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BOOK REVIEWS

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Environmental Archaeology. Theoretical and Practical Approaches

BY NICK BRANCH, MATTHEW CANTI, PETER CLARK AND CHRIS TURNEY

xv + 240 pp., 24.8 × 19 × 1 cm, ISBN 0 340 80871 3 paperback, GB£ 22.99, London, UK: Hodder Arnold, 2005

I enjoyed this book and think it will be a useful introduction to students and non-specialists in various aspects of archaeology. I think it should probably have been called something like 'Environmental Geoarchaeology', as the strength of the book is that it ventures into a number of areas of the practical application of archaeology in the field that are not just environmental, but are nevertheless important in archaeological and environmental reconstruction. I also liked the introduction to the whole theoretical framework for studying humans in their past environment. Given the resurgence in interest in environmental change as an influence on human societies, it is fitting that this discussion should be brought to light in core teaching material. There are a few areas where I would have liked more detail, for example a little more explanation, perhaps with a case study, of the effects of calibration on radiocarbon dating and the need for large numbers of dates where possible. That said, it is a very useful undergraduate introduction and I would recommend it as a first- and possibly second-year undergraduate teaching resource.

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Mankind and the Oceans

EDITED BY NOBUYUKI MIYAZAKI, ZAFAR ADEEL AND KOUCHI OHWADA

xiii + 225 pp., 34 figs, 23.5 × 15.5 × 1.25 cm, ISBN 92 808 1057 X paperback, US$ 32.00, Tokyo, Japan: United Nations University Press, 2005

This book contains three sections: the first called 'Human activities related to marine life and management' is general and introductory; the second called 'Case studies of marine pollution in the world' gives five examples ranging from pollutants in the coastal water of China to contaminants in marine mammals of the Pacific; and the third called 'Marine biodiversity and environment in the Black Sea and the south-western Atlantic Ocean'. The preface states that this volume is intended as 'a reference book for undergraduate and graduate students, as well as the general public'. The stated aim of the book is 'to explore the relationship between human life and the ocean from aspects of marine environment, marine pollution, marine biodiversity, and the desirable management approaches'. The book resulted from a symposium held in Japan in 1998 and is rather slanted towards Japan in terms of discussion of some management issues and towards Asia in terms of case histories. This, in itself, is not a difficulty, but what is problematical is that all sections of the book suffer to an extent from either being too limited in scope or from having too few contributions to be able to fulfil the laudable but ambitious objectives.

The case studies are pertinent and both chapters in the biodiversity section make interesting reading, but the Black Sea and the south-western Atlantic are barely covered, and the Black Sea can scarcely be described as oceanic. A book that is professedly about the oceans contains chapters, not only on the Black Sea, but also on the Seto Inland Sea, the South and East China Seas (coastal waters of China) and, oddest of all, Baikal, a freshwater lake.

Although each of the parts of this small volume have some interest, together they do not add up to much because there are not enough of them to yield a publication as comprehensive as is implied by the rather grandiose and uninformative title. This means that, although the book is nicely produced and easy to read, it is difficult to see it fulfilling its intended aim as a reference book.

The figures are plentiful and clear. Each chapter is well referenced and the index is comprehensive and accurate. No typographical errors were detected, although I did wonder if 'eutrophication in coastal water and the occurrence of harmful algal blooms' were really a '*poignant* reminder of the human impact on coastal areas'.

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Tropical Forests: Regional Paths of Destruction and Regeneration in the Late Twentieth Century

BY THOMAS K. RUDEL

xvi + 231 pp., 18 figs, 23 × 15 × 1.2 cm, ISBN 0 231 13195 X paperback, US$ 32.50, GB£ 21.00, Chichester, UK: Columbia University Press, 2005

On rare occasions you stumble across a book that so profoundly alters the way you view the world that you feel a fervent desire to tell others about it. Before reading Thomas Rudel's remarkably illuminating treatise on tropical deforestation and afforestation, I had considered myself a relatively well-informed student of tropical conservation biology; now I realize I was merely groping in the dark.

