UNEP WCMC

IUCN

UNESCO

Cloud forest **agenda**

Philip Bubb, Ian May,
Lera Miles and Jeff Sayer

UNEP

UNEP WCMC

IUCN

UNESCO

Cloud forest **agenda**

Philip Bubb, Ian May,
Lera Miles and Jeff Sayer

UNEP World Conservation Monitoring Centre
219 Huntingdon Road
Cambridge CB3 0DL
United kingdom
Tel: +44 (0) 1223 277314
Fax: +44 (0) 1223 277136
Email: info@unep-wcmc.org
Website: www.unep-wcmc.org

Director: Mark Collins

The UNEP World Conservation Monitoring Centre is the biodiversity assessment and policy implementation arm of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organization. UNEP-WCMC aims to help decision makers recognize the value of biodiversity to people everywhere, and to apply this knowledge to all that they do. The Centre's challenge is to transform complex data into policy-relevant information, to build tools and systems for analysis and integration, and to support the needs of nations and the international community as they engage in joint programmes of action.

UNEP-WCMC provides objective, scientifically rigorous products and services that include ecosystem assessments, support for implementation of environmental agreements, regional and global biodiversity information, research on environmental threats and impacts, and development of future scenarios for the living world.

Man and the Biosphere Programme
International Hydrological Programme
United Nations Educational, Scientific and Cultural Organization
7, place de Fontenoy, 75352 Paris 07 SP
France
Tel: +33 (0)1 45 68 10 00
Fax: +33 (0)1 45 67 16 90
E-mail: mab@unesco.org
waterportal@unesco.org
Website: http://www.unesco.org/mab
http://www.unesco.org/water/ihp

The Commission on Ecosystem Management
IUCN–The World Conservation Union
Rue Mauverney 28, 1196 Gland
Switzerland
Tel: +41-22-999-0000
Fax: +41 (22) 999-0002
Email: mail@hq.iucn.org
Website: http://www.iucn.org

Sponsors

The *Cloud Forest Agenda* report has been funded by the members of the Mountain Cloud Forest Initiative, comprising the United Nations Environment Programme (UNEP), the UNEP World Conservation Monitoring Centre, the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and the Biosphere (MAB) Programme and International Hydrological Programme (IHP), and the Commission on Ecosystem Management of IUCN–The World Conservation Union.

Acknowledgements

The authors would like to thank Rob Hepworth, Thomas Schaaf, Simon Rietbergen, Mark Collins, Adrian Newton, Julian Caldecott, Mark Aldrich, Larry Hamilton, Willem Ferwerda, Sampurno Bruijnzeel and Steve Edwards for their encouragement and for contributions to this report and the conservation of cloud forests.

Cover photographs

Front cover and page 1, left to right: R. Laval, Th. van der Hammen, Ong Hooi Giin/ UNEP/Topham, Philip Bubb, M. Harvey
Back cover: A.M. Cleef

Citation: Bubb, P., May, I., Miles, L., Sayer, J. 2004 *Cloud Forest Agenda*. UNEP-WCMC, Cambridge, UK.
Online at: http://www.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series/20.htm
A **Banson** production
Printed in the UK by Swaingrove Imaging

Foreword

Cloud forests are a rare habitat of tropical mountains which have not received sufficient attention for their exceptional concentrations of biodiversity and as sources of freshwater. As *Cloud Forest Agenda* demonstrates, these forests make up no more than 2.5 per cent of the world's tropical forests, but they harbour a disproportionately large number of the world's species. This wealth of biodiversity includes the wild relatives and sources of genetic diversity of many of our staple crops, such as beans, potatoes and coffee.

Cloud forests are also of vital importance to local communities and downstream people for their unique ability to capture water from the clouds, in addition to direct rainfall. Cloud forests face many of the same threats to their existence as other tropical forests, but their unique ecology and their location on mountain slopes make them particularly susceptible to habitat fragmentation and especially to climate change.

Cloud Forest Agenda is a product of the Mountain Cloud Forest Initiative, which is a partnership between the United Nations Environment Programme (UNEP) and its World Conservation Monitoring Centre (WCMC), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and its Man and the Biosphere (MAB) Programme and International Hydrological Programme (IHP), and IUCN–The World Conservation Union and its Commission on Ecosystem Management.

We present this report with the aim of stimulating new initiatives and partnerships for the conservation and restoration of cloud forests around the world. We invite governments, non-governmental organizations (NGOs) and the private sector to join us in making the vision and actions presented in *Cloud Forest Agenda* a reality. We call on leaders and organizations in the countries with cloud forests to become 'champions for cloud forests', recognizing the central conclusions of the Mountain Forum electronic conference on mountain people, forests and trees (Butt and Price, 2000):

1. Mountain people rely on the whole landscape for their livelihoods. Consequently, policies and institutions for mountain forests and agroforestry must recognize interactions between agricultural land use, forests and trees.
2. Every strategy for ensuring that mountain people derive sustainable livelihoods from their forests and trees must be tailor-made for the local biological, cultural and political environment – ways of responding to change must always be included.

