

# **SUSTAINABLE MOUNTAIN AGRICULTURE**

farmers' strategies and  
innovative approaches

**VOLUME 2**

**Editors**

**N.S. JODHA**

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Mountain agriculture, the dominant sector of mountain economies in the developing countries has suffered a serious decline or stagnation in the recent decades. In most parts of the mountains, the emerging scenarios indicate a widening gap between demand and supply of land resources and land-based products on the one hand and unsustainability of current resource use patterns and production activities on the other. These factors constitute the background to the studies reported in the present book. The focus of the text is on the understanding and identification of factors and processes contributing to the sustainability or unsustainability of mountain agriculture and related activities. Most of the involved issues are identified and analysed with reference to 'Mountain Perspective—Sustainability Framework' evolved by ICIMOD to examine the relevance of interventions to specific conditions of mountains.

The present book, in two volumes, synthesizes results of ICIMOD studies in the selected hill areas of India, China, Nepal and Pakistan, which were presented at an International Symposium on Strategies for Sustainable Agriculture in Mountain Regions. The themes covered are public policies and programmes, farmers' resource management strategies, some successful development initiatives, long-term issues in sustainability and zonation as a tool for designing development strategies for diverse mountain areas. Contributions from Andes mountain agriculture enrich the text which otherwise, is confined to the Hindu Kush Himalayan Region. This is an effort to identify approaches and options for sustainable development of mountain areas and mountain agriculture. The important message is to learn from the past and have a fresh look at the conventional development approaches to mountain areas.

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*Editors*

N.S. JODHA, M. BANSKOTA and TEJ PARTAP



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## FOREWORD

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This document has been produced as part of the work programme of the Mountain Farming Systems Division of ICIMOD. Mountain Farming Systems is one of ICIMOD's four thematic research programmes.

The programme has now completed the first phase of work on Strategies for Sustainable Mountain Agriculture. To complete this phase, problem-oriented research work, in selected areas of the Hindu Kush-Himalayan Region, was conducted. The areas of the Region focussed upon were West Sichuan (China), Himachal Pradesh (India), the North West Frontier Province (NWFP) (Pakistan), and the Middle Hills of Nepal. The work involved thematic reviews of selected development policies and programmes, site-specific studies covering crop, livestock, and horticulture-dominated farming systems as well as other reviews covering specific topics such as underexploited plant genetic resources, mountain beekeeping, and innovative and successful initiatives in the field of agricultural technology and rural institutions.

Work was conducted in collaboration with national institutions and experts from the regional countries. During the course of the studies, different national workshops were held (in China, India, Nepal, and Pakistan) to discuss the findings in the countries where research was being conducted. The experience gained from these national workshops became the input for the International Symposium for Strategies on Sustainable Mountain Agriculture, held at Kathmandu from September 10–14, 1990.

In addition to papers based on the HKH Region, papers were presented on the Andean Region. This volume includes these papers as well as a number of papers selected from background material, produced through the auspices of ICIMOD, in order to give the reader a broader picture of the problems and concerns of Sustainable Mountain Agriculture.

In publishing this volume, ICIMOD is fulfilling a part of its mandate to facilitate the economically and environmentally sustainable development of mountain areas through the dissemination of relevant information. Since agriculture remains the principal occupation of the majority of the inhabitants of the Hindu Kush-Himalaya, it is understood that Mountain Farming Systems merit a great deal of study, especially within the context of long-term sustainability. ICIMOD hopes that this volume will serve to add to the understanding of these systems and to the long-term benefit of mountain peoples.

Several organisations have supported ICIMOD's endeavours in this particular study, and I would like to acknowledge the support of the Asian Development Bank (ADB) and the Ford Foundation in helping us to undertake this work. In addition, the UNDP, the Rockefeller Foundation, and the Swiss Development Cooperation facilitated the par-

ticipation of various experts in the workshops held. His Majesty's Government of Nepal and a number of other organisations in Nepal have been generous in extending their logistical support. Finally, I would like to thank all those institutions—such as the Chinese Academy of Sciences, Agro-economic Research Centre, the University of Himachal Pradesh, the Agricultural Projects Services' Centre, Nepal, the Aga Khan Rural Support Project Pakistan, and the Planning Commission and Ministry of Agriculture of the Royal Government of Bhutan—which have given this search for Strategies for Sustainable Agriculture their valuable support.

DR. E.F. TACKE  
Director, ICIMOD

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## PREFACE

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Economic development has been a long, slow process for much of the developing world. This is especially so for the peoples who inhabit the mountainous region of Asia. In the two decades after World War II development strategies emphasised the importance of growth in per capita income and food production, in the expectation that the benefits of such growth would be universal, "trickling down" to the poorest communities. Growth was achieved, but there was little evidence of trickle down. Rapidly increasing food production was brought about by the Green Revolution but the benefits were mostly confined to the flat, well irrigated lands of Asia. Few of the new miracle varieties of rice and wheat were suitable for mountain environments and the technologies that went with them were inappropriate, if not damaging. Development thinking in the late 1960s and 1970s shifted to an emphasis on growth with redistribution and on satisfying certain "basic needs"—nutrition, health, water supply, shelter, sanitation and education. The new strategies accepted that poverty could not be eliminated solely by economic growth and required a direct attack, mobilising government and aid spending rather than relying on market forces. This has undoubtedly brought considerable benefits. Mountain people are now better served than at any time in the past by schools and primary health care centers, potable water supplies and veterinary clinics as well as by improved roads and access to markets. Yet, at the same time, the resource base on which these people depend has deteriorated at an accelerating rate. The roads and markets have been a mixed blessing, encouraging unbridled exploitation. Forests have been felled, the vegetation cover removed and steep slopes have become severely eroded. Together with exploitation, the impact of population pressure and inappropriate technologies have severely degraded the mountain environment.

