BRIDGING SCALES AND KNOWLEDGE SYSTEMS

Concepts and Applications in Ecosystem Assessment

EDITED BY
WALTER V. REID, FIKRET BERKES, THOMAS WILBANKS, AND DORIS CAPISTRANO
ABOUT ISLAND PRESS

Island Press is the only nonprofit organization in the United States whose principal purpose is the publication of books on environmental issues and natural resource management. We provide solutions-oriented information to professionals, public officials, business and community leaders, and concerned citizens who are shaping responses to environmental problems.

In 2006, Island Press celebrates its twenty-second anniversary as the leading provider of timely and practical books that take a multidisciplinary approach to critical environmental concerns. Our growing list of titles reflects our commitment to bringing the best of an expanding body of literature to the environmental community throughout North America and the world.


The opinions expressed in this book are those of the author(s) and do not necessarily reflect the views of these foundations.
BRIDGING SCALES
A • N • D
KNOWLEDGE SYSTEMS

Concepts and Applications
in Ecosystem Assessment

A contribution to the
MILLENNIUM ECOSYSTEM
ASSESSMENT
Millennium Ecosystem Assessment Panel
Harold A. Mooney (cochair), Stanford University, United States
Angela Cropper (cochair), The Cropper Foundation, Trinidad and Tobago
Doris Capistrano, Center for International Forestry Research, Indonesia
Stephen R. Carpenter, University of Wisconsin, United States
Kanchan Chopra, Institute of Economic Growth, India
Partha Dasgupta, University of Cambridge, United Kingdom
Rik Leemans, Wageningen University, Netherlands
Robert M. May, University of Oxford, United Kingdom
Prabhu Pingali, Food and Agriculture Organization of the United Nations, Italy
Rashid Hassan, University of Pretoria, South Africa
Cristián Samper, Smithsonian National Museum of Natural History, United States
Robert Scholes, Council for Scientific and Industrial Research, South Africa
Robert T. Watson, The World Bank, United States (ex officio)
A. H. Zakri, United Nations University, Japan (ex officio)
Zhao Shidong, Chinese Academy of Sciences, China

Millennium Ecosystem Assessment Board
Cochairs
Robert T. Watson, chief scientist and senior advisor, ESSD, The World Bank
A. H. Zakri, director, Institute of Advanced Studies, United Nations University

Institutional Representatives
Salvatore Arico, United Nations Educational, Scientific and Cultural Organization
Peter Bridgewater, Ramsar Convention on Wetlands
Hama Arba Diallo, United Nations Convention to Combat Desertification
Adel El-Beltagy, Consultative Group on International Agricultural Research
Max Finlayson, Ramsar Convention on Wetlands
Colin Galbraith, Convention on Migratory Species
Erika Harms, United Nations Foundation
Robert Hepworth, Convention on Migratory Species
Olav Kjørven, United Nations Development Programme
Kerstin Leitner, World Health Organization
Alfred Oteng-Yeboah, Convention on Biological Diversity
Christian Prip, Convention on Biological Diversity
Mario Ramos, Global Environment Facility
Thomas Rosswall, International Council for Science—ICSU
Achim Steiner, IUCN—The World Conservation Union
Halldor Thorgeirsson, United Nations Framework Convention on Climate Change
Klaus Töpfer, United Nations Environment Programme
Jeff Tschirley, Food and Agriculture Organization of the United Nations
Ricardo Valentini, United Nations Convention to Combat Desertification
Hamdallah Zedan, Convention on Biological Diversity

At-large Members
Fernando Almeida
Phoebe Barnard
Gordana Beltram
Delmar Blasco
Antony Burgmans
Esther Camac
Angela Cropper (ex officio)
Partha Dasgupta
José María Figueres
Fred Fortier
Mohamed H.A. Hassan
Jonathan Lash
Wangari Maathai
Paul Maro
Harold Mooney (ex officio)
Marina Motovilova
M. K. Prasad
Walter V. Reid
Henry Schacht
Peter Johan Schei
Ismail Serageldin
David Suzuki
M.S. Swaminathan
José Galízia Tundisi
Axel Wenblad
Xu Guanhua
Muhammad Yunus
BRIDGING SCALES
A • N • D
KNOWLEDGE SYSTEMS

