Biodiversity Economics

Human-induced biodiversity loss is greater now than at any time in human history, with extinctions occurring at rates hundreds of times higher than background extinction levels. The field of biodiversity economics analyses the socio-economic causes of and solutions to biodiversity loss by combining the disciplines of economics, ecology and biology. This field has shown a remarkable degree of transformation over the past four decades and now incorporates the analysis of the entire diversity of biological resources within the living world. *Biodiversity Economics* presents a series of papers that shows how bio-economic analysis can be applied to the examination and evaluation of the problem of various forms of biodiversity loss. Containing state-of-the-art bio-economic research by some of the leading practitioners in the field, this volume will be an essential research tool to those working on biodiversity issues in the academic, policy and private sectors.

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Preface

The field of biodiversity economics, i.e. the analysis of the problems at the interface between the disciplines of economics and biology, probably has its origins primarily in the work of Colin Clark. Much of this early work looked at the exploitation of fisheries in the context of various institutional assumptions: open access, social planning, etc. Since these early efforts, the field of biodiversity economics has expanded in many different directions. It still concerns the analysis of the causes of resource overexploitation and decline, but also includes within its core the examination of the sorts of externalities involved (values) and the types of policies applied. In addition, and most crucially, the field now encompasses many resources other than simply marine resources: forests, wildlife, and even genetic resources (used in agriculture and pharmaceutical industries). The entire diversity of biological resources within the living world is now brought within the field of biodiversity economics.

All of these problems share a common aspect – the dynamic nature of biological resources. Biological resources are distinctive in that they live and grow and respond to other living things. This generates a common analysis across the entire discipline that focuses on how human societies interact with other living things and how management should take biological characteristics into consideration.

In this volume we provide a set of papers that demonstrates the application of this framework across the entire range of issues currently under consideration within this important field. We divide the volume into four sections, three representing the core areas of biodiversity economics and the last a demonstration of their application in a concrete context (agricultural biodiversity). In Part I, we commence with a set of eight papers comprising an examination of the causes of biodiversity loss. Then in Part II we turn to a section of five papers assessing the issues concerning the valuation of biodiversity. In Part III we examine the range of policies for biodiversity conservation. Finally, in Part IV, we include a case study on agricultural biodiversity: causes, values and policies. The volume as a whole serves as a demonstration of the means by which bio-economic

analysis might be applied to the examination and evaluation of the problem of various forms of biodiversity losses.

The volume emanates from a collaborative effort undertaken by an interdisciplinary network of European scientists (known as BioEcon) working to advance economic theory and policy for biodiversity conservation. The BioEcon network has provided a platform for economists, lawyers and natural scientists from leading European academic and research institutions as well as members of prominent policy organisations to work together on advancing our understanding of the anthropogenic causes of biodiversity decline as well as on developing novel economic incentives for biodiversity conservation.[1] Over the past decade more institutions from all around the world have become involved in the network activities (such as its annual conference) while the network has provided the launching pad for many new researchers and research agendas in the field of biodiversity economics.[2] We hope that this volume will help to consolidate this relatively new field and continue to encourage new researchers and new research agendas in the area.

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[1] The partners in BioEcon are: Alfred-Weber-Institute, University of Heidelberg, Germany; Center for Development Research, Department of Economics and Technological Change, University of Bonn, Germany; Centre for Economic Research, Tilburg University, Netherlands; Centre for Environment and Development Economics, Environment Department, University of York, UK; Centre for the Philosophy of Law, Université catholique de Louvain, Belgium; Department of Economics, Norwegian University of Science and Technology, Norway; Department of Economics, School of Oriental and African Studies, UK; Department of Economics, University College London, UK; Department of Land Economy, University of Cambridge, UK; Finnish Forest Research Institute, Vantaa Research Centre, Finland; Fondazione Eni Enrico Mattei, Italy; Laboratoire Montpellierain d'economie Theorique et Appliquee, Centre National de la Recherche Scientifique, Université Montpellier 1, France.