Such resource degradation is not unique to the mountains although it is perhaps more dramatically obvious there. Elsewhere in the world has come a growing realisation of the perils of the damage we are causing to our natural resources and environment. In 1987 the issues were given worldwide attention by the publication of the World Commission on Environment and Development report "*Our Common Future*". In addition to illustrating the problems we face the Brundtland Report, as it is known, called for a new strategy of *sustainable development* as a basis for economic growth in the coming decades.

Following the publication of the report the concept of sustainable development has caught the imagination of policy makers, economic, social and environmental advisers and leaders of the non government community. Policy and programme proposals, project documents and plans are invariably replete with references to the need for sustainability. Yet few use the term precisely. It has come to mean all things to all men and women.

In the Brundtland Report sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Such a definition resonates with our ideals and our humanity but is not readily translated into a plan of practical action.

Today we are in urgent need of more practical, down to earth interpretations of sustainability. We need to be in a position to ask and answer, with precision, such questions as "Is this cropping system sustainable?" "Is this forest sustainable under the present pattern of exploitation?" "Is this watershed sustainable under the present regime?" "Is the current lifestyle of these people sustainable?" And, if the answers are "no", how can the sustainability be improved? We also need to be aware that sustainability—the ability of the field or village or watershed to survive may involve costs. There may well be trade-offs in development between sustainability, economic growth and equity for instance. Designing a sustainable, but essentially static, resource management regime may be relatively easy. It will be considerably more difficult to design one that is sustainable yet also provides growing incomes that are equitably shared.

These are the formidable challenges of the 1990s and the 21st century. They are faced by all peoples of the world, but perhaps most acutely by mountain people. The concept of sustainable development faces its severest test in mountain environments. At the same time, the acute and dramatic nature of resource degradation in the mountains brings the issues into sharp relief. Success may well carry lessons for other environments elsewhere in the world.

This book addresses many of the central issues of sustainable agricultural development in the mountains. It provides innovative concepts, detailed case studies and thoughtful analysis. Readers will find a wealth of information, ideas and examples of practical experiences culled from a wide range of countries and mountain environments.

PROFESSOR GORDON R. CONWAY

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and Professor, Centre for Environmental Technology  
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## EDITORS' NOTE

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The work presented in this book covers various dimensions and issues relating to mountain agriculture in the overall context of development strategies, experiences, problems and prospects in the mountain areas with special focus on the Hindu Kush-Himalayan region. ICIMOD's work on the subject during the last three years supplemented by contributions from other institutions and experts in the International Symposium on Strategies for Sustainable Mountain Agriculture in September 1990, determined the overall scope of the book. Besides adding to the depth and variety of issues, this also increased the size of the book. For the reasons of comprehensive reporting on the subject and protecting linkages between different aspects covered by conceptual and empirical work extending to different geographical areas and relating to a range of thematic contexts, it was difficult to exclude some material to reduce the size of the book.

Concerned with the possible operational problems and convenience of readers, the whole book is divided into two volumes, published simultaneously. The thematic coverage of the two volumes is governed by closer linkages between the issues and evidence covered by different papers. Accordingly, Volume 1 focusses on agricultural development perspectives, approaches, and strategies in the HKH region. The long-term sustainability issues and use of agro-ecological zonation as a tool for development planning in mountain areas are other important aspects covered by Volume 1. Volume 1 consists of 15 chapters.

Volume 2 covers relatively more operational dimensions of the subject where micro-level or project-level realities, experiences and implications are reported and analysed. Chapters dealing with farmers' strategies and some innovative project initiatives are covered by Volume 2. Volume 2 consists of 18 chapters.

N.S. JODHA, M. BANSKOTA and TEJ PARTAP (editors)

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## ACKNOWLEDGEMENTS

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Acuteness of environmental degradation and poverty in mountain regions of the developing countries is now well recognised. The problems are sharply manifested by the stagnation and decline of Agriculture the major activity of mountain people. Understanding of the factors and processes contributing to this decline and identification and adoption of possible solutions is a herculean task. This is more so due to specific conditions characterising mountains and general disregard of mountain regions in the past by researchers and policy makers alike.

To address the above problem ICIMOD attempted to mobilise available knowledge and evidence on different aspects of the problem through an International Symposium on Strategies for Sustainable Mountain Agriculture and subsequently present the relevant material through the two volumes before all those associated with development of mountain areas. We take this opportunity to thankfully acknowledge the help of all those who have contributed in this task.

Our thanks are due to the authors who not only managed to prepare and revise their contributions under tight time schedules but many of them presented their evidence and argument in the overall context of mountain-perspective sustainability framework suggested by us.

We would also like to thank Mrs. Greta Rana and Mrs. Archana Karki for their assistance in language editing. This made the job easier for the publishers. The secretarial assistance from Mrs. Sami Joshi and Reeta Rana deserves praise specially for the hardwork they did in typing the manuscript time and again for several months.

Finally we thank ICIMOD Director and all our professional staff colleagues. Their cooperation and involvement in programme activities from time to time saw successful completion of the project and production of this book.

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