Rudel has a background in human ecology, geography and sociology, and has worked for over three decades in the tropics. He advocates a regional and historical approach to understand the drivers of land-use change in the tropics, extending in particular the work of Geist and Lambin (2002). Employing formal meta-analyses, he critically surveys the extensive literature on tropical land-use studies to assess both regional differences and temporal trends since the 1970s. Rudel demonstrates with much persuasiveness that his multifactorial, regional approach provides clearer insights into the drivers of tropical land-use change than do the classical reductionist methods used by many ecologists and economists that require large

sample sizes, just a few possible explanatory variables and a natural tendency to overgeneralize.

The book is chock-full of valuable synthesis and concepts. At the outset, Rudel argues from a land-use perspective that there are actually seven distinctive zones in the tropics (South America, Central America and the Caribbean, South Asia, South-east Asia, West Africa, Central Africa and East Africa), linked by factors such as history, degree of geographic isolation and the ratio of forest area to human population size, rather than the three zones (Neotropics, African tropics and Asian tropics) that most ecologists recognize. With this framework in place, he then devotes a chapter to each of the seven regions, assessing the influences of their political and economic history, geography and ecology on the pattern and pace of deforestation and afforestation.

The book offers far too many insights to summarize briefly, but I mention a few key concepts here. Rudel shows that the drivers of land-use change differ dramatically among his seven tropical regions, especially between those with large versus relatively small areas of remaining forest. He demonstrates that government initiatives, such as the forest-colonization and transmigration programmes in Brazil and Indonesia, were the largest drivers of tropical deforestation in the 1970s and 1980s, but have since been overtaken by the rapidly-growing role of private industries, particularly logging, agriculture and mining. His conceptual framework explains, for example, why increasing globalization is likely to exacerbate deforestation in forest-rich regions like the Amazon and Central Africa, while promoting afforestation in forest-poor regions like South Asia and West Africa. Further, he evaluates the impacts of a multitude of other factors, such as land-tenure insecurity, population growth, rural-to-urban migration trends, international lender-imposed structural adjustment programmes, fluctuating interest rates and corruption, on forest conservation.

Rudel soundly rejects the 'one-size-fits-all' approach to land management, arguing, for example, that community-based initiatives to promote forest conservation are likely to succeed in nations like India that have a long history of local governance, little frontier immigration and relatively small areas of forest, and fail in others that lack such attributes. Instead of generalizing, he urges a region-specific strategy for forest conservation and management. Rudel's book and the recent tome by Primack and Corlett (2005) that highlights pervasive ecological and biogeographical differences among the world's major tropical regions, demonstrate conclusively that generalizing across the tropics can be perilously misleading and oversimplistic.

Quite simply, Rudel's book is a work of outstanding scholarship. His tone is invariably balanced and credible; even when disagreeing with a particular argument or researcher he does so in a measured non-polarizing manner. Text boxes that encapsulate the stories of those eking out a living in tropical frontiers, poignantly illustrating the evolving challenges they face, enhance the book. Although the illustrations in the book are mediocre, this is only a minor detraction from what is otherwise an outstanding contribution. In short, this book will be indispensable reading for anyone concerned with the fate and management of the world's imperilled tropical forests.

References

Geist, H.J. & Lambin, E. (2002) Proximate causes and underlying driving forces of tropical deforestation. *Bioscience* **52**: 143–150.

Primack, R. & Corlett, R. (2005) *Tropical Rain Forests: An Ecological and Biogeographical Comparison.* Massachusetts, USA: Blackwell Scientific.

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Restoration Ecology: The New Frontier

EDITED BY JELTE VAN ANDEL AND JAMES ARONSON

x + 319 pp., 84 figs, 25 × 19 × 2.5 cm, ISBN 0 632 05834 X paperback, US$ 74.95, Malden MA, USA: Blackwell Publishing, 2006

Restoration ecology is perhaps the most rapidly growing area in ecology. The current volume is an attempt to synthesize the current state of the field, and is directed toward graduate students, researchers, and restoration professionals. This is not a 'how to' book, but rather a mixture of synthetic conceptual sections (Parts 1, 2 and 4) and ecosystem summaries in the context of ecological restoration (Part 3). Although an edited text, the great majority of the nine conceptual chapters were written by the two editors. In addition, the authors and editors are to be praised on the shared organization of the ecosystem chapters, giving the book a more unified feeling than many edited volumes.

