

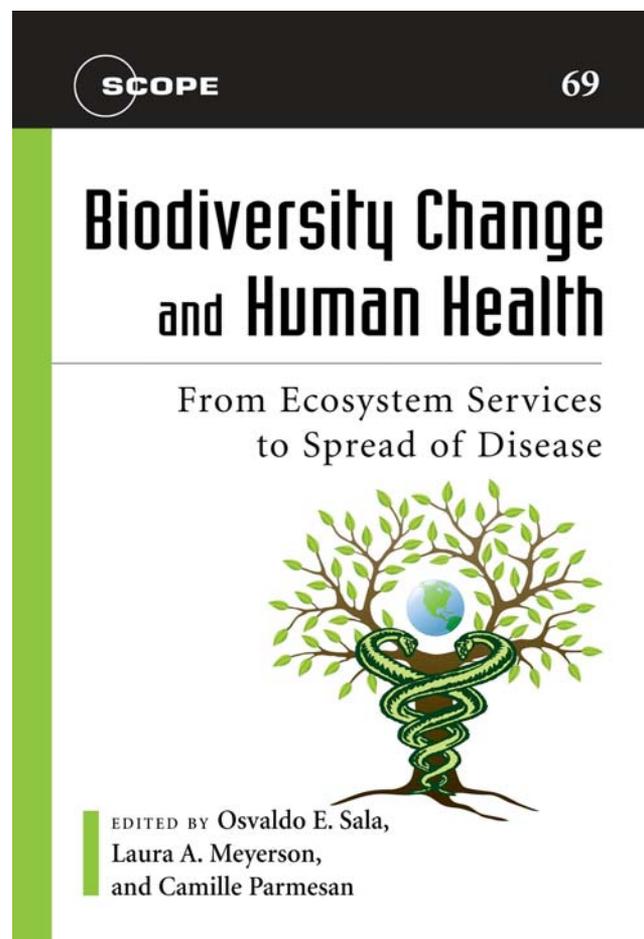
*Book Review*

## An Ecosystem View of Biodiversity and Human Health Relationships

**BIODIVERSITY CHANGE AND HUMAN HEALTH: FROM ECOSYSTEM SERVICES TO SPREAD OF DISEASE, OSVALDO E. SALA, LAURA A. MEYERSON, AND CAMILE PARMESAN (EDITORS), 2009, ISLAND PRESS, SCIENTIFIC COMMITTEE ON PROBLEMS OF THE ENVIRONMENT (SCOPE) SERIES VOL. 69, 320 PP, ISBN: 9781597264969**

The launch of the Millennium Ecosystem Assessment in 2001 brought increased visibility to biodiversity and ecosystem services, and yet a full understanding of the links between biodiversity and human health, so critical to developing environmental and public health policy, is still emerging. By breaking down disciplinary walls and highlighting recent findings, *Biodiversity Change and Human Health* provides a comprehensive look at the documented impacts of biodiversity change on health and identifies research priorities that incorporate all aspects of these interactions.

*Biodiversity Change and Human Health* is the product of a 2005 workshop on Biodiversity, Health, and the Environment. The workshop brought together experts from the natural and social sciences for a week of discussions at the intersection of biodiversity and health. This volume synthesizes the current science and highlights novel ideas that emerged at the workshop. Editors Osvaldo Sala (Brown University), Laura Meyerson (University of Rhode Island), and Camille Parmesan (University of Texas), and their diverse team of contributors, examine the links between biodiversity change and human health. The timely



volume builds upon and complements previous publications in the area of biodiversity and health, namely *Biodiversity and Human Health*, edited by Grifo and Rosenthal (1997), and *Sustaining Life: How Human Health Depends on*

*Biodiversity*, edited by Chivian and Bernstein (2008) [see *EcoHealth* 6:1]. It emphasizes broad definitions of health (physical health, well-being, and quality of life) and of biodiversity (natural biodiversity as well as biodiversity in human-dominated systems, such as agriculture). It considers the complex trade-offs between biodiversity change and health as well as the complex synergisms. It also issues a call for action to develop measurable indicators of health, and particularly more direct measures of quality of life, that can feed into decision-making processes. The volume highlights the far-reaching implications of biodiversity change and underscores the multidimensional issues that must be considered when developing policy. As such, it is recommended for policy makers, physicians, educators, and graduate students in a range of fields, including environmental science, public health, medicine, biological sciences, and ecology.

