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Agrodiversity

Learning From Farmers Across the World

Edited by Harold Brookfield, Helen Parsons, and Muriel Brookfield



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Agrodiversity

This book presents part of the findings of the international project “People, Land Management, and Environmental Change”, which was initiated in 1992 by the United Nations University. From 1998 to 2002, the project was supported by the Global Environment Facility with the United Nations Environment Programme as implementing agency and the United Nations University as executing agency.

The views expressed in this book are entirely those of the respective authors, and do not necessarily reflect the views of the Global Environment Facility, the United Nations Environment Programme, and the United Nations University.

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Edited by Harold Brookfield, Helen Parsons, and Muriel Brookfield

PUSTAKA PERDANA



1012332



United Nations
University Press

TOKYO • NEW YORK • PARIS



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United Nations University Press
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Shibuya-ku, Tokyo, 150-8925, Japan
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United Nations University Press is the publishing division of the United Nations University.

Cover design by Rebecca S. Neimark, Twenty-Six Letters

Printed in the Hong Kong

UNUP-1087
ISBN 92-808-1087-1

Library of Congress Cataloging-in-Publication Data

Agrodiversity : learning from farmers across the world / edited by Harold Brookfield, Helen Parsons, and Muriel Brookfield.—1st American pbk. ed.
p. cm.

Includes bibliographical references and index.
ISBN 92-808-1087-1

1. Agrobiodiversity. I. Brookfield, H. C. II. Parsons, Helen. III. Brookfield, Muriel.

S494.5.A43 A48 2003
333.76'16—dc21

2003010734



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List of acronyms

AEZ	agro-ecological zone
AGRIFEX	International Food and Agriculture Trade Fair (Ghana)
AMEXTRA	Asociación Mexicana para la Transformación Rural y Urbana
AVODEP	Association des Volontaires pour le Développement et Protection de l'Environnement (Guinée)
BAG	biodiversity advisory group
BECO	Banana Export Company (Jamaica)
CAMP	Collaborative Agroecosystems Management Project
CARE	An international humanitarian aid organization
CHACRA	Centro del Hombre, Ambiente y Conocimiento de Recursos Amazonicos (Peru)
CICA	Centro de Investigación en Ciencias Agropecuarias (Mexico)
DAT	demonstration advisory team
DBH	diameter (of trees) at breast height
ESD	Environment and Sustainable Development programme
FAO	Food and Agriculture Organization of the United Nations
FMBC	Forest Management and Biodiversity Conservation Programme in Gaoligongshan (China)
FT	field type
GEF	Global Environment Facility
GIRA	Grupo Interdisciplinario de Tecnología Rural Apropiada (Mexico)
GPS	geographic position system
IIAP	Research Institute of Peruvian Amazonia
IPAM	Instituto de Pesquisa Ambiental da Amazonia (Brazil)

IUCN/UNESCO	International Union for the Conservation of Nature/United Nations Educational, Scientific and Cultural Organization
IVI	importance value index
KARI	Kenya Agricultural Research Institute
LER	land equivalent ratio
LUS	land-use stage
MESMIS	Metodología de Evaluación de Sistemas de Manejo Incorporando Indicadores de Sustentabilidad
NAFTA	North American Free Trade Agreement
NGO	non-governmental organization
NRI	National Research Institute, Papua New Guinea
PLEC	People, Land Management, and Environmental Change project
PNG	Papua New Guinea
PRA	participatory rural appraisal
SAM	sustainability assessment map
STAT	scientific and technical advisory team
UNAP	Universidad Nacional de la Amazonia Peruana
UNEP	United Nations Environment Programme
UNU	United Nations University
UWI	University of the West Indies
YAF	Yunnan Agroforestry Systems Research Project and Indigenous Land Resources Management Programme (China)

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Preface

The United Nations University is an international community of scholars engaged in research, postgraduate training, and dissemination of knowledge in furtherance of the purposes and principles of the Charter of the United Nations. The University's academic activities are coordinated and carried out by the UNU Centre at Tokyo and the research and training centres/programmes located in 17 different places in the world, as well as through a global network of associated and cooperating institutions and scholars. The UNU groups its work within two major thematic areas – Peace and Governance and Environment and Sustainable Development. The Environment and Sustainable Development (ESD) programme area focuses on the interactions between human activities and the natural environment, in particular the challenges facing developing countries. This book results from one of the ESD projects – the UNU project on People, Land Management, and Environmental Change (PLEC), which involves a collaborative effort between scientists and smallholder farmers across the developing world.