Chapters 3–7 (Part 3) are ambitious summaries of current cutting-edge concepts in community ecology. Although sometimes a little dense, they provide sufficient direction for readers to more fully explore individual topics. Curiously, even though restoration ecology is largely a botanical field, most of the examples cited from the ecological literature were zoological, perhaps reflecting the greater complexity (maturity?) of animal community ecology. Perhaps a later edition could be more explicitly related to botanical ecology and make more direct linkages to ecological restoration throughout these conceptual reviews.

Indeed, there were limited direct linkages between the conceptual chapters (restoration ecology) and the ecosystem reviews (ecological restoration). This is indicative of the field itself, where the integration of conceptual and practical issues is still in its infancy. One interesting difference between these sections was the reticence, even angst, of the conceptual authors (for example worries about moving targets and multiple stable states) and the practical confidence of the ecosystem chapters, where the authors had fairly clear views about what was wrong with these ecosystems and how they needed to be improved, even if they were still struggling with the means to do so. This dichotomy was all the more striking when some of the authors of these two views were the same, wearing different hats!.

Although the eight ecosystem summaries (and even parts of the synthetic chapters) have a strongly European emphasis, the entire volume can be read profitably by anyone interested in restoration ecology. Still, this European point of view may be a revelation to many workers in North America and Australia, as the authors fully realize. European ecosystems have a deep and pervasive ancient human footprint. The authors stress this by describing as potential goals for restoration 'semi-natural communities' which are defined

as the anthropogenic ecosystems of pre-industrial Europe. They are also more willing than non-Europeans to discuss currently 'emerging ecosystems' as having ecological legitimacy in their own right, and to put humanity more fully in the mix of what Nature means (in contrast to the wilderness models of nature in North America and Australia, and even the tropics). I particularly enjoyed reading about the rich and diverse environmental histories of each of these ecosystems. Another striking trait of this European volume is the small attention it gives invasive species, which are often the limiting factor in ecological restoration elsewhere in the world. Appropriately for Europe, it places greater emphasis on the negative effects of nitrogen and phosphorus enrichment and acidification.

The production values are high, with few errors and crisp mostly useful figures. Although most of the contributors are non-native English speakers, the English is relatively free of strained language. The reference section is rich, with well over 1000 citations, combined into a single section at the end of the book. Although released in mid-2005, this book follows the new trend of post-dating the publication date (to 2006), apparently to help the volume appear up-to-date as long as possible. In the rapidly developing field of restoration ecology, this is perhaps an even greater temptation.

I suspect that this volume will find its way onto the shelves of many restoration researchers and practitioners and will be used as a key text in graduate courses, where it will help fill a large void. My own copy is already heavily bookmarked, and will be a constant source of research ideas and lecture material. We still await the arrival of similarly suitable undergraduate texts in ecological restoration, for which this volume will likely serve as a reference point.

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Working Forests in the Neotropics: Conservation through Sustainable Management?

EDITED BY DANIEL J. ZARIN, JANAKI R.R. ALAVALAPATI, FRANCIS E. PUTZ AND MARIANNE SCHMINK

xvii + 437 pp., 46 figs, 23 × 15 × 3 cm, ISBN 0 231 12907 6 paperback, US$ 45.00, Columbia, NY, USA: Columbia University Press, 2004

The relative debates of inclusive versus strictly protectionist approaches to conservation continue to be intensely argued, with seemingly irreconcilable opposing positions taken by key voices in the debate. This text on 'working forests' in the Neotropics of Latin America provides a balanced examination of the feasibility of using extractive forests to contribute to conservation objectives. Following upon the recent slew of books written by leading biologists contending that inviolate protected areas are essential for conservation, and by social scientists arguing for community conservation to fulfil social needs, this book provides an unusual examination of extractive forest reserves, written largely by biologists who provide a careful examination of its potentials, and pitfalls.

Beginning with a thought-provoking introduction that defines 'working forests' as forests used for economic purposes, the introductory chapter states the need to explore the idea of production forests as a viable and sustainable method for forest conservation. The book is divided into four sections, each beginning with an overview chapter written by the editors, framing the overall contours of the issue and providing the context for the case studies that follow. The two sections on industrial forestry (five chapters) and community forestry (eight chapters) provide a detailed look at issues that critically impinge on the sustainability of these ventures, including timber certification, monitoring, market engagement and smallholder timber extraction. The third section on 'Working forest paradoxes' contains eight chapters discussing the challenges of balancing multiple conservation and social objectives, and different stakeholder needs, while selecting optimal management strategies and monitoring their working. The final and shortest section explores the future of sustainable forest management with two articles that discuss the potential future for industrial and community forestry in Latin America.

