



Rehabilitation of Degraded Lands in Mountain Ecosystems of the Hindu Kush-Himalayan Region

Proceedings of an International Workshop
Held in Baoshan, China
December 19-22, 1994

Edited by
Pei Shengji

assisted by
Sameer Karki



Organised by
International Centre for Integrated Mountain Development
in Collaboration with the Kunming Institute of Botany, the Chinese Academy of Sciences (CAS), and
the Baoshan City Government

Copyright © 1995

International Centre for Integrated Mountain Development

All rights reserved

Cover Photograph: Workshop participants visiting the ICIMOD Rehabilitation Site in Baoshan, Yunnan Province, China
Foreground: Legume shrubs (*Tephrosia candida*) two years after planting on degraded land
Background: Rehabilitated water reservoir at the site village

Published by

International Centre for Integrated Mountain Development
G.P.O. Box 3226,
Kathmandu, Nepal

ISBN 92-9115-404-0

The views and interpretations in this paper are those of the author(s). They are not attributable to the International Centre for Integrated Mountain Development (ICIMOD) and do not imply the expression of any opinion concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

Rehabilitation of Degraded Lands in Mountain Ecosystems of the Hindu Kush-Himalayan Region

The degradation of the environment in the Hindu Kush-Himalayas (HKH) is not a recent phenomenon. In the last 30 or 40 years, in particular, the degradation of mountain ecosystems, which are frequently affected by changes of land-tenure systems in many countries of the region. One of the strategies to cope with declining fertility or productivity, in part, has been to move to other sites within traditional village boundaries or to migrate to other uninhabited parts of the region. However, the people/land ratio is now exceeding the natural carrying capacity of the land in many parts of the HKH region. The carrying capacity of the land is to a large extent determined by the ratio of cultivated land to the lands that support and maintain the fertility of agricultural lands. These "support lands" consist of forests and pastures, and it is these lands that have deteriorated rapidly over the last 30-40 years.

*Proceedings of an International Workshop
Held in Baoshan, China
December 19-22, 1994*

ICIMOD's project on "Rehabilitation of Mountain Ecosystems" has been developed to look into the issues of land degradation in the HKH region through a multidisciplinary approach and through community participatory, action-oriented research. The programme is being implemented and participated in by the ICIMOD member countries of China, India, Nepal, and Pakistan. The project has encouraged an integrated approach and a wide range of activities these include biomass development, water harvesting, soil-water erosion control, and planting of useful indigenous and exotic grasses, shrubs, and trees which are mostly fast growing and nitrogen-fixing species, and planting in contour hedgerows and in pits on the heavily eroded slopes of degraded lands. As such the project activities differ considerably from afforestation programmes that have been used in the past for rehabilitation of degraded lands.

The research undertaken so far provides not only technologies for biomass development, water-soil erosion control, and water harvesting methods for similar mountain areas in the region, but also provides experience in institutional strengthening and peoples' participation at local village level. Examples are social fencing and stall-feeding, which are successfully implemented in the project site villages.

Edited by
Pei Shengji
assisted by
Sameer Karki

The workshop provided a forum for environmental workers from the region and other countries to meet and exchange research findings from field studies and discuss subjects concerned with the restoration of degraded ecosystems for mountain development. First hand information and data were generated from field-based case-study sites in collaboration with ICIMOD member country institutions and were presented and assessed at the workshop.

I would like to take this opportunity to thank the International Development Research Centre (IDRC), Canada for their generous support to the programme and workshop, the Chinese Academy of Sciences, the Kunming Institute of Botany, and the Baoshan government for their hospitality and support to the success of the workshop. Thanks are also due to Professor Pei Shengji, Head of ICIMOD's Mountain Natural Resources (MNR) Programme and Coordinator for the Project as well as to other staff members from the MNR Programme of ICIMOD.

Organised by
International Centre for Integrated Mountain Development
in Collaboration with the Kunming Institute of Botany,
the Chinese Academy of Sciences (CAS),
and the Baoshan City Government

Foreword

The degradation of the environment in the Hindu Kush-Himalayas (HKH) is not a recent phenomenon. What is new is the scale and speed of land degradation during the last 20 to 30 years, in particular the degradation of natural resources on common land, which are frequently affected by changes of land-tenure systems in many countries of the region. One of the strategies to cope with declining fertility or productivity, in part, has been to move to other sites within traditional village boundaries or to migrate to other uninhabited parts of the region. However, the people: land ratio is now exceeding the natural carrying capacity of the land in many parts of the HKH region. The carrying capacity of the land is to a large extent determined by the ratio of cultivated land to the lands that support and maintain the fertility of agricultural lands. These "support lands" consist of forests and pastures, and it is these lands that have deteriorated rapidly over the last 30-40 years due to increasing population pressure and overgrazing.

ICIMOD's project on 'Rehabilitation of Degraded Lands in Mountain Ecosystems' has been developed to look into the issues of resource degradation in the HKH region through a multidisciplinary approach and through community participatory, action-oriented research. The programme is being implemented and participated in by the ICIMOD member countries of China, India, Nepal, and Pakistan. The project has encouraged an integrated approach and a wide range of activities; these include biomass development, water harvesting, soil-water erosion control, and planting of useful indigenous and exotic grasses, shrubs, and trees which are mostly fast growing and nitrogen-fixing species, and planting in contour hedgerows and in pits on the heavily-eroded slopes of degraded lands. As such the project activities differ considerably from afforestation programmes that have been used in the past for rehabilitation of degraded lands.

