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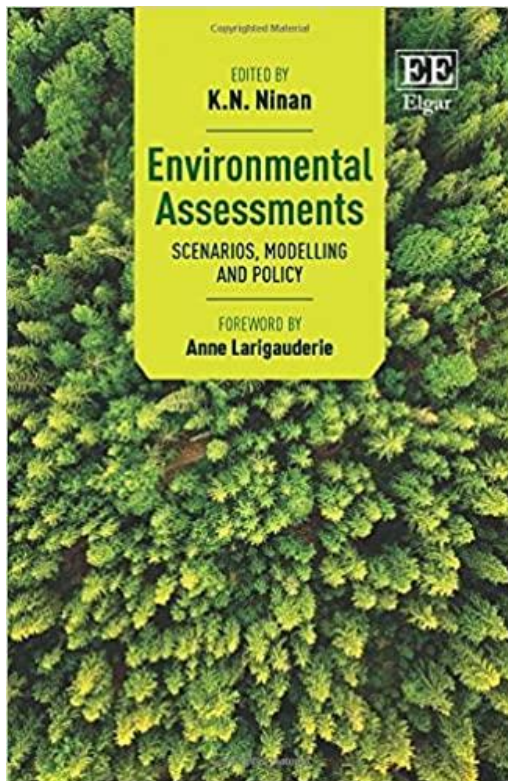
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## BOOK REVIEW

### Role and Scope of Environmental Models

Purnamita Dasgupta\*

KN Ninan (Ed.). 2020. *Environmental Assessments Scenarios, Modelling and Policy*. UK: Edward Elgar Publishing. ISBN: 978 1 78897 686 2, 288 pp.



The book *Environmental Assessments: Scenarios, Modelling and Policy* presents various perspectives on the role and contribution of environmental models in safeguarding nature and natural wealth. As its editor KN Ninan wrote in a recent article, nature is the key to human well-being and prosperity. Ninan is Chairperson of the Centre for Economics, Environment, and Society at Bangalore, India. He applies his rich experience in working with natural resources to bring together a volume of contributions by eminent scholars in the field of environmental modelling and scenario building with links to policy relevance. As Anne Larigauderie,

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Executive Secretary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), notes in her foreword to the book:

Scenarios and models have been a key component of most global, regional and national environmental assessments carried out over the last decade, including those of IPBES. Scenarios and models in assessments of biodiversity and ecosystem services have helped in alerting the scientific community and policy-makers to the possible future risks for nature, nature's contribution to people and the quality of their lives, and sustainable development.

An elaboration on the context within which this book review was written may be in order. The ongoing pandemic has brought home the ground reality of the need to restore and maintain a human–nature balance—as much to the uninitiated as to the converted. This year, publications from three important financial institutions—The UK Treasury (the Dasgupta Review), OECD (2021), and World Bank (Johnson *et al.* 2021) have highlighted the criticality of biodiversity and nature for human well-being, and the interlinkages between the economy and nature. An initial simulation estimate (Dobson *et al.* 2020) suggests that the present value of prevention costs of the pandemic for 10 years, through interventions such as combatting deforestation and limiting wildlife trade, could be just 2% of the total cost attributed to the pandemic. That the degradation of ecosystems and biodiversity losses can lead to societal welfare losses running into billions of dollars is being increasingly recognised, as is the consequent worry about how best to reduce risks to ecosystems. It is here that well-designed models and scenario analyses can contribute towards assessing risks and formulating steps to prevent or reduce these environmental consequences (and future losses). The imperatives imposed by a changing climate that adversely impacts nature's contribution to people and exacerbates biodiversity losses are, for instance, an area that calls for urgent action to achieve food security, planetary health, and protect biodiversity (FAO 2021; IPBES 2019).

The potential for models to contribute towards alerting stakeholders about threats and risks to the environment has been well recognized in the scientific literature. As noted in the preface, the importance of mainstreaming such knowledge within environmental decision-making by policymakers gained traction with the IPBES, which took this up in its *Methodological Assessment Report on Scenarios and Models of Biodiversity and Ecosystem Services*, specifically in the context of global warming and biodiversity loss. As several scholars have noted, biodiversity loss and climate change are interlinked concerns that can be addressed

simultaneously through interventions for ecosystem restoration (for instance, see Strassburg *et al.* 2020). As the Dasgupta Review (2021) notes, restoration is costlier than conservation for ecosystems. The most recent Insights publication, Martin *et al.* (2021) states that: “Due to climate change, ecosystems and people are confronted with unprecedented, often locally new, climate-forced impacts, with humanitarian crises looming as a result of degrading living conditions and the potential for cascading risks across various scales.”

It is in this context that *Environmental Assessments* is a timely and value-added contribution to the existing literature on ways to enhance informed decision-making to avoid upsetting nature–people relationships and ensuring that environmental risks are minimised to the maximum extent possible.

Over 13 chapters, the book examines various theoretical framings as well as empirical applications of environmental models and scenario-building exercises, with a focus on understanding the drivers of environmental change as well as the implications for human society. The first three chapters (Part I) examine theoretical and conceptual issues in specific contexts, including the paper by Teh *et al.* (2016) in *Regional Environmental Change* (re-published here) on developing national-scale integrated socio-ecological scenarios for Canada’s oceans and marine fisheries. Two subsequent chapters bring forth the complexities in estimating the economic effects of climate change in the context of Integrated Assessment models (Prieg and Yumashev) and monitoring land-use and land-cover changes at multiple spatial scales (Rosa). Both these chapters deal with two very important current topics, namely, the use of spatial data and Integrated Assessment models in the context of the environment.

In Part II, a mix of applications and case studies are presented at various scales—global, regional, and national—with illustrations and cases from a range of sectors including forestry, wetlands and oceans, agriculture and livestock, fisheries, invasive species, and urban ecosystems. The global appeal of the book is in the geographies that it covers, including ocean and marine fisheries in Canada, livestock and deforestation in Brazil, forests in Cambodia, seafood supplies in British Columbia, drivers of environmental change in Latin America and the Caribbean, wetland management in Kerala, India, municipal planning and adaptive management in Nicaragua. The tone for the section is set by two key chapters, the first of which is a re-publication of the paper by Kubiszewski *et al.* (2017) in *Ecosystem Services*, which discusses the future value of ecosystem services in the context of global scenarios. This is followed by an excellent exposition on the challenges of modelling, in the context of controlling invasive exotic weeds

in protected areas. Illustrations, data, and substantive evidence are crucial for building confidence in the application of environmental studies in any form or shape. This section does an excellent job of presenting myriad ways of working with environmental models and scenarios to target the policy relevance of modelling-based research studies.

An interested reader may want to begin with the introduction, which is exceptionally comprehensive and well-written. It puts together substantial information not only regarding the contents of the book but also on several basic concepts such as descriptions of various tools and frameworks and types of scenarios and models and the purposes they serve. It provides valuable direction to the reader on the heady mix of technical diversity incorporated within the subsequent chapters.

This book is an important contribution to research on environmental models, providing a comprehensive overview of the literature on building scenarios and how these can contribute in decision-making to reduce risks to planetary health and human well-being.

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