Founded in 1992, with Global Environment Facility (GEF) support from 1998 to 2002, and with the United Nations Environment Programme as implementing agency and UNU as executing agency, PLEC brought together the best of scientists and smallholder farmers for identification, evaluation, and promotion of small-scale farmers' resource management systems and practices that conserve ecological processes and embrace biodiversity for generating income and coping with changes in social and nat-

ural conditions. PLEC empowered expert farmers and their expertise in agriculture and resource use by linking them to their fellow farmers, young generations, extension workers, and officials as well as about 150 scientists. PLEC operated through a global network of locally based multidisciplinary clusters that have been established in all the countries discussed in this book. Demonstration sites are located in a wide range of agro-ecosystems in formerly forested regions, semi-arid regions, mountains, and wetlands of globally significant biodiversity.

This book reports rich and successful experiences of PLEC project findings and results, mainly over the four-year period of GEF support. Apart from an overview of PLEC history and methods, a foreword, and a concluding chapter, this book contains 12 country chapters. The content of each covers an introduction to the national team and demonstration sites, and a review of project methods, activities, and outcomes at the demonstration sites and beyond. Here one can only highlight some successful PLEC experiences.

PLEC clusters work in substantially different environments in 12 developing countries. Not only the biophysical environments but also economic, social, and cultural contexts are quite different among clusters. These clusters had developed their own research and working methods suitable to their local situations and individual projects before GEF support started in 1998. Since GEF-funded work focused on demonstration activities and demonstration sites, there was a need to promote best methods suitable to demonstration site work as well as to ensure that all assessment methods meet accepted scientific standards. As a result, a variety of these best methods developed in the clusters were brought together through working guidelines, including assessment and promotion of best practices in the communities.

Over the past few years, national clusters have established 27 demonstration sites and tested and demonstrated many good practices of biodiversity management with over 300 expert farmers in their fields, fallows, and forests. The demonstration is an expert farmer-led sharing of knowledge, techniques, and planting materials between farmers, and between farmers, scientists, and other local stakeholders. For example, PLEC-Brazil identified a total of 136 good production and management systems; 19 of them were selected for demonstration because they provide important sources of income for families and help them to maintain high levels of biodiversity in their landholdings. There is ample evidence that the resource base, including biodiversity and soil fertility, could actually be enhanced by management, rather than necessarily be reduced under human use.

Through training and participation in PLEC, many researchers, technicians, and local officials have replaced their former view, looking down upon farmers' practices, with a view that respects farmers' knowledge and

innovations. This behavioural change has also raised collaborating farmers' self-esteem and enabled farmers to feel confident and responsible for resource conservation. The demonstrations of best practices enhanced capacities of farmers and communities in coping with new problems and opportunities for their livelihoods. Farmers' associations empowered farmers in negotiation for support from various sources. Community conservation rules were built up or strengthened for regulating access to and use of resources, especially common and overexploited resources. PLEC has been a pioneer in developing new forms of collaborative research and action between scientists and farmers in developing countries, and its work has achieved a lot of favourable notice. Through all these activities, PLEC has succeeded in formulating its unique culture of research and development. This book sets out to bring it together.

I would like to express my gratitude to all PLEC members, including collaborating farmers, for their contribution to the project success. Most have worked with only minimal reward, or no reward, in pursuit of the project objectives. The editorial team led by Professor Harold Brookfield deserve special thanks for their painstaking work in making this book. I would also like to acknowledge the financial support from GEF/UNEP over the last few years.

Building upon the successful PLEC experiences, UNU will continue to play its part to the best of its ability in supporting research, training, and dissemination that contribute to rural poverty reduction through integrated management of biodiversity, soil, and water in agricultural landscapes.

