ICIMOD

Mountain Agriculture

in the Hindu Kush-Himalayan Region

Proceedings of an International Symposium held
May 21 to 24, 2001 in Kathmandu, Nepal

Editors
Tang Ya
Pradeep M. Tulachan

about ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is an independent 'Mountain Learning and Knowledge Centre' serving the eight countries of the Hindu Kush-Himalayas – Afghanistan  , Bangladesh  , Bhutan  , China  , India  , Myanmar  , Nepal  , and Pakistan  – and the global mountain community. Founded in 1983, ICIMOD is based in Kathmandu, Nepal, and brings together a partnership of regional member countries, partner institutions, and donors with a commitment for development action to secure the future of the Hindu Kush-Himalayas. The primary objective of the Centre is to promote the development of an economically and environmentally sound mountain ecosystem and to improve the living standards of mountain populations.

Mountain Agriculture in the Hindu Kush-Himalayan Region

Proceedings of an International Symposium held
May 21 to 24, 2001 in Kathmandu, Nepal

Editors
Tang Ya
Pradeep M. Tulachan

International Centre for Integrated Mountain Development (ICIMOD)
Kathmandu, Nepal

Plates

Cover:

Background: Sketch from 'Sloping Agricultural Land Technology', Tej Partap and Harold R Watson, published by ICIMOD 1994

Front cover: Agroforestry in Nepal (ICIMOD archive)

Back cover (clockwise): Farmers planting paddy (ICIMOD archive)
Apple orchards with beehives for pollination in Himachal Pradesh (Uma Partap)
Yarn made from allo (ICIMOD archive)
Water and erosions studies in the Yarsha Khola watershed, Nepal (ICIMOD PARDYP project, Madav Dhakal)

Separator pages, as above plus:
Sketch from 'Ecoregional Approaches to Mountain Agriculture', ICIMOD Partnership Platforms 1/03, published by ICIMOD 2003
Image from 'Smallholder Dairy in Mixed Farming Systems of the HKH', Pradeep M Tulachan, Mohammad A. Jabbar, and M.A. Mohamed Saleem, published by ICIMOD 2002

ISBN: 92 9115 717 1

Published by
International Centre for Integrated Mountain Development
GPO Box 3226, Kathmandu, Nepal

Editorial Team
A. Beatrice Murray (Editor)
Sushil Man Joshi (Technical Support and Layout)

Printed and bound in Nepal by
Sewa Printing Press

Foreword

Improving the productivity and sustainability of mountain agriculture is a critical component of ICIMOD's integrated approach towards improving mountain livelihoods. Thus it was central to our mission for ICIMOD to organise the International Symposium on Mountain Agriculture in the Hindu Kush-Himalayas (HKH), May 21-24, 2001. This symposium represented the culmination of many years of work in the projects 'Appropriate Technologies for Soil Conserving Farming Systems', funded by the Asian Development Bank (ADB) and the 'Investigating Issues and Options for Improving Livelihoods of Marginal Mountain Farmers' project funded by the Australian Centre for International Agricultural Research (ACIAR), and brought in interim results from the project on 'Indigenous Honeybees in the Himalayas: A Community-based Approach to Conserving Biodiversity and Increasing Farm Productivity' funded by the Austrian Government.

Participants from ICIMOD's national collaborating institutions and from other organisations shared the findings of the various studies carried out under these projects and discussed the implications of the results and future approaches. Additional papers were contributed by ICIMOD's strategic and partner institutions in and beyond the Hindu Kush-Himalayan region on studies and projects related to the sustainable development of mountain agriculture.

The papers were revised and refined by the authors and were technically edited by Dr. Tang Ya, Dr. Pradeep M. Tulachan and Dr. A. Beatrice Murray prior to being published. Although this additional input resulted in some delay, it provided the opportunity to clarify points that will be of use to readers.

I am confident that the results published here will be of considerable value to all stakeholders engaged in the development and promotion of sustainable mountain agriculture for poor mountain farmers.

Dr. J. Gabriel Campbell
Director
ICIMOD

Acknowledgements

We are grateful for the generous financial support from the Asian Development Bank (ADB) for the two phases of the 'Appropriate Technologies for Soil Conserving Farming Systems Project' that have been implemented by ICIMOD over the past six years; from the ACIAR for the 'Investigating Issues and Options for Improving Livelihoods of Marginal Mountain Farmers' project, and from the Austrian Government for the 'Indigenous Honeybees in the Himalayas: A Community-based Approach to Conserving Biodiversity and Increasing Farm Productivity' project.

