



CBD Technical Series No. 42

REVIEW OF THE LITERATURE ON THE LINKS BETWEEN BIODIVERSITY AND CLIMATE CHANGE

Impacts, Adaptation, Mitigation

<https://www.cbd.int/ts/>

Technical Series no. 42 presents three reviews of the scientific literature on the links between biodiversity and climate change impacts, adaptation and mitigation. These focus on work published after the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (AR4). The reviews, prepared by UNEP World Conservation Monitoring Centre, informed the deliberations of the CBD's Second Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change and complement the main report from the CBD AHTEG, which appears as CBD Technical Series No. 41.

Impacts of Climate Change on Biodiversity

This review shows that recent research has strengthened many of the findings of the IPCC AR4, which led it to conclude that climate change will have significant impacts on biodiversity; on ecosystems, species, genetic diversity within species, and on ecological interactions. There is compelling evidence from the current literature that the distribution, composition, structure and function of ecosystems are starting to respond to changes in temperature, precipitation and increased CO₂ levels. Some ecosystems may shift poleward, or in mountainous regions upwards. Changes in species composition and richness and changes in species' distributions have been documented and modelling work indicates that such changes are likely to become more widespread. Novel interactions among species may form, and current interactions may breakdown, or invasive species may become established. Phenological changes are already being observed and mismatches in phenological responses to climate change may significantly affect interactions among species (e.g. plant-pollinator relationships) and potentially lead to extinctions. Recent research also suggests that positive feedbacks are likely to amplify the impacts of climate change on ecosystems.

Climate Change Adaptation and Biodiversity

Adaptation strategies tend to focus on technological, structural, social, and economic measures, and the linkages between biodiversity and adaptation are often overlooked. Nevertheless, biodiversity is linked to climate change adaptation in three main ways. First, biodiversity can play a role in societal adaptation. There is evidence that ecosystem-based adaptation can provide cost-effective strategies across the major sectors involved in adaptation (e.g. coastal defense, water sector, agriculture, etc.). Second, societal adaptation strategies can have significant impacts on biodiversity. In many instances these impacts are negative, but where appropriate natural resource management is used, for example in improved agricultural practices, adaptation strategies may prove beneficial for biodiversity. Finally, biodiversity conservation itself is a sector that requires its own adaptation strategies. Such strategies, which involve improved protected area design, maintaining habitat connectivity in the wider landscape, and reducing other anthropogenic pressures, are likely to increase the resilience of biodiversity to climate change.

Climate Change Mitigation and Biodiversity

The IPCC AR4 provided growing evidence of the importance of natural ecosystems in the carbon cycle (especially in carbon storage and sequestration) and therefore in mitigation policies. Climate mitigation policies focused on reducing CO₂ emissions can have both positive and negative impacts on biodiversity. Currently, many renewable energy projects, such as biofuels or wind farms, are being planned without consideration of their biodiversity impacts; as are some land-based mitigation strategies such as monoculture plantations. Mitigation strategies have the potential to be directly beneficial to biodiversity by focusing on protecting carbon rich land, such as forests, on managing or restoring sensitive ecosystems such as peatlands, or by promoting best practice management (e.g. in agriculture). Finally, although more research is needed in this field, geo-engineering techniques have potential for both positive and negative impacts on biodiversity.

<https://www.cbd.int/doc/publications/cbd-ts-42-en.pdf>

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