

A photograph of a moss-covered tree trunk in a tropical forest. The tree trunk is covered in thick, golden-brown moss and is illuminated by warm, low-angle sunlight, creating a strong contrast with the dark, shadowed areas. A bromeliad with long, pointed leaves is growing from the moss on the trunk. The background is a dense, dark forest with some green foliage visible in the upper left.

Cloud Forests in the Humid Tropics

T. Stadtmüller

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A Bibliographic Review

Thomas Stadtmüller



The United Nations University



Centro Agronómico Tropical de Investigación y Enseñanza

The United Nations University project Agro-forestry: An Alternative to the Destruction of Tropical Forests was initiated as part of the Natural Resources Programme in order to help develop more knowledge about this relatively new discipline focusing on soil use management. Agro-forestry, which is based on the traditional practice throughout the tropics of combining tree cultivation with crop or livestock production, has only recently gained formal recognition in land-use and development programmes. It aims at contributing to the improvement of conditions of life for an estimated 400 million people practising shifting cultivation and at helping to reduce pressure on the world's remaining forests, especially tropical rain forests. A brief study on cloud forests was included in the overall project because of the particularly important role they play in increasing precipitation and run-off, and the threat to their existence from accelerated clearing of "unused" lands in tropical regions.

Originally published in Spanish as Los bosques nublados en el trópico húmedo: Una revisión bibliográfica

Translated by Noël D. Payne

The views expressed in this publication are those of the author and do not necessarily reflect the views of the United Nations University.

© The United Nations University, 1987
NRTS-33/UNUP-670
ISBN 92-808-0670-x
United Nations Sales No. E.87.III.A.3
00600P

Printed in Costa Rica

The United Nations University
Toho Seimei Building, 15-1 Shibuya 2-chome, Shibuya-ku, Tokio 150, Japan
Tel.: (03) 499-2811 Telex: J25442 Cable: UNATUNIV TOKYO

Centro Agronómico Tropical de Investigación y Enseñanza
Turrialba, Costa Rica
Tel.: 56-64-31 Telex: 8005 CATIE C.R. Cable: CATIE Turrialba

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ACKNOWLEDGEMENTS

The author wishes to thank the following people:

Dr. Gerardo Budowski, Head of CATIE's Department of Renewable Natural Resources, for his invaluable suggestions and recommendations.

Dr. Carlos Quesada, Head of CATIE's Watershed Management Program, for his continual support during the execution of this work.

Peter L. Weaver of the Institute of Tropical Forestry, Puerto Rico; Jim Barborak, Jürgen Blaser and Dr. Daniel Marmillod of CATIE for their greatly appreciated comments.

Lorena Orozco for her help in revising the original manuscript.

Noël Payne for the enthusiasm with which she undertook the English translation, and her editing advice.

Thomas Stadtmüller

Turrialba, February 1986

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PREFACE

Cloud forests have always been a fascinating topic for scientists of various disciplines such as geographers, climatologists, meteorologists, forest ecologists, botanists, zoologists, hydrologists, and conservationists in general. One cannot help but be impressed upon entering these forests, a pastiche of the mysterious and the enigmatic, with their abundance of epiphytes, especially mosses, bromeliads and orchids, the presence of peculiar insects, reptiles, mammals, and birds such as the magnificent quetzal.

This scientific and multidisciplinary topic attracted the attention of the United Nations University (UNU), of Tokyo, which commissioned CATIE's bioclimatologist, Thomas Stadtmüller, to undertake a study on the subject. It would review the state of the art as a basis for generating new scientific effort, especially that which could be carried out as part of a worldwide network.

However, interest reaches beyond pure science. Cloud forests contribute additional water through what is known as "horizontal precipitation" which adds from 7% to as much as 158% of rainfall, as indicated in table 2 of this publication. In addition to the significant increase in precipitation, there are other regulatory effects, particularly regarding maintenance of the habitat of endangered species and possibilities of using this water for commercial ends.

Reading this document one is made aware that there are many kinds of cloud forests, occurring at elevations of less than 500 and up to 3,900 metres above sea level.

It is a tragedy that these cloud forests are disappearing as part of a worldwide conversion of tropical forests to other uses: it is estimated that only 500,000 square kilometres remain in the humid tropics.

After studying the location, ecology, composition, structure, and important climatic and hydrological aspects of tropical cloud forests, the author makes important conclusions and recommendations. Above all, he points out the gaps in our knowledge, such as the lack of quantification of horizontal precipitation over large areas, the role of epiphytes, effects on plant physiology, and local and regional hydrology. This last point is especially critical, since it influences water supplies vital to downstream areas.

It is eloquently argued that certain cloud forests should be totally protected while for others partial protection should suffice. This task falls less upon the scientist than the decision-maker, be he or she at the national or international level, with sufficient time, money, and multidisciplinary back-up to succeed.

Drawing from more than two hundred references, this present work summarizes the state of existing knowledge while at the same time highlighting what remains to be learned. It is hoped that this document will prove of great utility to those working

or considering working on the subject of cloud forests, as well as to decision-makers. It should not only foster progress in different scientific fields of study, but above all be used to facilitate concrete actions and decisions which will ensure that this unique treasure remains to be benefitted from and enjoyed by future generations, preserving one of the many mechanisms that govern our biosphere.

Gerardo Budowski, Ph.D.
Head, Department of Renewable
Natural Resources

Turrialba, March 5, 1986

"At these elevations between 2,500 and 3,500 metres above sea level, the traveller finds himself constantly surrounded by a dense fog. This precipitation (or this mysterious formation of water?) that could be the result of a strong electrical tension, gives the vegetation a verdent colour which is continuously renewed."

Alexander von Humboldt in 1807 about high mountain vegetation in Colombia and Ecuador.