Concepts and Applications in Ecosystem Assessment

EDITED BY
WALTER V. REID
Fikret Berkes
Thomas Wilbanks
Doris Capistrano

ISLAND PRESS
WASHINGTON • COVELO • LONDON
CONTENTS

PREFACE ix

ACKNOWLEDGMENTS xi

CHAPTER 1: Introduction  1
WALTER V. REID, FIKRET BERKES, THOMAS J. WILBANKS, AND DORIS CAPISTRANO

BRIDGING SCALES 19

CHAPTER 2: How Scale Matters: Some Concepts and Findings  21
THOMAS J. WILBANKS

CHAPTER 3: The Politics of Scale in Environmental Assessments  37
LOUIS LEBEL

CHAPTER 4: Assessing Ecosystem Services at Different Scales in the Portugal Millennium Ecosystem Assessment  59
HENRIQUE M. PEREIRA, TIAGO DOMINGOS, AND LUIŠ VICENTE

CHAPTER 5: A Synthesis of Data and Methods across Scales to Connect Local Policy Decisions to Regional Environmental Conditions: The Case of the Cascadia Scorecard  81
CHRIS DAVIS

CHAPTER 6: Scales of Governance in Carbon Sinks: Global Priorities and Local Realities  105
EMILY BOYD

BRIDGING KNOWLEDGE SYSTEMS 127

CHAPTER 7: What Counts as Local Knowledge in Global Environmental Assessments and Conventions?  129
J. PETER BROSIS

CHAPTER 8: Bridging the Gap or Crossing a Bridge? Indigenous Knowledge and the Language of Law and Policy  145
MICHAEL DAVIS
CHAPTER 9: **Mobilizing Knowledge for Integrated Ecosystem Assessments**  165
CHRISTO FABRICIUS, ROBERT SCHOLES, AND GEORGINA CUNDILL

CASE STUDIES  183

CHAPTER 10: **Keep It Simple and Be Relevant:** The First Ten Years of the Arctic Borderlands Ecological Knowledge Co-op  185
JOAN EAMER

CHAPTER 11: **Cosmovisions and Environmental Governance:**
The Case of In Situ Conservation of Native Cultivated Plants and Their Wild Relatives in Peru  207
JORGE ISHIZAWA

CHAPTER 12: **Harmonizing Traditional and Scientific Knowledge Systems in Rainfall Prediction and Utilization**  225
RENGALAKSHMI RAJ

CHAPTER 13: **Managing People’s Knowledge:** An Indian Case Study of Building Bridges from Local to Global and from Oral to Scientific Knowledge  241
YOGESH GOKHALE, MADHAV GADGIL, ANIL GUPTA, RIYA SINHA, AND K. P. (PRABHA) ACHAR

CHAPTER 14: **Barriers to Local-level Ecosystem Assessment and Participatory Management in Brazil**  255
CRISTIANA S. SEIXAS

CHAPTER 15: **Integrating Epistemologies through Scenarios**  275
ELENA BENNETT AND MONIKA ZUREK

SYNTHESIS  295

CHAPTER 16: **The Politics of Bridging Scales and Epistemologies:** Science and Democracy in Global Environmental Governance  297
CLARK MILLER AND PAUL ERICKSON

CHAPTER 17: **Conclusions:** Bridging Scales and Knowledge Systems  315
FIKRET BERKES, WALTER V. REID, THOMAS J. WILBANKS, AND DORIS CAPISTRANO

NOTES  333

LIST OF AUTHORS  337

INDEX  343
The Millennium Ecosystem Assessment (MA) was carried out between 2001 and 2005 to assess the consequences of ecosystem change for human well-being and to establish the basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human well-being. The MA was originally conceived as a global scientific assessment that would be modeled on two intergovernmental processes that have contributed significantly to policy development in relation to the problems of climate change and stratospheric ozone depletion: the Intergovernmental Panel on Climate Change and the Ozone Assessment.

The very first meeting of the group tasked with exploring whether the MA should be launched, however, set the design of the assessment on a very different course. While many aspects of the MA process did still draw heavily on the experience of other international assessments, that first meeting and subsequent design team meetings introduced three novel dimensions. First, the group concluded that the assessment could not be done at a single global scale and would need to examine processes of ecosystem change and human impacts at other scales, including in particular the scale of individual communities. Second, it was evident that the audience for the findings of an assessment of these issues was much broader than the traditional audience of global assessments (national governments) and must include other stakeholders from business, nongovernmental organizations, indigenous people, and other civil society groups. Finally,
it was clear that the knowledge base for an assessment of this nature could not be limited to the scientific literature but must draw on other “informal” sources of knowledge, including local, traditional, and practitioner’s knowledge.