We deeply appreciate the cooperation and help of the ICIMOD national collaborating institutions in carrying out various activities across the HKH. We would also like to thank Dr. Niraj Joshi from the Institute of Agriculture and Animal Science (IAAS), Nepal, for the preliminary editing of the papers. Finally, our thanks are due to all the ICIMOD support staff who assisted in organising the symposium.

Executive Summary

The Hindu Kush-Himalayan region extends 3,500 km from east to west covering an area of 3.4 million sq.km in all or part of eight countries. It is a region of great natural and social diversity, resulting from the tremendous geographical and climatic extremes: altitudes ranging from near sea level to over 8000 masl over a distance of just 150 km; climates ranging from sub-tropical to alpine; and long periods of dryness alternating with torrential downpours during the monsoon. This is a challenging environment for human survival: there are few industrial resources, and the extreme terrain and climate mean that communications are often poor and infrastructure minimal. The great majority of the 150 million people who live in this region are farmers: agriculturalists, agro-pastoralists, or pastoralists according to location. These often isolated communities are for the most part poor and almost totally reliant on their own resources for survival: 'subsistence' farmers who rely on hard work and the local natural resources to meet their everyday needs. Over the centuries these people have developed strategies for survival that can be maintained independent of contact with the adjacent low-lying areas using approaches that spread risks, both socially and physically, rather than maximising potential output.

The situation is changing rapidly, however. Over the past 50 years there has been a massive increase in communication with the outside world: roads and airstrips have opened up; seasonal and long-term migration, including school boarding, has become the norm in many parts – bringing with it experience of other places and lifestyles and ready cash for purchases and investments; and TV, radio, and now the Internet bring scenes of very different lifestyles to those who stay at home. All of this is leading to a major shift in perceptions and expectations. Thus the same resources must now be used to maintain a dramatically increased population with higher expectations; at the same time new opportunities are being recognised for developing mountain farming and increased education has opened up new possibilities for understanding, insight, and change.

The challenge for farming systems is clear. How can the total value (and volume) of products be increased to meet the needs and expectations of the present and expected future population, whilst avoiding environmental degradation and ensuring that resources are maintained for future generations?

It was with this in mind that ICIMOD organised the International Symposium on Mountain Agriculture in the Hindu Kush-Himalayas in May 2001 to bring together people from all over the region and outside to discuss the diverse problems and multitude of approaches

to developing environmentally sound mountain farming systems and improving mountain livelihoods. The discussions were restricted to sedentary agricultural systems (the problems of pastoralists and potentials of rangelands are being considered under a separate programme). The discussions were based on a series of invited and submitted papers, which are presented here in this volume in reviewed and edited form.

The papers are of a diverse nature, but all are concerned in some way with aspects of mountain agriculture, alleviation of mountain poverty, and environmental impacts. The papers can be divided into two broad categories, one dealing with socioeconomic and environmental issues, the other with possible technological options that could bring about a transformation in the mountain livelihoods and benefit the environment. Small size, low capital investment, poor productivity, lack of markets, and lack of appropriate technology have direct effects on mountain poverty. But there are also many potentials in terms of niche products, local (indigenous) knowledge and experience, and climatic and geographical advantages that are only now becoming fully recognised. In some areas like Himachal Pradesh (HP), considerable benefits are already becoming apparent from the focused introduction of new approaches with broad institutional support. Equally there are technological options available like contour hedgerow intercropping agroforestry technology (CHIAT, often called sloping agricultural land technology or SALT), that have been tried and tested at diverse sites in the HKH region and have proven their value both for increasing agricultural productivity and for preventing soil erosion from agricultural land, thus conserving the mountain environment.

The **Welcome Address** and two **Keynote Speeches** are provided as introduction, followed by the papers separated into six broad thematic topics: **Issues in Mountain Agriculture in the HKH** covering such topics as poverty reduction, land use change, and assessment of agricultural systems and identification of opportunities; **Technologies for Improving the Productivity of Mountain Agriculture** with assessments of soil and nutrient losses and methods for managing them including the results of studies of CHIAT and its potential for application; **Opportunities and Options for Income Generation and Transition** with an interesting and valuable group of papers describing pocket area success stories and the opportunities and constraints in areas like apple farming, non-timber forest products (NTFPs), and pigeonpea production; **Issues of Marginal Farms and Potential for Development** with broader studies of the different issues in different parts of the HKH region; **Gender, Empowerment and Community Approaches** looking at gender roles and relationships and the impact on farming practices, as well as approaches to increasing community involvement and ownership of agricultural initiatives especially beekeeping; and **Institutional Strategies for Improving Mountain Farming,** which looks at the general approaches being taken in different countries and states of the region.