[2] Details of all network activities can be found at www.bioecon.ucl.ac.uk

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Lastly, we would like to dedicate the volume to the late Prof. David Pearce who has been an esteemed colleague, collaborator, teacher and friend to the contributors to this volume. Over the past thirty years Prof. Pearce has made several important conceptual and methodological contributions towards our understanding of the causes of biodiversity decline while he has been instrumental in popularising and establishing economic instruments for biodiversity conservation into major policy fora. The introductory chapter written specifically for this volume was sadly one of Prof. Pearce's last works. In this paper Prof. Pearce explores the strength and nature of societies' preferences for conserving biodiversity resources and finds that in many contexts actual conservation actions and budgetary outlays fall considerably short of the 'rhetoric' over how much we care about biodiversity. His insightful piece concludes by highlighting the importance of accurately valuing and accounting for biodiversity resources and services in public decision making, which constituted a recurrent and far-reaching policy message from his important body of work.

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Foreword

I am delighted to see that biodiversity economics has become a discipline in its own right. Those of us who have been addressing the multiple dimensions of biodiversity have long sought better ways of incorporating economic thinking into our various challenges. Biodiversity loss is a serious preoccupation for the entire science of conservation biology, which has its own journal and scientific society, but it remains weak in delivering appropriate policy advice, largely because it is not able to demonstrate the economic implications of policy alternatives.

Other parts of the biodiversity community deal with what ultimately is an economic relationship, namely sustainable use. While the concept certainly has significant ethical dimensions, it more fundamentally deals with the costs and benefits of alternative management strategies, and these often will be based on economic principles. Is it more cost-effective to have safari hunting of rhinoceros, or photo safaris? How can economic calculations of sustainable off-take incorporate stochastic events, such as annual changes in rainfall (and thus productivity of vegetation)?

Others working on biodiversity focus on very specific issues, such as the impact of invasive alien species on natural ecosystems and human economies. Quantification of the negative impacts of these invasive alien species can help to convince policy-makers to design, implement and support appropriate measures to prevent such species from becoming established or to manage them efficiently once they have become part of an ecosystem. Biodiversity economics has much to contribute to the problem of invasive aliens, clearly demonstrating the suitability of alternative approaches to the problem.

I was also pleased to see the attention being given to the non-wild parts of biodiversity, here called 'agro-biodiversity'. The relationship between domesticated landscapes and the surrounding matrix has significant economic dimensions, as these non-domestic landscapes provide important ecosystem services to the agricultural lands. These include providing clean water, supporting pollinators, maintaining habitats for wild relatives of domesticated plants and animals (thereby providing genetic materials

for the future), forming soils and ameliorating climate extremes. All of these have economic dimensions, and biodiversity economics has a key role to play in helping to develop appropriate incentive measures, such as systems of payment for ecosystem services, that are efficient and equitable as well as environmentally effective.

These are just a few of the topics where biodiversity economics is making important contributions. It is especially pleasing to see the breadth of institutions involved in BioEcon, demonstrating that biodiversity economics is built on a solid consensus of scholarly research.

I would like to close by paying homage to David Pearce, whose many contributions to biodiversity economics over the past few decades have been the foundation upon which so many other contributions have been built. His economics-based perspectives have helped to legitimise the arguments conservationists have been making for many decades, while also usefully challenging some of our cherished assumptions. His opening chapter well summarises many of the ideas that made his contributions so powerful to policy-makers and scientists alike. This is a worthy monument to his numerous contributions.

While biodiversity economics addresses issues such as valuation, incentives and tradeoffs, it is also apparent from this volume that much work remains to be done. This book is the best available account of the current state of the art in this important discipline. I have no doubt that the coming years will lead to even more dramatic progress in biodiversity economics. The future diversity of life on our planet depends on such progress.

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