Motoyuki Suzuki
Vice Rector
Environment and Sustainable Development

Foreword: Mainstreaming PLEC's vision and upscaling PLEC's goals

Miguel Pinedo-Vasquez

This book summarizes much of what PLEC has accomplished over the last four years. As such, it looks backward. But each chapter also outlines a continuing and clear future for the PLEC approach and activities; thus it is also a forward-looking work. The PLEC demonstration approach has empowered dozens of expert farmers, and identified and evaluated scores of biodiversity-friendly and economically rewarding production technologies and conservation practices developed by farmers with local knowledge, tools, and organization. It attempted to disseminate such practices to a broader group of stakeholders, including other farmers as well as those who influence them. It doubtless achieved much, as is reported here by cluster leaders and discussed in broader perspective by Harold Brookfield and his co-editors. These chapters provide a summary of a job very well done but also of a job not yet finished, a vision not yet realized.

The PLEC coordinators did not start thinking about the future of PLEC only at the end of the four years of the GEF-funded phase. Since the beginning of this global programme, farmers and other stakeholders have asked about the future again and again. Most members of PLEC teams gave an honest answer: "It will depend on the results, on how effectively this approach has met the expectations of farmers and people working in rural communities." Farmers reminded PLEC teams that as members of poor rural communities they had participated in many similar projects and had enjoyed the short-term economic benefits brought by such projects. But, PLEC farmers warned, the interest and prosperity brought by projects was

impossible to sustain after the projects were done. Although PLEC was a demonstration initiative rather than a development or conservation project, PLEC activities – as is mentioned in the country chapters – also brought some short-term economic benefits to almost all of the sites in the 12 countries. And GEF-funded PLEC was also a project restricted to a mere four years.

The cycle of short-lived initiatives that characterizes rural development and conservation programmes in most poor countries is as persistent and chronic a feature of the conservation and development landscape as are the problems of poverty, environmental degradation, and biodiversity loss that the projects are supposed to resolve. Multiple and intractable political and economic factors that underpin development and conservation programmes are responsible. Even the best projects seem unable to escape these limitations to achieve long-term effects and sustain the benefits achieved by short-term efforts. In many of the rural regions where PLEC demonstration activities were implemented, the teams found little positive evidence of the achievements of past development or conservation programmes. Most of PLEC's sites were at some time host to a number of conservation, development, and other projects. Several of these we knew had achieved very impressive and valuable results; but they have since vanished. Can we break these cycles and achieve lasting change and benefits that incorporate the experiences and results of our short-term projects? This is a most important challenge that, as PLEC participants, we are ready to confront. We are committed to working in innovative ways to translate the hard-won achievements of our teams, and especially of the expert farmers, into long-term programmes with durable benefits. As is discussed in the chapters of the book, PLEC members have already begun paving the way for the transition of PLEC from a rather small and short-term project into a programme with broader and lasting impacts.

Our next steps will be to build upon the accumulated experiences of PLEC to both upscale PLEC activities and mainstream PLEC approaches. We plan to achieve these goals through a series of focused and linked activities. These activities are aimed at altering the behaviour of those groups that directly affect the conservation, use, or erosion of globally important resources of biodiversity, soils, and water. The most important of these target groups are smallholder farmers themselves and their advisers, including agricultural technicians, researchers, and extension agents.

By upscaling and mainstreaming the results of demonstration activities, the scope of the long-term PLEC programme will be extended to new regions and countries and it will reach out to other conservation and rural development projects. The future “long-term” PLEC will continue building functional networks that promote the movement of knowledge among stakeholders. These new networks will help to disseminate the production

systems, conservation practices, expert farmers, and successful demonstration activities on regional, national, and international scales. We envision that current PLEC teams will reach out to identify, contact, and invite members of projects working on similar issues in other localities or countries of the region to join in PLEC activities. The participants of the networks will be encouraged to extend efforts to identify, test, promote, and monitor environmentally sustainable and economically rewarding production and management systems using PLEC demonstration approaches. Networks will base their work on sound knowledge of the area and its resources, environmental, social and political trends, and economic opportunities.

