



Renewable Natural Resources Management for Mountain Communities









Editors

Michael Stocking

Hilde Helleman

Roger White

About the Organisations

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 a better future for the people and environment 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.

The **Natural Resources Systems Programme** (NRSP), of the UK Department for International Development, undertakes research on the integrated management of natural resources. This encompasses the social, economic, institutional and biophysical factors that influence people's ability to both use and maintain the productive potential of the natural resource (NR) base over a relatively long timeframe. The intended outcome of the research is that NR-related strategies for improving people's livelihoods, that are of proven relevance to poor people, will be delivered in forms that could be taken up by the poor themselves and/or by the development practitioners operating at a range of levels, from grassroots to senior policy level.

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International Centre for Integrated Mountain Development

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Foreword

This book presents the findings of a Symposium and Research Workshop on Renewable Natural Resources Management for Mountain Communities held in Nepal in February and March 2003.

The papers presented at the Symposium in Kathmandu (24-25 February) describe renewable natural resources research undertaken by ICIMOD's People and Resources Dynamics in Mountain Watershed Project (PARDYP) and the Hillside system of the Natural Resources Systems Programme (NRSP). About 70 persons attended the symposium from a wide range of organisations in Nepal, countries in the Hindu Kush Himalaya region, and from Bolivia, Kenya and Uganda. The Research Workshop was held in the mid-hills of Nepal near Pokhara (26 February-1 March) with 37 participants.

The management of renewable natural resources in hillside and mountain areas is intricately linked with livelihood opportunities and sustainable development. The goal of the PARDYP and NRSP Hillside research is to enable improved and more sustainable livelihoods for communities and individuals. Their research emphasises the role of the management of soil, water and land resources in improving livelihood opportunities and human well-being. PARDYP and the NRSP Hillside system have complementary research programmes and while PARDYP has a regional mandate, NRSP Hillside works in Nepal, Bolivia and Uganda.

This Symposium and Research Workshop was developed in recognition that the valuable experience gained and information held by ICIMOD and NRSP should be shared with stakeholders, nationally, regionally and internationally. The discussion during the Symposium and Research Workshop will help develop the research agenda in the management of renewable natural resources and inform the debate on sustainability, livelihoods, poverty reduction and environmental issues in hillside and mountain areas.

The sponsors of this Symposium and Research Workshop were PARDYP, on behalf of ICIMOD, and NRSP on behalf of the UK Government's Department for International Development (DFID) and the Nepal Agricultural Research Council (NARC). PARDYP is co-financed by IDRC, Canada; SDC, Switzerland; ICIMOD; and the countries participating in the project. NRSP is funded by DFID.

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- The people of mountains and hillsides in the Hindu Kush-Himalayas, Bolivia and Uganda, without whose contribution the research described here would not have been possible. This book is dedicated to them in the hope that, even in a small way, it will contribute to a betterment of their livelihoods.
- The contributors to, and the participants of, the symposium and workshop for their participation, papers, discussions, and delivery of manuscripts on time and to specification.
- ICIMOD's People and Resource Dynamics in Mountain Watersheds Project (PARDYP) and DFID's Natural Resources Systems Programme (NRSP) and their donors for supporting the symposium, the workshop and this publication.
- The staff at the two venues for the meetings, the Himalaya Hotel (Kathmandu) and the Bluebird Hotel (Pokhara), and the people and guesthouses of Landruk for their time and hospitality.
- Finally, the ICIMOD publications section for editing and technical support in preparation of this manuscript and Melvyn Kay for editorial support.

Acronyms and Abbreviations

AGREN	Agricultural Research & Extension Network
AFRENA	Agroforestry Research Network for East and Central Africa
A2N	Africa 2000 Network
AHI	Africa Highland Initiative
AKIS	Agricultural Knowledge and Information Systems
AKT	Agro-ecological Knowledge Toolkit
APP	Agricultural Perspectives Plan
ARS	Agricultural Research Station
BCF	buffer zone community
BZ	buffer zone
CBO	community-based organisation
CDE	Centre for Development and Environment
CF	community forest
CFU	colony-forming units
CGS	competitive grant system
CI	collaborating institutions
CIAT	International Centre for Tropical Agriculture
CIDA	Centre for International Development Assistance
CIMMYT	International Maize and Wheat Improvement Centre
CPR	common pool resources
DADO	District Agricultural Development Office
DAO	District Agricultural Office
DAP	diammonium phosphate
DEM	digital elevation model
DFI	District Farming Institute
DFID UK	Department for International Development (Head office)
DFID-Nepal	Department for International Development (Nepal office)
DFO	district forest officer
dpi	dots per inch
DPTF	district policy task forces
ELF	experienced leader farmer
EU	European Union
FAO	Food and Agriculture Organization
FECOFUN	Federation of Community Forest Users in Nepal
FFS	farmer-field school
FLE	farmer-led experimentation
FP	farmer's practice
FRG	farmer research groups

