

# Integrating Ecology and Poverty Reduction



Jane Carter Ingram • Fabrice DeClerck  
Cristina Rumbaitis del Rio  
Editors

# Integrating Ecology and Poverty Reduction

The Application of Ecology  
in Development Solutions



Springer

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# Foreword

Humanity has entered the Anthropocene. If ever there was a time when we could take nature's beneficence for granted, it has passed. With seven billion people on the planet, and the eight-billionth arrival expected by 2025, human pressures on every ecosystem have multiplied, in some cases to the breaking point. The famine in the Horn of Africa reminds us that productive and resilient ecosystems are important not only for human well-being but also for human survival, especially in the dire circumstances of impoverished populations.

The urgent need to sustain ecosystems in the face of climate change, growing human populations, and rising demands for a multitude of primary commodities and agricultural outputs is giving rise to a burgeoning new discipline of sustainable development. More than ever, we need to understand how society depends on a range of complex and subtle ecosystem functions, and conversely, how ecosystem functions are impacted by human activities. The intellectual challenge is enormous. Both ecosystems and human systems are immensely complex. Their interactions add further dimensions of complexity. And understanding natural and human systems requires a range of analytical tools that surpass traditional academics' disciplinary boundaries.

The present volumes, *Integrating Ecology and Poverty Reduction*, are a powerful and innovative addition to this vital field of research. These volumes are also a personal thrill for me, since their genesis is the multidisciplinary setting of the Earth Institute at Columbia University. I am most grateful to our former Earth Institute postdocs who conceived and carried out these studies. They and the contributors to these volumes have earned our admiration and gratitude.

Every chapter in these volumes shows that the emerging scientific discipline of sustainable development is both vital and difficult. This is especially the case when it is viewed as an applied science that aims to find practical solutions in specific human-ecological contexts. It is one thing to recognize that ecosystem functions are vital to a society's health and economic productivity (as explored in the first volume, *Integrating Ecology and Poverty Reduction: Ecological Dimensions*), and quite another to devise institutions and policies that protect ecosystems in the face of climate change, growing populations, and rising economic pressures (as explored

in the second volume, *Integrating Ecology and Poverty Reduction: The Application of Ecology in Development*). The case studies in these volumes describe as many failures as successes in the policy sphere and illuminate the subtle and multidimensional approaches to both science and policy that are necessary for success in managing complex and interacting systems.

Despite the range of geographies, ecologies, and development challenges covered in these volumes, there is a unified and highly successful intellectual approach. This is development seen through the ecologist's eyes and with the ecologist's tools. The overriding theme is how the science of ecology – with its focus on complex systems, interacting components and networks, threshold effects, and strong nonlinearities – can and should inform development thinking and design.

As one would expect, the detailed ecological context of development looms large. The details of ecological stress, resource ownership, community organization, gender relations, migration patterns, biodiversity, land use patterns, transport conditions, and vulnerability to environmental hazards and climate change, all condition the interactions of society and ecosystems, and all shape the ways to find sustainable approaches to economic development. It is a vast challenge to understand these complex relations. It is an even greater challenge to ensure that the impacted communities themselves can appreciate the ecological and social context in which they operate, so that they can devise effective means to solve pressing problems.

The chapters put a great deal of emphasis on how ecological knowledge is shared and diffused within a community. There is need for formal training and scientific knowledge, of species, climate, and ecological changes. There is need for a deep understanding of the key actors in the communities. There is an especially vital need for gender awareness and women's empowerment. Women are often disempowered in local communities, and yet play the vital role in managing croplands, water resources, fuelwood, and other ecosystem services. Without women's empowerment, sustainable solutions are impossible to identify, much less to achieve.

Population dynamics, including the challenges of the demographic transition to low fertility rates and the management of migration, loom large in the challenges. Both the issues of natural population increase caused by continued high fertility rates in low-income settings and the challenges of massive migration, from rural to urban areas and across national boundaries, are among the most vexing problems of sustainable development. Population growth is highest in the poorest and most fragile ecosystems, such as the drylands of the Horn of Africa. Migration from such regions can also trigger social conflicts and violence. Migration is leading to a dramatic surge of urbanization, beyond the planning and management capacity of many sprawling urban areas. The second volume has excellent discussions of these dimensions of demographic-ecological interactions.

Many of the chapters in the second half of the second volume deal with various strategies for monetizing the social value of ecosystem services. The basic idea is straightforward: since ecosystem services provide great value to society, there ought to be a way to create economic incentives to sustain those services, and more generally to benefit poor communities that manage the services. Yet the wonderful case

studies and analyses make clear that this strategy is much easier said than done. There is no off-the-shelf strategy for creating appropriate incentives. Each situation, type of ecosystem service, and pattern of local culture and politics calls for a tailored design.

The cases are fascinating. We gain insight into community-based management of forests, fisheries, non-forest products, biodiversity conservation, ecotourism, and much more. We learn about a fascinating project to “pay for ecosystem services” (PES) in a wildlife reserve in Tanzania. Even though the community receives very modest compensation for its conservation activities, and for forgoing other economic activities around the site, the project has proved to be very popular with the community and has successfully combined conservation with development initiatives; in short, PES proved to be “a highly cost-effective model for community-based conservation” (p. 167). In other cases, however, with different ecological and social dynamics, PES proved to be less robust and less effective.

What is most exciting about these volumes is the consistently high quality of ecological analysis combined with an equally high quality of keen social observation. This collection of chapters is, in short, sustainable development analysis at its best, drawing strength by acknowledging the complexity of biological and social systems, avoiding oversimplification, and always giving due attention to the interactions of nature, culture, and economy. Readers will savor these chapters as bold and cutting-edge approaches to a budding scientific discipline of enormous practical importance. The field of sustainable development is enormously enriched by this pioneering effort.

Jeffrey D. Sachs  
Professor, Director of the Earth Institute

# Preface

The two volumes comprising the series *Integrating Ecology and Poverty Reduction* address the ecological dimensions of some of the major challenges of reducing poverty in developing countries (Vol. 1) and present potential solutions and opportunities for more effectively leveraging ecological science and tools to address some of those challenges (Vol. 2). Collectively, we hope these volumes serve to foster a deeper, more nuanced understanding of the ecological dimensions of various aspects of poverty, particularly in rural areas of developing countries where some of the world's poorest people live, and a heightened appreciation for the role that ecological science and tools can play in poverty reduction efforts. We acknowledge that no development challenge is uniquely ecological in its provenance or its resolution, but posit that ecological science and tools are critical components of effective solutions to some of the world's most vexing international problems.

The second volume of this series, *Integrating Ecology and Poverty Reduction: The Application of Ecology in Development*, builds upon the first volume, *Integrating Ecology and Poverty Reduction: Ecological Dimensions*, by exploring the way in which ecological science and tools can be applied to address major development challenges associated with rural poverty. In Vol. 2, we explore how ecological principles and practices can be integrated, conceptually and practically, into social, economic, and political norms and processes to reduce poverty and positively influence the environment upon which humans depend. Specifically, these chapters explore how ecological approaches and considerations can be useful for enhancing the positive impacts of education, gender relations, demographic shifts and dynamics, markets, and governance for poverty reduction. As one of the final chapters on the future and evolving role of ecological science points out,



sustainable development must be built upon an ecological foundation if it is to be realized. The chapters in this volume illustrate how traditional paradigms and forces guiding development can be steered along more sustainable trajectories by utilizing ecology to inform project planning, policy development, market development, and decision-making.

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