For a book that grew out of articles presented at an international conference in 2002, the editors have maintained a coherent thread through the volume, with only a couple of papers of uneven quality (minimal, considering there are 22 chapters in this lengthy volume). As the first chapter states (p. 11) 'The community . . . involved in tropical forest conservation in Latin America is far from monolithic and speaks, often loudly, with many voices'. There seems to be a bias towards voices originating from outside the region, however, with few authors from other parts of the Neotropics excepting for Brazil. Yet, the book manages to integrate major voices in the debate from organizations with positions as diverse as Conservation International and the Center for International Forestry Research. By bringing these voices together within the covers of one book, yet providing clarity instead of clamour, this book provides much food for thought for those interested in the hard task of understanding how to manage trade-offs between conservation and social objectives. The challenge remains of how to integrate knowledge from these multiple perspectives and experiences. Here is where the book falls short, and I wished that the editors had also worked on a final summary chapter, to compare the different contexts of, and approaches to, working forest management in different regions of Latin America. This would have enabled the editors, authors and readers to fully capitalize on the power of comparative analysis that remains latent in this book.

The book will make valuable supplemental reading for a graduate course on conservation, sustainable development or land cover change, and could also serve as a good foundation for advanced graduate seminar series. For those interested in the debate on exclusivist versus inclusive strategies on conservation, it is a critical reader. Excepting the reproductions of satellite images and image-based classifications, the remaining colour plates appear to be an unnecessary and costly duplication of grey tone equivalents already present in the main text.

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Environmental Change. Key Issues and Alternative Approaches

BY FRANK OLDFIELD

xx + 363 pp., 24.5 × 19 × 1.7 cm, ISBN 0 521 53633 2 paperback, GB£ 35.00, Cambridge University Press, 2005

Is there a need for yet another book on environmental change? The answer is 'no' if it only regurgitates existing work or fails to provide a new perspective; the answer is 'yes' if it offers a novel synthesis of existing knowledge and fresh ideas as to how research may proceed in order to enhance the credibility of data and the certainty of conclusions, and thus contribute to the planning and preparation required to deal with future environmental change.

Oldfield opens with a focus on issues he considers vital. Inevitably these are aspects of climatic change, such as the widely debated impacts of sea-level rise, the increased frequency of extreme weather events and implications for society, the complex issue of combined climatic change and continued human impact on ecosystem characteristics and functioning, the problems created in relation to sustainability and vulnerability (i.e. issues of poverty and development), and possible major and potentially catastrophic environmental changes such as the disintegration of the west Antarctic ice sheet. The pivotal role of the Intergovernmental Panel on Climate Change (IPCC) is highlighted as a coordinator and integrator of scientific results and their implications for society. The approaches for examining environmental change are classified into methodological frameworks (for example environmental monitoring, modelling and palaeoenvironmental investigations), programmes which integrate information from methodological approaches such as the International Geosphere-Biosphere Programme (IGBP) and impact assessments, and methodologies which forge links between these disparate approaches as exemplified in the use of palaeoenvironmental reconstructions in the testing of models of climatic change. A brief introduction to subsequent chapters reflects the book's organization with a focus first on the main methodologies for obtaining information, then on the evidence from palaeoenvironmental studies, the detail of human impact, and finally on projections of future changes and their impact.

Although an examination of the various types of models and their strengths and weaknesses occupies one chapter, there is a distinct emphasis on palaeoenvironmental studies, which occupy the following five chapters. Methods of palaeoenvironmental investigation are reviewed prior to thematic reconstructions, which are subdivided into the long term record of glacial-interglacial oscillations, the environmentally heterogeneous period between the last glacial maximum and the present interglacial (the Holocene), and the spectrum of change during the Holocene itself. The next five chapters review evidence for environmental change in the last 300 years, a period referred to as the Anthropocene, which reflects the predominance of human-induced change; subject headings include changes in the atmosphere, land, aquatic environments, biodiversity and climate over the last 30 years or so. Three chapters are devoted to forecasts of environmental change, especially in relation to global temperature change and sea-level rise, predictions of future precipitation, evaporation and runoff characteristics, wind and ocean current patterns, and finally the possible impacts of such changes. The ultimate chapter examines some of the sceptical responses to climate change, an exercise which paradoxically not only highlights the limitations of this scepticism, but also some of the inadequacies of current research, and then revisits the questions posited initially. In this latter context, it also recognizes the shortcomings of current research in terms of providing a sound basis for planning/policy requirements.