The volume is divided into 5 parts with 16 chapters that provide a synthetic and comprehensive discussion of biodiversity and health. The first part addresses cross-cutting themes that are central to understanding the relationship between biodiversity and human health, as well as the institutional and historical factors that have to date limited the far-sightedness of policies related to biodiversity and health. For example, biodiversity is important for supporting a balanced diet, yet the need for a diverse and adequate food supply must be balanced with the need for sustainable agricultural systems. Draining swamps to eliminate anopheline mosquitoes to combat malaria has mostly been positive for human health but negative for biodiversity. Similarly, removing wildlife host reservoirs of zoonotic diseases threatens not only these populations, but also jeopardizes the complex and often diverse communities of which they are a part. Examples such as these highlight the need for upstream interventions through ecosystem management and better predictive tools instead of the more reactive measures taken to date. However, developing a policy framework that values both ecosystem services and human health requires far-sightedness to consider future impacts. It also requires policy processes that cross geopolitical boundaries, because such boundaries have limited influence on organismal and ecosystem processes.

Grounded in these cross-cutting ideas, the sections that follow detail the current state of the science surrounding biodiversity and health. The second section addresses the multidimensional ways that biodiversity can impact quality of life (QOL), drawing upon evolutionary psychology and

highlighting the links between physical and mental health. The contributors offer several studies that support the relationship between nature and QOL, but stress that data to support the link between biodiversity and QOL are largely absent. They call for the development of better metrics and indicators, particularly for QOL, and fully integrating such metrics in environmental health. The effectiveness of environmental interventions could be evaluated with such indicators, and changes in QOL indicators could serve as early warning signs for biodiversity loss.

The third section addresses the impact of biodiversity change on ecosystem services and, in turn, how changes in ecosystem services affect human health. Drawing examples from aquatic biodiversity and water quality (nutrient loading, waterborne pathogens, and the accumulation of pollutants in aquatic food webs), the authors highlight the need for far-sighted policies that consider societal gains and environmental costs over multiple generations. Another example comes from human alteration of the global nitrogen cycle and its impact on agricultural practices, plant diversity, and the complex cascading interactions that impact human health.

The fourth part of the book focuses on changes in biodiversity and the spread of disease, including the impact of a variety of stressors on biodiversity, such as ecosystem destruction and climate change. Included is a comprehensive review of microbial diversity, highlighting the importance of understanding the basic ecology of microorganisms to understand their role in both health and disease. Also addressed are parasitic and infectious diseases in the context of environmental changes, degradation of cultural traditions, and ecosystem destruction. Disease-causing organisms pose a particular challenge in that the same organisms causing devastating diseases also are constituents of biodiversity, raising the issue of “good” and “bad” biodiversity and the conundrum of what ecological price we may pay for eradicating a pathogen.

Finally, the book addresses biodiversity as a resource for traditional and modern medicine and the political and logistical barriers to preserving this resource for future treatments. The volume calls for more collaboration between medical, natural, and social sciences. Such interdisciplinary research will more thoroughly identify all aspects of important trade-offs to consider when making policy decisions.

The volume contains some omissions. For example, it lacks a discussion of the biodiversity of human-associated

microorganisms that are intimately involved in human health and disease. However, it succeeds in greatly broadening the scope of discussions surrounding biodiversity and health.

Compiled as an edited volume, *Biodiversity Change and Human Health* is well edited and remarkably synthetic in its ambitious effort to examine the complex links between biodiversity change and human health. It contains new information of great relevance. It highlights research gaps and emphasizes cross-disciplinary approaches to fill these gaps. The challenge of balancing the needs and goals of society with the protection of ecosystems will only become more critical in the years to come. By describing several examples of synergistic interactions that promote sustain-

ability *and* overall health and well-being, the volume points to a future that includes win-win solutions. Researchers and policy makers alike should take note of the issues raised in these chapters because they set a framework for innovative research that will hopefully guide innovative policy solutions.

Christine M. Jessup

AAAS Science & Technology Policy Fellow,  
National Institutes of Health, Bethesda, MD 20892  
e-mail: [cjessup@stanfordalumni.org](mailto:cjessup@stanfordalumni.org)

Published online: January 12, 2010