FTF	farmer-to-farmer
FUG	forest user group
FYM	farmyard manure
GBPIHED	G.B. Pant Institute of Himalayan Environment and Development
GCP	ground control points
GEF	Global Environment Facility
GF	group farmers
GIS	geographical information system
GLASOD	Global Assessment of Land Degradation
GPS	global positioning system
HARP	Hill Agriculture Research Project
HH	household
HKH	Hindu Kush-Himalayas
HMGN	His Majesty's Government of Nepal
HRP	Hill Research Programme
HS	hillsides
HSPS	Hillsides Production Systems (NRSP)
HYMOS 4	Hydrological Modeling System 4
IC	Indian currency
ICIMOD	International Centre for Integrated Mountain Development
IDRC	International Development Research Centre (Canada)
ICRAF	International Centre for Research in Agroforestry
IIED	International Institute for Environment and Development
IFPRI	International Food Policy Research Institute
IGCEDP	Indo German Changar Ecological Development Programme
IIRR	International Institute of Rural Reconstruction.
IISD	International Institute for Sustainable Development
INRM	integrated natural resource management
IPCC	Intergovernmental Panel on Climate Change
IPM	integrated pest management
IPNS	integrated plant nutrient management system
IRRI	International Rice Research Institute
ISCO	International Soil Conservation Organisation
ISRIC	International Soil Reference and Information Centre
IVI	importance value index
LADA	Land Degradation Assessment in Dryland Areas
LARC	Lumle Agricultural Research Centre (now ARS/Lumle)
LC	local councils
LF	leader farmers
LMS	land management strategies
LPs	local professionals
LRMP	Land Resources Mapping Project
M&E	monitoring and evaluation
masl	metres above sea level
MECDP	Mt. Elgon Conservation and Development Project

MFPED	Ministry of Finance, Planning and Economic Development
MoAC	Ministry of Agriculture and Co-operatives
MOV	means of verification
NAADS	National Agricultural Advisory Development Services
NARC	Nepal Agricultural Research Council
NARDF	National Agriculture Research and Development Fund
NAREB	Nepal Agricultural Research Executive Board
NARO	National Agricultural Research Organization
NGO	non-government organisation
NORMs	Natural and Resource Management Services
NPC	National Planning Commission
NPI	national partner institute
NR	natural resource
NRM	natural resource management
NRSP	Natural Resources Systems Programme (DFID)
NTFP	non-timber forest product
O.C.	organic carbon
ODA	Overseas Development Administration (now DFID)
ODG	Overseas Development Group
ODI	Overseas Development Institute
OPR	output-to-purpose review
PAM	participatory agro-ecosystem management
PAR	participatory action research
PARDYP	People and Resource Dynamics in Mountain Watersheds of the HKH Project
PCN	project concept note
PCR	project cycle results
PLEC	People, Land Management and Environmental Change
PMU	pogramme management unit
POA	annual operation plan
PP	project proposals
PPME	participatory planning, monitoring, and evaluation
PRA	participatory rural appraisal
PRAP	participatory research action plans
PTD	participatory technology development
PTF	policy task force
QA	questionnaire on SWC approach
QM	questionnaire on SWC mapping
QT	questionnaire on SWC technologies
RAPID	Research and Policy in Development
R&D	research and development
RMA	research management adviser
RRA	rapid rural appraisal

RS	remote sensing
RWSSSP	Rural Water Supply and Sanitation Support Project
SALT	sloping agricultural land technology
SDC	Swiss Agency for Development and Co-operation
SL	sustainable livelihood
SLM	sustainable land management
SMP	soil management practice
SOWAP	soil and surface water protection using conservation tillage
SRL	sustainable rural livelihoods
SSM	sustainable soil management
SSMP	Sustainable Soil Management Programme (Helvetas)
STSS	Soil Testing and Service Section
SWC	soil and water conservation
TIN	triangulated irregular network
TORA	Theory of Reasoned Action
TSC	technical sub-committee
UBC	University of British Columbia
UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UoB	University of Berne
UP	uptake pathways
VDC	village development committee
VPTF	village policy task force
WHO	World Health Organisation
WOCAT	World Overview of Conservation Approaches and Technologies
WRI	World Resources Institute

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Foreword

Acknowledgements

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