But to mainstream PLEC's vision, ideas, and approaches effectively we must go beyond creating and strengthening networks. Working together with stakeholders, PLEC must seek multiple effective modalities for shifting the way scientists, policy-makers, extensionists, and other opinion-formers view and promote development and environmental conservation. We must learn how to promote the new conservation and development paradigms that PLEC embodies. In the future PLEC must more effectively use its many members and friends who are renowned academics, highly placed government functionaries, and skilled communicators to help place the PLEC approach solidly in the mainstream of agricultural, forestry, fisheries, and conservation activities throughout the developing world.

PLEC needs to invest its talents and work more intensively in innovative regional training programmes using the existing facilities of academic and research centres. These programmes can help rethink and rewrite academic and training curricula for those who will be policy-makers and opinion-formers in the future. We can help make possible the incorporation of PLEC's central ideas, such as valuing and working with locally developed successful farming practices, employing local innovative "expert farmers" as teachers, and carrying out training in farmers' fields, into the everyday *modus operandi* of governmental and non-governmental agencies.

In the future, PLEC will strive to provide ever better and more relevant field-based information to national and international private and public agencies that are engaged in rural conservation and development programmes through a diversity of channels. We will continue using the usual print media, but we will also continue to build upon some teams' experience using video approaches, and PLEC will continue to add to and expand its web-based information and news service to broadcast the activities of the new programme and its constituent networks.

A broad set of activities and focus on capacity development on multiple levels will improve – if it cannot guarantee – the likelihood of long-term sustainability for PLEC's efforts. The success of the future PLEC programme will make the most of the diversity and expertise of its existing and new members, from expert farmers to renowned academics. The training of

the next generation of farmers, extension agents, politicians, journalists, and members of other groups that influence rural development and conservation is critical for making PLEC a long-term global programme. Our vision is that by mainstreaming the lessons learned during the last five years, and upscaling our activities to other regions and countries, we will help to bring solutions to chronic rural poverty, environmental degradation, and erosion of biological diversity to more people in more communities around the world.

Introduction

Harold Brookfield, Helen Parsons, and Muriel Brookfield

Through generations of innovation and experiment, smallholder farmers have nurtured a great diversity of plants and animals, both wild and domesticated, and accumulated rich knowledge of their local biodiversity. The process of learning, experiment, and innovation continues throughout the developing world, even in the modern context of globalization. Much has been written on the loss of biodiversity under threat from commercial and intensified production, but only a few individual researchers publishing through academic channels have worked on how farmers manage their resources to sustain and enhance them. Whereas most biodiversity projects relate to protected areas or to crop plants alone, large numbers of farmers conserve biodiversity in the entire landscape of their farmland and its surrounds. This book describes the work in the field of the United Nations University project on People, Land Management, and Environmental Change (PLEC), which has been seeking to learn from farmers how they use their knowledge and skills to manage diversity and their resources conservatively and profitably.

PLEC is a global network of country clusters, set up by the United Nations University in 1992. From 1998 until 2002 it was funded by the Global Environment Facility (GEF) via the United Nations Environment Programme (UNEP); the United Nations University has provided modest funds throughout. In August 2002, a meeting concerned largely with planning future PLEC work decided to replace the final term in the name by “Ecosystem Conservation”, thus retaining a popular acronym while better



Figure I.1 The location of PLEC demonstration sites

describing PLEC's central concerns. Throughout the period described in this book, however, the original title was current.

By 2002 the project had brought together more than 200 professionals, almost all in developing countries, and including over 130 scientists and researchers, over 100 skilled or expert farmers, and several thousand other farmers. It has trained about 180 students, undergraduate and graduate. PLEC members, coordinators, and advisers work out of over 60 institutions in Brazil, China, Ghana, Guinée, Jamaica, Kenya, Mexico, Papua New Guinea, Peru, Thailand, Tanzania, Uganda, Britain, the USA, Japan, and Australia. From the beginning until 2002, scientific coordination of the project was based in the Department of Anthropology in the Research School of Pacific and Asian Studies at the Australian National University, the workplace of the editors of this volume. Associate scientific coordinators, Christine Padoch and Michael Stocking, respectively of the New York Botanical Garden and the University of East Anglia in Norwich, UK, contributed very substantially to the project.

