wild relatives to facilitate crop breeding; many provide sustainable and emergency food sources for communities.
- **Health:** protection of habitats maintains access to traditional medicines and slows the expansion of vector-borne diseases that thrive in degraded ecosystems.

Implications: Protected area specialists need to work more closely with relevant national and local level governments and technical agencies responsible for managing ecosystem services such as water supplies, coastal protection, flood control etc. In some cases, investments in restoring ecosystems within, and adjacent to, protected areas may be more cost-effective than investing in hard infrastructure alone.

- **Global:** 33 of the world's 105 largest cities derive their drinking water from catchments within forest protected areas.
- **Global:** 112 studies in marine protected areas found that they increased size and populations of fish.
- **Kenya:** improved fishery health through protection of coral reefs is providing dual benefits for coral reef conservation and per capita income for local people.
- **Papua New Guinea:** in Kimbe a locally-managed marine protected area network is being designed, focusing on resilience to climate change, to protect coral reefs, coastal habitats and food security.
- **Global:** over 100 studies in protected areas have identified important crop wild relatives.
- **Colombia:** the ***Alto Orito Indi-Angue Sanctuary*** was set up explicitly to protect medicinal plants.
- T**rinidad and Tobago:** restoration and conservation of the Nariva wetlands recognizes their importance as a carbon sink, a high biodiversity ecosystem and a natural buffer against coastal storms.
- **Sri Lanka:** the Muthurajawella protected area affords flood protection valued at over US$5 million/year.
- **Australia:** management of Melbourne's forested catchments (almost half of which are protected areas) is being adapted in the face of climate change scenarios to minimise impacts on water yield.
- **Canada:** The protected watershed of Banff National Park flows into Alberta's Bow River Basin, which is home to approximately 1.2 million people. The park supplies life-giving drinking water, provides recreational opportunities, and supports farmers and industries well beyond its boundaries.
- **Switzerland:** 17% of forests are managed to stop avalanches, a service worth US$2-3.5 billion/year.

Over 180,000 protected areas now cover 12.7% of the world's land area and 7.2% of coastal waters: many are already providing vital mitigation and adaptation benefits to climate change.



Wetlands provide multiple services, regulating water flow, reducing pollution, and protecting wildlife and fisheries.

Unfortunately this role is poorly recognized and their integrity remains at risk. Unless individual protected areas and national networks are well protected and effectively managed they will not be robust enough to withstand climate change and contribute positively to national and local response strategies.

Six key policy and management developments are needed for protected areas to function more effectively as a climate change response mechanism:

1. **More and larger protected areas:** particularly in ecosystems where much carbon is stored and/or captured or where important ecosystem services are under threat – particularly tropical forests, peat lands, mangroves, freshwater and coastal marshes as well as sea grass beds and other marine ecosystems.
2. **Connecting protected areas within landscapes/seascapes:** through management of natural or semi-natural vegetation or waters beyond protected area boundaries. This can include buffer zones, biological corridors and ecological stepping stones, which maintain connectivity, enhance ecosystem resilience to climate change at the landscape/seascape scale and increase the total amount of habitat under some form of protection.
3. **Recognition and implementation of the full range of governance types from protected areas managed by state agencies to local community, indigenous peoples and the private sector:** to encourage more stakeholders to become involved in declaring and managing protected areas as part of national and community climate response strategies.
4. **Improving management within protected areas:** to ensure that natural ecosystems and the services that they provide are recognized and not degraded or lost through illegal use or unwise management decisions.
5. **Increasing the level of protection for carbon stores:** by strengthening protection and management practices to enhance carbon storage, for example to maintain old-growth forest, avoid ground disturbance or drying out of peat, and restoring degraded habitats within protected areas.
6. **Focusing some planning and management specifically on mitigation and adaptation needs:** including modification of protected area design and management plans, enhanced management of wetlands, fire and invasive alien species.

Looking forward

Ecosystem-based approaches will be critical elements in national and local climate strategies, complementing energy reduction and investments in hard infrastructure and new technologies. Better understanding of the contribution that protected areas make to mitigation and adaptation and the availability of new funding mechanisms, such as the Reducing Emissions from Deforestation and Forest Degradation Plus (REDD+) and adaptation funds, could enable the expansion of more effectively managed protected area networks. Incorporating the role of protected area systems into national climate change strategies will enable governments to promote more sustainable development and reduce the loss and degradation of natural habitats, thereby responding to both climate change and biodiversity goals.

THE NATURAL SOLUTIONS SERIES

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