As representatives of international bodies we see opportunities for the *Cloud Forest Agenda* to contribute to the UN Millennium Development Goal to ensure environmental sustainability, particularly with regard to access to safe drinking water; to carrying out the World Summit on Sustainable Development (WSSD) Plan of Implementation regarding mountain ecosystems and biodiversity; to the Programme of Work on Mountain Biodiversity of the Convention on Biological Diversity; and to the implementation of the Proposals for Action agreed by the Intergovernmental Panel and Forum on Forests. We will also continue to build the Mountain Cloud Forest Initiative in the following roles:

- UNEP and the UNEP World Conservation Monitoring Centre – by seeking to work with national and regional agencies to conduct assessments of cloud forest status and develop conservation strategies; and by continuing to develop conservation-relevant information on the world's cloud forests and promoting networking through the UNEP-WCMC website (http://www.unepwcmc.org/forest/cloudforest).
- UNESCO – by promoting the conservation of cloud forests and the identification of successful approaches to sustainable mountain development through the Man and the Biosphere (MAB) Programme; by continuing to develop and disseminate knowledge on the management and restoration of cloud forest watersheds through the International Hydrological Programme (IHP).
- IUCN – by promoting initiatives by its government and NGO members for conservation and sustainable use of cloud forests, with the assistance of its Commission on Ecosystem Management and the IUCN regional and country offices.

Through this partnership between UNEP, UNESCO and IUCN, we hope that the Mountain Cloud Forest Initiative will stimulate wider cooperation and greater action to promote the conservation, restoration and sustainable development of mountain cloud forests everywhere.

Klaus Toepfer, Executive Director
United Nations Environment Programme

Koïchiro Matsuura, Director-General
United Nations Educational, Scientific and Cultural Organization

Achim Steiner, Director General
IUCN–The World Conservation Union

Contents

L.S.Hamilton

Introduction

Tropical montane cloud forests represent a rare and fragile ecosystem that is under threat in many parts of the world. Urgent action is needed to conserve these rich mountain forests, not only because they harbour concentrations of endemic and threatened species but to maintain their vital role in the provision of freshwater. All tropical forests are under threat but cloud forests are uniquely threatened both by human pressures and by climate change impacting on temperature, rainfall and the formation of clouds in mountain areas.

This report aims to stimulate new initiatives to conserve and restore cloud forests around the world. It provides maps of their distribution, regional overviews of the threats they face, and an agenda for priority actions. The particular qualities of cloud forests and issues in their conservation are identified, alongside examples of successful conservation approaches.

THE MOUNTAIN CLOUD FOREST INITIATIVE

Cloud Forest Agenda is a product of the Mountain Cloud Forest Initiative, which is a partnership between the IUCN Commission on Ecosystem Management, UNEP and its World Conservation Monitoring Centre (UNEP-WCMC), and the UNESCO Man and the Biosphere and International Hydrological Programmes.

The vision of the Mountain Cloud Forest Initiative is a future where all cloud forests, with their unique plants and animals and water catchment functions, are valued and protected by mountain communities and downstream users. Cloud forests are also recognized both as sensitive indicators of climate change and areas that are under particular threat from these changes. Their conservation is strongly supported by the global community.

The Mountain Cloud Forest Initiative programme of action includes:

- promotion of prioritized agendas for the conservation and management of cloud forests at regional and local levels;
- promotion of Ecosystem Approaches to cloud forest management and restoration;
- supporting local champions for cloud forest conservation;
- generation and dissemination of information to decision-makers and practitioners;
- development of practical tools and models for the conservation of cloud forests.

The latest information on the Mountain Cloud Forest Initiative is available on its web pages (http://www.unep-wcmc.org/forest/cloudforest).

WHAT ARE TROPICAL MONTANE CLOUD FORESTS?

Cloud forests are mountain forests defined and limited by the persistent presence of clouds and mists. The term

tropical montane cloud forest is used to include all forests in the humid tropics that are frequently covered in clouds or mist and so, in addition to rainfall, capture water droplets that condense on the vegetation. The presence of clouds and this additional input of water significantly influence the hydrology, ecology and soil properties of cloud forests (Stadtmuller, 1987).

The experience of being in a cloud forest is typically one of an abundance of lush, evergreen vegetation in a cool, humid atmosphere. If the clouds are in the forest, or have recently passed through, there is a constant sound of water dripping from the leaves. One of the characteristics of cloud forests is the quantity and diversity of ferns, mosses, orchids and other plants growing on every rock, tree trunk and branch surface.

L.Brecht

The form and appearance of tropical montane cloud forests vary greatly according to how exposed they are to the prevailing winds and clouds, their altitude and local soil types. On lower mountain slopes, cloud forest trees are usually 15-20 m tall. At higher altitudes, where the forest is more consistently in the clouds and winds are greater, the trees are more stunted and covered in more epiphytes. Descriptions of the different types of cloud forest, such as lower and upper montane and subalpine, can be found in Bruijnzeel and Hamilton (2000) and on the Mountain Cloud Forest Initiative web pages.

Cloud forests occur within a wide range of annual and seasonal rainfall patterns, from 500–6 000 mm/year. They are found wherever clouds and mist are frequently in contact with a mountain slope. They typically form a belt of vegetation over an elevational range of about 500 m, but there is considerable variation in the altitude at which they are found. On large inland mountain systems cloud forests may typically occur between 2 000 and 3 500 m, whereas in coastal and insular mountains this zone may descend to 1 000 m. Under exceptionally humid conditions a cloud forest zone may develop on steep, tropical island or coastal mountains at elevations as low as 500 m.

K.Schaefer

W.Ferwerda