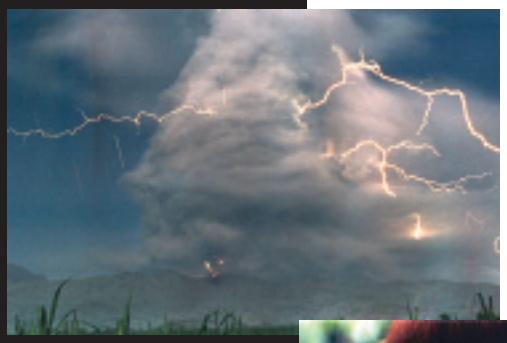
Secretariat of the Convention on Biological Diversity

CBD Technical Series No.

42

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

Impacts, Adaptation and Mitigation



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FOREWORD

The achievement of the three objectives of the Convention on Biological Diversity (CBD) – the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources – is coming under threat from one of the world's major environmental, social and economic challenges: climate change.

Climate change adds to the global challenge of biodiversity conservation. There is ample scientific evidence that climate change affects biodiversity. It is threatening individual species as well as entire ecosystems, with negative consequences for human well-being. However, the links between biodiversity and climate change flow both ways. Biodiversity, through the ecosystem services it supports, makes an important contribution to both climate change mitigation and adaptation. The interlinkages between biodiversity, climate change, and sustainable development, have been recognized within both the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC), as well as other international fora.

Healthy, intact ecosystems have long provided critical ecosystem services, providing people with food and shelter, protecting communities from drought and floods, and building the basis of much of our traditional knowledge, innovations and practices. As climate change threatens food security and increases exposure to natural disasters, these ecosystem services will become even more important and valued.

Where species and ecosystems are well protected and healthy, natural adaptation may take place, as long as the rate of change is not too rapid and the scale of change is not too great. However, where climate change stacks as an additional threat upon other stresses such as pollution, overuse or invasive alien species, natural adaptive capacity may be exceeded. It is important, therefore, to ensure that biodiversity conservation and management considers the interplay of all human activities, including climate change.

The report of the Second *Ad Hoc* Technical Expert Group (AHTEG) on Biodiversity and Climate Change, which has been published as CBD Technical Series No. 41, *Connecting Biodiversity and Climate Change Mitigation and Adaptation – Report of the Second* Ad Hoc *Technical Expert Group on Biodiversity and Climate Change*, is the outcome of scientific and technical deliberations conducted by experts from 23 countries as well as United Nations organizations, intergovernmental and non-governmental organizations, and representatives from indigenous communities. The present document provides a review of recent scientific literature on the links between biodiversity and climate change which was used for reference by the AHTEG.

I wish to thank the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC) for preparing this important document.

Ahmed Djoghlaf
Executive Secretary
Convention on Biological Diversity

PREFACE

These three literature reviews on the 'Links between Biodiversity and Climate change: Impacts, Adaptation and Mitigation' were produced by UNEP-WCMC. They were commissioned by the UK Department for the Environment, Food and Rural Affairs (with additional support from the Ministry of Environment, Finland) to provide background material for the Convention on Biological Diversity (CBD) Second *Ad Hoc* Technical Expert Group (AHTEG) on Biodiversity and Climate Change. These reviews complement the CBD Technical Series No. 41 *Connecting Biodiversity and Climate Change Mitigation and Adaptation*. This work was reviewed at the meetings of the CBD second AHTEG on Biodiversity and Climate Change held in London in November 2008 and in Helsinki in April 2009. The reviews were subsequently peer reviewed.

The IPCC 4th Assessment Report (AR4; IPCC 2007) concluded that climate change will have significant impacts on many aspects of biological diversity; on ecosystems, species, genetic diversity within species, and on ecological interactions. The implications of these impacts are significant for the long-term stability of the natural world and for the many benefits and services that humans derive from it. Adaptation strategies will be needed to respond to these impacts. Countries are starting to develop and implement adaptation policies. These adaptation strategies tend to focus on technological, structural, social, and economic developments, and the linkages between biodiversity and adaptation are often overlooked. Nevertheless, biodiversity is linked to climate change adaptation, in its role in adaptation strategies and the impacts of adaptation strategies on it. Biodiversity is also important with regards to mitigation policies. Indeed, the IPCC AR4 provided growing evidence of the importance of natural ecosystems in the carbon cycle and in mitigation policies. In addition, it was recognised that climate mitigation polices focussed on reducing carbon dioxide emissions can have impacts on biodiversity; both positive and negative.

Because of the importance of these impacts and of climate change itself, there has been a great deal of recent research on these three issues, though more for some than others. These three reviews focus on the scientific literature published after the AR4. The first part of this work reviews the literature on the impacts of climate change on biodiversity. The second section aims to provide a better understanding of the role of biodiversity in societal and in biodiversity conservation adaptation as well as the impacts of adaptation strategies on biodiversity. Finally the third section aims to highlight the developments in our understanding of the role of biodiversity in climate change mitigation, and the impacts of mitigation policies on biodiversity.

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SECTION 1

IMPACTS OF CLIMATE CHANGE ON BIODIVERSITY

A review of the recent scientific literature