The research undertaken so far provides not only technologies for biomass development, water-soil erosion control, and water harvesting methods for similar mountain areas in the region, but also provides experience in institutional strengthening and peoples' participation at local village level. Examples are social fencing and stall-feeding of animals which are successfully implemented in the project site villages.

The workshop provided a forum for experts and development workers from the region and other countries to meet and exchange research findings from field studies and discuss subjects concerned with the restoration of degraded ecosystems for mountain development. First-hand information and data were generated from field-based case-study sites in collaboration with ICIMOD member country institutions and were presented and assessed at the workshop.

I would like to take this opportunity to thank the International Development Research Centre (IDRC), Canada for their generous support to the programme and workshop, the Chinese Academy of Sciences, the Kunming Institute of Botany, and the Boashan government for their hospitality and support to the success of the workshop. Thanks are also due to Professor Pei Shengji, Head of ICIMOD's Mountain Natural Resources' (MNR) Programme and Coordinator for the Project as well as to other staff members from the MNR Programme of ICIMOD.

Pei Shengji
Head, Mountain Natural Resources
Division and Coordinator of the Project

Egbert Pelinck
Director General
ICIMOD

Preface

This workshop report presents the highlights of an International Workshop on Rehabilitation of Degraded Lands in Mountain Ecosystems of the Hindu Kush-Himalayan (HKH) Region held from December 19-22, 1994, in Baoshan of Yunnan Province, China. The workshop was jointly organised by the International Centre for Integrated Mountain Development (ICIMOD) and the Chinese Academy of Sciences (CAS) and attended by 35 participants from research institutions, universities, government agencies, and NGOs in Canada, China, India, Pakistan, Nepal, and Hongkong. The participants were mainly from collaborating institutions involved in the ongoing research project on Rehabilitation of Degraded Lands in Mountain Ecosystems of the HKH Region and scientists from other institutions working in the area.

Degradation of mountains ecosystems is a global malaise, and the Himalayas constitute a threatened ecosystem. More than ninety per cent of the people in the Himalayan region have to cultivate land for a living. Rural people rely on natural resources such as soil, water, forests, and pastures to meet their daily needs. Heavy rains erode fertile mountain slopes during the monsoon, population pressure on mountain lands increase year by year; overgrazing, deforestation, transformation from traditional to modern systems, and cultivation of marginal land and steep slopes evoke further damage; biomass cover is extensively destroyed, soil fertility declines, and water cycles are affected. It is clearly understood that natural resources, in particular land-soil, water, and biomass and the entire biosystems of the HKH region are drastically depleted and unstable. Sustainable management of natural resources in the degraded mountain ecosystems is seen, therefore, as a major challenge for all mountain societies and governments in the region.

The objective of the workshop to bring together all the participating institutions involved in the ICIMOD project and individuals working in the areas of land rehabilitation to meet and discuss: (1) the major outputs so far from the past two years of the project; (2) important findings from field-based studies of the project and relevant studies from the region; (3) the type of training materials that could be prepared by collaborating institutions, and (4) to discuss and identify priority activities for future follow-up programmes.

It is believed that the four-day workshop itself and the field trip to Damay village site in Baoshan have achieved the objective through the sharing of knowledge and interaction amongst all participants. The outputs generated from the workshop, which are presented here in this report, will be most useful for guiding collaborative institutions taking part in the project as well as other institutions in the region.

On behalf of the workshop organisers, I would like to take this opportunity to thank all the participants for their valuable contributions. I would also like to thank the Baoshan city government, the Kunming Institute of Botany, CAS, and the Damay villagers for their hospitality. We extend, here again, our gratitude to the International Development Research Centre (IDRC), Canada for its financial support to the workshop and contribution to the success of the project.

Pei Shengji
Head, Mountain Natural Resources
Division and Coordinator of the Project

Acknowledgements

ICIMOD gratefully acknowledges the financial support of the International Development Research Centre (IDRC, Canada) and the support from the Chinese Academy of Sciences which co-hosted the workshop. The hospitality of the local government of Baoshan City of Yunnan Province made it possible for the workshop to be held successfully.

Contents

Part I

Proceedings of the Progress and Prospects for the Project "Rehabilitation of Degraded Lands in Mountain Ecosystems of the HKH Region" 1

Chapter 1	Introduction to the Workshop	2
Chapter 2	Reports by Working Groups on Issues of Themes on Rehabilitation of Degraded Lands	7
Chapter 3	Eco-Regional Approach to Rehabilitation of Degraded Lands in Mountain Ecosystems of the Hindu Kush-Himalayas	11
Chapter 4	Country Reports	18

Part II

Issues and Themes of Rehabilitation of Degraded Land and Training Materials - Technological and Socioeconomic Aspects 27

Chapter 5	Understanding Degradation Processes in the Middle Mountains of Nepal	28
Chapter 6	Soil Fertility Issues under Irrigated and Rain-Fed Agriculture In the Middle Mountains of Nepal	34
Chapter 7	Living Terrace Edge — An Effective Method of Slope Utilisation in the Upper Reaches of the Yangtze River	43
Chapter 8	A Matter of Relativity — Design for Low-Cost Soil Erosion Monitoring under Differing Land-Use Regimes	50
Chapter 9	Use of Native Plant Species and Indigenous Knowledge for Rehabilitation of Degraded Mountain Ecosystems	59
Chapter 10	A Study on Species' Screening and Techniques for Afforestation in the Hot and Dry Valley of the Jinsha River	70
Chapter 11	Rehabilitation of Degraded Lands in Mountain Ecosystems: A Technical Report of Plantation Establishment in Nepal	85
Chapter 12	Abstracts	107

Annex 1	Workshop Programme	110
Annex 2	List of Participants	113