Convention on Biological Diversity

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Biodiversity and

Climate Change Action

There is growing scientific consensus that an average global warming of 2°C above the pre-industrial level[1] would constitute a dangerous level of climate change with serious implications for the achievement of Millennium Development Goals, the objectives of the Convention on Biological Diversity (CBD) and other Rio Conventions. Global greenhouse gas emissions are on an accelerating trend and if left unchecked, could lead to a 6.4°C (11.5° F) temperature increase by the end of the century, exceeding conservative estimates[2].

It is now widely recognized that climate change and biodiversity are interconnected, not only through the effects of climate change on biodiversity, but also through changes in biodiversity and ecosystem functioning that affect climate change. The carbon cycle and the water cycle, arguably the two most important large-scale processes for life on Earth, both depend on biodiversity—at genetic, species and ecosystem levels.

Biodiversity is part of the solution to climate change

[1] which is around 450ppm atmospheric carbon dioxide equivalent (IPCC 4th Assessment Working Group I Report, e.g. TS-5, p. 66.)
[2] IPCC Chair, Dr. Rajendra Pachauri, told UN delegates on 26 August, 2009. See also The Copenhagen Diagnosis: Climate Science Report which summarises the key findings in climate science since the publication of the Intergovernmental Panel on Climate Change Fourth Assessment Report in 2007. It is available at www.copenhagendiagnosis.org

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We must act now to:

- **identify and implement priority ecosystem-based adaptation and mitigation measures** to help reduce the risk of species extinctions and limit damage to ecosystem functions and services;

- **invest in preserving and restoring habitats**, especially those sensitive to climate change as an essential "insurance policy" to safeguard against climate-change impacts.

Fast Facts

• Changes in species and ecosystems due to climate change have already been observed; an increasing number of ecosystems, including areas of high biodiversity value, are likely to be further disrupted by a temperature rise of 2℃ or more above pre-industrial levels.

• Approximately 10% of species assessed so far will be at an increasingly higher risk of extinction for every 1℃ rise in global mean temperature.

• The predicted consequences of ocean acidification for marine plants and animals, food security and human health are profound. Our planet's temperature is regulated by the oceans; international trade in coastal and marine fisheries is a $70 billion a year business that drives coastal economies.

• Many of the major impacts of climate change on ecosystems and people are occurring through changes in the water cycle.

• Climate change is projected to further adversely affect key development challenges; the poorest communities find it most difficult to adapt to climate change and are most vulnerable to changes in ecosystems and their services.

• Conserving natural terrestrial and marine ecosystems and restoring degraded ecosystems can contribute to achieving key objectives of both the UNFCCC and CBD; Improved land use management and conservation of habitats can help reduce the amount of carbon dioxide released into the atmosphere by storing carbon and can assist climate change adaptation.

• Ecosystem-based adaptation, for example for disaster-risk reduction and water management, can generate social, economic and cultural co-benefits and help maintain resilient ecosystems.

• Ecosystem-based approaches and other sustainable land and water management activities have potential benefits for indigenous peoples and local communities but a number of conditions are important for realising these co-benefits: land tenure, the principle of free and prior informed consent, recognition of identities and cultural practices, participation in policy-making process and incentives.

• 45% of green carbon is stored in natural terrestrial ecosystems and the remaining 55% is captured by living organisms in oceans by plankton and the ocean's blue carbon sinks; 85% of the global carbon stock lies outside of the protected area network and in ecosystems other than forests.

• REDD activities should take biodiversity conservation into consideration to maintain ecosystem resilience and the long-term stability of the carbon pool. A comprehensive network of effectively designed and managed protected areas could be considered an important REDD strategy.

Biodiversity and associated ecosystem services are impacted by climate change

The Millennium Ecosystem Assessment identified climate change as a dominant driver of future biodiversity loss and indicated that it will adversely affect key development challenges, including the provision of clean water, energy services, and food; maintenance of a healthy environment; and conservation of ecological systems, their biodiversity, and associated ecosystem goods and services[3].

[3] Ecosystems and Human Well-being - Policy Responses. Ch 13. p. 378. Available at www.millenniumassessment.org/documents/document.318.aspx.pdf

Many of the major impacts of climate change on ecosystems and people are occurring through changes in the water cycle. Climate change exacerbates other threats caused by human activity. Climate change will likely require some changes to biodiversity conservation and management approaches to ensure their effectiveness over the longer term. **The resilience of biodiversity to climate change can be enhanced by reducing non-climatic stresses in combination with conservation, restoration and sustainable management strategies.**

Societies need to be aware of the adverse impacts of climate change response measures on biodiversity and the provision of key ecosystem services. For example, some of the geo-engineering options currently being discussed by the scientific community may have significant negative impacts on biodiversity – CBD COP 9, for example, called for the precautionary approach to be applied to ocean fertilization activities given uncertainty over its impacts on marine biodiversity and associated ecosystem services.

