

---

# Traditional and Modern Natural Resource Management in Latin America

---

Edited by Francisco J. Pichón,  
Jorge E. Uquillas,  
and John Frechione

UNIVERSITY OF PITTSBURGH PRESS

---

# Contents

List of Acronyms	ix
Acknowledgments	xi

## Introduction

*John Frechione* 1

### **Part 1. Characterizing and Conceptualizing the Problem**

Chapter 1. Rural Poverty Alleviation and Improved Natural Resource Management Through Participatory Technology Development in Latin America's Risk-Prone Areas
--

*Francisco J. Pichón and Jorge E. Uquillas* 21

### **Part 2. Theoretical and Practical Issues**

Chapter 2. Rural Development and Indigenous Resources: Toward a Geographic-Based Assessment Framework
--

*Bruce A. Wilcox* 75

Chapter 3. Combining Indigenous and Scientific Knowledge to Improve Agriculture and Natural Resource Management in Latin America
--

*Billie R. DeWalt* 101

### **Part 3. Case Studies**

Chapter 4. Organizing for Change—Organizing for Modernization? Campesino Federations, Social Enterprise, and Technical Change in Andean and Amazonian Resource Management
---

*Anthony J. Bebbington* 125

Chapter 5. Organizing Experimenting Farmers for Participation  
in Agricultural Research and Technology Development  
*Jacqueline A. Ashby, Teresa Gracia, María del Pilar Guerrero,  
Carlos Arturo Quirós, José Ignacio Roa, and Jorge Alonso Beltrán* 157

Chapter 6. Technologies for Sustainable Forest  
Management in the Northern Zone, Costa Rica  
*Carlos Reiche* 184

#### **Part 4. Indigenous/Local Knowledge Systems**

Chapter 7. Indigenous Knowledge for Agricultural Development  
*D. Michael Warren* 197

Chapter 8. Local Knowledge Systems in Latin America:  
Current Trends and Contributions Toward  
Sustainable Development  
*Consuelo Quiroz* 212

Chapter 9. Biodiversity and Agroforestry  
Along the Amazon Floodplain  
*Nigel J. H. Smith* 233

Notes 253

Bibliography 267

Index 307

---

## Introduction

*John Frechione*

---

The modern development era, which began about fifty years ago, was initiated as an attempt to improve people's quality of life and standard of living worldwide. There have been occasional successes (such as some aspects of the green revolution), but with 1.4 billion people still inhabiting risk-prone environments, and still lacking the capacity to support themselves in a sustainable manner (see Pichón and Uquillas, this volume), these development efforts must be evaluated with caution in relation to alleviating poverty and resource degradation in the risk-prone areas. The scenario that most concerns development practitioners at present is one of high, and often increasing, human populations who depend on agricultural activities for their livelihoods and who inhabit fairly delimited risk-prone areas.<sup>1</sup>

Many of these areas are, in fact, already degraded and are likely to degrade further under currently available intensification practices. Increased agricultural production or extraction of natural resources can be achieved either by the expansion of areas under production or by

more intensive management. The first option frequently results in great losses of biodiversity, accelerated soil erosion, and increased flooding, among other negative repercussions. Currently in Latin America, areas that remain for the expansion (extensification) of agriculture are marginal and particularly susceptible to environmental degradation. Many rural inhabitants are forced to choose extensification because of a lack of viable alternatives, although this option is becoming less available as agricultural frontiers close. The second option (more intensive management of agriculture and extraction) can help to alleviate pressure on such risk-prone areas, but information on strategies to achieve this goal is generally lacking.

In the development arena, much of the emphasis on natural resource management (NRM) has focused on the top-down dissemination of modern technology, based on relatively simple or homogeneous systems such as plantation forestry, monocropping with high-yielding cereals, and ranching. In contrast, the rich reservoir of empirical knowledge acquired by rural peoples is often ignored. Traditional management practices involving agroforestry, forest fallows, extraction of resources, and so on may have much to offer for developing and conserving risk-prone areas in sound ways.<sup>2</sup>

Natural resource management—where the interaction of humans and nature involves a broad set of strategies and technologies for a wide variety of natural resources—is presently a topic of worldwide interest. Aware of this trend and that conventional approaches have failed to deal adequately with problems of complex agroecological systems, international agricultural research institutions such as the International Potato Center (CIP) and the International Center for Tropical Agriculture (CIAT) have created NRM programs. Small-scale research and extension projects using participatory and systemic approaches have multiplied in Latin America over the last few years. Although neither the positive nor the adverse social, economic, and environmental impacts of traditional natural resource management have been sufficiently documented, it appears that traditional NRM systems may have much to offer.

Confronted with a complex of profound problems that contribute to the perplexing situation of poverty and environmental degradation in

risk-prone agricultural areas, development agencies (among many others) are seeking solutions from all potential sources. The current endeavor is to seek, develop, and implement, in risk-prone areas, intensification strategies that will provide increased yields, that are sustainable (that is, they will not degrade the natural resource base in the long term), and that will contribute to the preservation of biodiversity, in itself a proved source of components for potentially sustainable strategies.

As a major role player in agricultural development efforts worldwide (and, since the early 1970s, having poverty reduction as a priority), the World Bank has a profound interest in seeking solutions to the deteriorating situation in risk-prone agricultural areas. For this reason, its regional office for Latin America and the Caribbean initiated an analysis of how and to what extent international agricultural research centers and national research programs are addressing the crucial and interrelated issues of poverty and natural resource management in rural, risk-prone areas. This led to a particular interest in documenting exceptional policies and current trends concerning traditional and local knowledge and the real or potential contribution these could make in efforts toward sustainable development coupled with increasing food production for internal consumption and the market.

To confront these concerns the World Bank convened a workshop on "Traditional and Modern Approaches to Natural Resource Management in Latin America and the Caribbean," which took place on 25–26 April 1995. The workshop brought together a diverse group of experts, charged with addressing several interrelated major themes: (1) assessing traditional resource management strategies as a prelude to any intervention by research or development programs; (2) involving farmers and other relevant practitioners in the design and implementation of research on resource management; (3) diversifying agriculture—away from excessive dependence on a monoculture commodity approach and toward production systems based on mixed cropping, especially agroforestry; (4) introducing multidisciplinary approaches to designing NRM strategies; and (5) revamping agricultural research and extension programs, with greater involvement of the private sector and non-governmental organizations (NGOs). The results of this exercise form the chapters of the present volume.