The work of the clusters is the main subject matter of this book. Only a necessary minimum about the general subject and philosophy of the project is presented. These aspects and the methodology are discussed in depth in a previous book and the project periodical (Brookfield *et al.* 2002; *PLEC News and Views*). Here the editors devote two initial chapters and a short concluding chapter to general issues and methodology. The other chapters about the work of the clusters are built on edited versions of the final reports to UNEP and the GEF from the GEF-supported clusters, or to the

United Nations University from the four clusters not supported by GEF funds.

Because of the nature of its work, PLEC has focused on particular small areas in each country where scientists are able to develop close relations with the farmers, learn about their management methods, and assist them in many technical ways. In these areas, PLEC looks for the exceptional, or expert, farmers who manage resources better than others, and encourages these farmers to demonstrate their successful methods to other farmers and stakeholders. Since 1998 the research sites selected by project scientists in collaboration with farmers in the 12 developing countries have been termed “demonstration sites”. About 25 demonstration sites are fully developed, and more limited work has been done in a number of others.

PLEC has acquired an enviable reputation for working with farmers in their fields using farmers’ own ideas and evaluation criteria. Farmer-to-farmer training has been particularly successful at several of the demonstration sites, as described in subsequent chapters of this book. For instance, in Tanzania (Chapter 8), “the farm becomes a chalkboard, the expert farmer a teacher, the scientists and technicians become facilitators, and participating farmers the adopters, modifiers, or improvers of the technology”. PLEC deliberately dwells on positive experiences in order to draw lessons to support “agrodiversity” as a developmental approach with policy relevance towards reversing loss of biodiversity and controlling land degradation, while at the same time improving small farmers’ livelihoods.

The farmer-to-farmer training promoted by PLEC, in contrast to top-down intervention, has been more comprehensively adopted in some countries and sites than in others. Reasons for this variation are discussed in general terms in Chapters 1 and 2, and are discussed in a national context in several of the country chapters. They are perhaps best put by Elizabeth Thomas-Hope and Balfour Spence of Jamaica, in Chapter 13. They write:

The knowledge flow occurred between farmer and scientist in a two-way direction, but it has also occurred between farmers ... The specifics of the relationships and the process are unique to each group and are different from one community to another. There is no template or fixed model for the successful transfer of knowledge at a demonstration site, except that both agricultural practices and social relations must be considered in facilitating the process of agrodiversity knowledge transfer. The way in which the process unfolds is always tentative. The researchers must therefore be led by the specific dynamics of each demonstration site in which they may work.

Most country chapters, while mainly based on the cluster final reports, are enriched by information derived from other reports and publications by the cluster members. Additional sources used in the editorial process are included in the Bibliography for each country chapter. The names of the

Agrodiversity

Learning From Farmers Across the World

Edited by Harold Brookfield, Helen Parsons, and Muriel Brookfield

Through generations of innovation and experiment, smallholder farmers have nurtured a rich diversity of plants and animals, both wild and domesticated. Most academic literature emphasizes the accelerated loss of biodiversity, but this book describes how large numbers of smallholder farmers are conserving biodiversity in their farmland and surrounds. It is based on the fieldwork of the United Nations University Project on People, Land Management and Environmental Change (PLEC), which has observed how farmers use their knowledge and skills to manage diversity and also to manage their resources conservatively and profitably.

PLEC members, coordinators and advisers work out of over 60 institutions in Brazil, China, Ghana, Guinée, Jamaica, Kenya, Mexico, Papua New Guinea, Peru, Thailand, Tanzania, Uganda, Britain, the United States, Japan, and Australia. The work of these country groups is the main subject matter of this book. Because of the nature of its work PLEC has focused on particular small areas in each country, where scientists are able to develop close relations with the farmers, and to learn about their management methods and assist them in many technical ways. In these areas PLEC looks for exceptional or expert farmers who manage resources better than others. This book highlights their positive experiences in order to draw lessons in support of "agrodiversity" as a developmental approach to policies for reversing loss of biodiversity, controlling land degradation, and improving small farmers' livelihoods. Learning from farmers has been a valuable and important outcome of PLEC, and it has a great deal of potential application to other situations.

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**United Nations
University Press**

TOKYO • NEW YORK • PARIS

ISBN 92-808-1087-1



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