This publication will be a valuable source of information for all those working for mountain development, in particular, mountain agriculture, in the HKH and other regions.

Acronyms and Abbreviations

ABA	Alital Beekeeper's Association
ACPC	Allo Cloth Production Club
ADB	Agricultural Development Bank
ADBN	Agricultural Development Bank of Nepal
ADOs	agriculture development officers
AIR	All India Radio
AJK	Azad Jammu and Kashmir
AKRSP	Aga Khan Rural Support Programme
ARS	agricultural research station
AZRC	Arid Zone Research Centre
CEC	cation exchange capacity
CGIAR	Consultative Group for International Agricultural Research
CHIAT	contour hedgerow intercropping agroforestry technology
CHT	Chittagong Hill Tracts
CHTDB	Chittagong Hill Tracts Development Board
CIB	Chengdu Institute of Biology
CLV	carnation latent virus
CPR	common property resource
CSIR	Council for Scientific Research and Industrial Development
CSIR	Council of Scientific and Industrial Research
DAC	direct antigen coating
DFID	Department for International Development
ELISA	enzyme linked immunosorbent assay
FAO	Food and Agriculture Organization (UN)
FD	Forest Department
FYM	farmyard manure
GBPIHED	G. B. Pant Institute for Himalayan Environment and Development
GDP	gross domestic product
HIMCU	Himachal Canning Unit
HLFFDP	Hills Leasehold Forestry and Forage Development Project
HMGN	His Majesty's Government of Nepal
HPMC	Himachal Pradesh Horticultural Produce Marketing and Processing Corporation Ltd.
HYV	high yielding variety

IAAS	Institute of Agriculture and Animal Science
ICAR	Indian Council of Agricultural Resources
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDE	International Development Enterprises
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IFRI	International Forestry Resources and Institutions
INGO	international non-government organisation
IPMI	Integrated Pest Management Institute
ISNAR	International Service for National Agricultural Research
IUCN	International Union for the Conservation of Nature and Natural Resources
JKW	Jhikhu Khola watershed
KARINA	Karakoram Agricultural Research Institute for the Northern Areas
KBS	knowledge-based system
KHA	Kush-Hali Associates
KHARDEP	Koshi Hills Area Development Program
KVK	krishi vigyan kendra
LARC	Lumle Agricultural Research Centre
LCC	leguminous cover crops
LDDD	Livestock and Dairy Development Department
LRMP	Land Resource Mapping Project
LSU	livestock unit
MASIF	Mountain Agricultural System Information Files
NADRI	National Aridland Development and Research Institute
NAF	Nepal Agroforestry Foundation
NARC	national agricultural research council
NARC	Nepal Agricultural Research Council
NATP	National Agriculture Technology Project
NCI	national collaborating institution
NCT	National Council for Tibb
NGO	non-government organisation
NIH	National Institute of Health
NTFP	non-timber forest product
NVS	natural vegetative strips
NWFP	North West Frontier Province (Pakistan)
OM	organic matter
PARC	Pakistan Agricultural Research Council
PARDYP	People & Resources Dynamics in Mountain Watersheds of the Hindu Kush-Himalayas Project
PCSIR	Pakistan Council of Scientific and Industrial Research
PIAMS	Pakistan Institute of Acupuncture and Medical Sciences
PPD	Plant Protection Department
PRA	participatory rural appraisal
PTD	participatory technology development

R&D	research and development
RD	recommendation domain
RIMS	research impact and management study
RUWDUC	Rural Women's Development Unity Centre
SALT	sloping agricultural land technology
SCW	Soil Conservation Wing
SD	sustainable development
SDC	Swiss Development Cooperation
SMS	subject matter specialist
SSD	Soil Science Division
TN	total nitrogen
ToT	transfer of technology
UMB	urea molasses block
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USP	Upland Settlement Project
UWB	University of Wales, Bangor
VDC	village development committee
VLWs	village level workers
WRP	Watershed Rehabilitation Project

Contents