The MA was the largest assessment effort ever to attempt to incorporate all of these dimensions in its design, and in that regard it can be seen as an experiment or pilot in applying multiple scales and knowledge systems in an assessment. But, in fact, a tremendous depth of research and experience exists in relation to each of these dimensions of scale, stakeholders, and knowledge systems. Recognizing that this existing experience could significantly aid the MA process, and also recognizing that the MA itself provided an experiment that could further advance understanding of issues of scale and epistemology, the MA Sub-Global Working Group organized an international conference on these issues called Bridging Scales and Epistemologies: Linking Local Knowledge and Global Science in Multi-scale Assessments. More than two hundred people from fifty countries participated in that conference, which was held in March 2004 and hosted by the Bibliotheca Alexandrina in Alexandria, Egypt.

This book—*Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment*—is one product of that conference. While the MA provides the motivation for this book, and while several chapters present experiences from the MA, this book, like the conference, reaches far beyond the MA process to explore the challenges, costs, and benefits of bridging scales and knowledge systems in assessment processes and in resource management. The issues explored in this book push the limits of science, politics, and social processes. Although a number of general lessons emerge, many questions remain unanswered about how to make such processes work, how to address issues of power and empowerment, and how to address technical issues of information scaling and knowledge validation. In this respect, the volume does not attempt to provide a blueprint, but it does illustrate the multiple dimensions of the challenges inherent in bridging scales and knowledge systems.
We would like to thank the MA Sub-Global Working Group, for its initiative in organizing the March 2004 conference that led to this book, and Ismail Serageldin and the Bibliotheca Alexandrina, for hosting the conference. One of this book’s editors (Doris Capistrano) was one cochair of the MA Sub-Global Working Group, and we would like to recognize the central role that the other Working Group cochair, Cristián Samper, played in designing the conference. We thank the conference international advisory committee, composed of Janis Alcorn, Alejandro Argumedo, Fikret Berkes, Marie Byström, Esther Camac, Doris Capistrano, William Clark, Angela Cropper, Elaine Elisabetsky, Carl Folke, Madhav Gadgil, Sandy Gauntlett, C. S. Holling, Louis Lebel, Liu Jiyuan, Akin Mabogunje, Jane Mogina, Harold Mooney, M. Granger Morgan, Douglas Nakashima, Thomas Rosswall, and Cristián Samper. We also thank the Conference Organizing Committee, which consisted of Carolina Katz Reid, Walter V. Reid, Chan Wai Leng, John Ehrmann, Marcus Lee, Nicolas Lucas, Ciara Raudsepp-Hearne, and Sara Suriani. Special thanks are due to Carolina Katz Reid for her tireless work as the conference organizer. We also thank the MA Board and Assessment Panel listed elsewhere in this volume.

We thank the sponsors of the conference and this publication: the Swedish International Biodiversity Programme, The Christensen Fund, the International Council for Science, the Canadian International Development Agency, Bibliotheca Alexandrina, and the MA. The MA, in turn, received significant
financial support from the Global Environment Facility, the United Nations Foundation, The David and Lucile Packard Foundation, the World Bank, the United Nations Environment Programme, the Government of Norway, the Kingdom of Saudi Arabia, and other donors listed on the MA Web site at http://www.MAweb.org.

Each of the contributed chapters in this volume underwent peer review. We thank the reviewers for their significant contribution to this volume: Neil Adger, Katrina Brown, David Cash, Donna Craig, Chimere Diaw, Polly Ericksen, Christo Fabricius, Cathy Fogel, Keith Forbes, Tim Forsyth, Peter Frost, Cole Genge, Clark C. Gibson, Madhav Karki, Don Kash, Ann Kinzig, Rene Kuppe, Murari Lal, Micheline Manseau, Peter H. May, Ronald Mitchell, P. K. Muraleedharan, Timothy O’Riordan, P. Ramakrishnan, Maureen Reed, Benjamin Samson, Marja Spierenburg, Angelica Toniolo, Ellen Woodley, and Fernanda Zermoglio.

WALTER V. REID
FIKRET BERKES
THOMAS J. WILBANKS
DORIS CAPISTRANO