Biodiversity can help people adapt to climate change

Biodiversity can support efforts to reduce the negative effects of climate change.

Ecosystem-based adaptation, which integrates biodiversity and provision of ecosystem services into an overall climate change adaptation strategy, can be cost-effective, can generate social, economic and cultural co-benefits and help maintain resilient ecosystems. Examples of ecosystem-based adaptation include:

- Sustainable water management where river basins, aquifers, flood plains and their associated vegetation provide water storage and flood regulation;
- Disaster risk reduction where restoration of coastal habitats such as mangroves, or the flood mitigation services provided by wetlands, can be a particularly effective measure against storm-surges, coastal erosion and flood risk;
- Sustainable management of grasslands and rangelands, to enhance pastoral livelihoods;
- Establishment of diverse agricultural systems, where using indigenous knowledge of specific crop and livestock varieties, maintaining genetic diversity of crops and livestock, and conserving diverse agricultural landscapes secure food provision in changing local climatic conditions; and
- Establishing and effectively managing protected-area systems to ensure the continued delivery of ecosystem services that increase resilience to climate change.

As the availability of water resources for ecosystems and people changes (e.g., increasing droughts and floods) a key adaptation response is to sustain or restore the water-related services that both aquatic (wetland) and terrestrial ecosystems provide. For example, wetland restoration is already being implemented as a means to improve water security; one of the most valuable services provided by forests is sustaining water supplies.

Linkages between biodiversity, water, climate change present some of the best examples whereby nature can help us cope with climate change. Such ecosystem-based adaptation approaches can not only improve sustainability, but also greatly reduce adaptation costs.

Biodiversity can help people mitigate climate change

Better land-use management, including conserved habitats, can reduce carbon emissions from land use change and help remove carbon dioxide from the atmosphere, thus helping to mitigate global warming (for example, reducing emissions from

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deforestation and degradation, improving soil carbon storage in soils).

A portfolio of land use management activities, including the **protection of natural forest and peatland carbon stocks**, the sustainable management of forests, the use of native assemblages of forest species in reforestation activities, sustainable wetland management, restoration of degraded wetlands and carbon-friendly agricultural practices can contribute to the objectives of both the UNFCCC and CBD.

Reducing emissions from deforestation and forest degradation (REDD) activities should take biodiversity conservation and sustainable use into account, as this helps maintain forest ecosystem resilience and the long-term stability of the carbon pool as well as providing co-benefits in terms of the delivery of other ecosystem services, including supporting sustainable livelihoods.

Primary forests are generally more resilient (and stable, resistant, and adaptive) than modified natural forests or plantations. Therefore, policies and measures that promote their protection and/or restoration yield both biodiversity conservation and climate change adaptation/mitigation benefits, in addition to a full array of ecosystem services. A comprehensive network of effectively designed and managed protected areas could be considered an important REDD strategy.

REDD activities have the potential to deliver significant co-benefits for forest biodiversity if mechanisms are designed appropriately. This means:

- recognizing the contribution of diverse forests, in particular primary forests, to long-term carbon sequestration/storage;
- considering the rights of and benefits accruing to indigenous and local communities;
- addressing important forest governance issues such as illegal logging.

Learn more

CBD reports on biodiversity and climate change*

• Report of the Second Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change. CBD Technical Series No. 41

• Review of the Literature on the Links between Biodiversity and Climate Change: Impacts, Adaptation and Mitigation. A report produced by UNEP-World Conservation Monitoring Centre. CBD Technical Series No. 42

• Forest Resilience, Biodiversity and Climate Change. CBD Technical Series No. 43

• Scientific Synthesis on the Impacts of Ocean Fertilisation on Marine Biodiversity. CBD Technical Series No. 45. In preparation.

• Scientific Synthesis on the Impacts of Ocean Acidification on Marine Biodiversity. CBD Technical Series No. 46. In preparation.

• Water, biodiversity, wetlands and climate change. CBD-Ramsar report (available from www.cbd.int/doc/case-studies/wtr/cs-wtr-ramsar-en.pdf).

• Water, Wetlands and Forests. CBD Technical Series. In preparation.ecosystems other than forests.

* Available at www.cbd.int/ts unless indicated otherwise