There is a vast amount of information in this book, which includes good illustrative material, a clear text and well-referenced primary research, although the use of the anonymous and eponymous 'we' is irritating in a text which aims to clarify the causes and consequences of change and which adopts a critical approach to data analysis. In this latter respect it is, however, thought provoking and agenda setting; this is exactly what might be expected from a practitioner of environmental change for half a century. Does Oldfield answer the questions he set in the opening chapter? The answer has to be 'no', but he does point out the pitfalls and points a way forward; anything more than this would be to contribute to what he himself describes as 'coherent myths' about environmental change. Have I answered the questions I set at the beginning of this review? Yes, this book is a worthwhile contribution to the literature; those engaged in environmental change research would do well to heed the messages about margins of error, checks and balances, and cross-disciplinary integration; those who might engage in environmental change research should find inspiration and a challenge in what is a fascinating and crucial field of enquiry.

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Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble

BY LESTER R. BROWN

365 pp., 23 × 15 × 2 cm, ISBN 0 393 32831 7 paperback, GB£ 10.99, New York, USA/London, UK: WW Norton & Co. Ltd, 2006

In 2003 Lester Brown published *Plan B*, proposing that economies are so thoroughly out of touch with their environmental support base that the old-style ways of running the planet suggested humans had planned to call by for a weekend rather than stay for eternity. So many changes have overtaken the world in just the past three years that Brown has markedly updated and expanded his earlier book, adding to the title the suffix '2.0'. Those readers familiar with Brown's views may not find much that is new in this book, but they will surely find it a first-rate assessment of where humankind stands today, or rather, how much faster the human species is headed toward a cliff.

Much of the book is taken up with familiar material: shrinking forests, growing deserts, eroding topsoil, collapsing fisheries, melting glaciers, water deficits, energy shortages and global warming, plus a host of associated problems such as population growth (still 80 million more people per year), poverty, the digital divide, hunger and malnutrition, and the fact that whereas the number of underfed

people is hardly declining, it has been surpassed by the number of overfed people. Taken together, these problems mean that a mix of challenges is faced on a scale wholly unprecedented in human history. Moreover, certain of these problems interact in a manner that is not simply additive but multiplicative; they generate compounded impacts.

All this translates into a slowing of economic progress. For instance, it is China's soaring demand for oil, not Middle East troubles, that recently pushed the price to US$ 70 a barrel, and trade experts predict it may rise to US$ 100. This surge in oil prices aggravates poverty, which in turn cuts back on family planning, which in turn again leads to too many people pressing ever harder on declining resources.

Brown makes much play, rightly so, with the thought that China represents a contemporary cautionary tale. Following its two decades of runaway economic growth (how other developing countries must yearn to follow the same track, as a few, notably India and Brazil, are doing already), China has developed such an appetite for resources such as oil, steel and timber that in most cases it already eclipses the USA. It has also become the world's number one consumer of basic commodities, such as grain, meat and coal, and consumer goods, such as televisions, fridges and cell phones. Within a decade, China could be challenging the USA as the world's number one economic superpower when reckoned in purchasing power parity. But if China's economy keeps on growing at a whopping 8% per year (2005 may have been nearer 9.5%), its per caput income will match today's USA level by 2031. Suppose that China's per caput consumption also matches today's USA level, then China's projected population of 1.45 billion will consume grain equivalent to two-thirds of the current global harvest and will use almost one-fifth more oil that today's output worldwide.

Most significant of all could be the fact that China plans to fuel its development processes by burning its huge stocks of coal. Indeed it aims to build 550 coal-fired power plants by 2030, which, if current technology prevails, will generate such a pulse to the global atmosphere's carbon dioxide burden that it will go far to negate the best anti-greenhouse-gas efforts of other industrialized nations to reduce greenhouse gas emissions.

So who was it who spoke of interesting times ahead? While setting out his survival strategy for our civilization (that's the way he phrases it), Brown's bottom-line view is that the world must quickly move ahead of its fossil-fuel, car-centred and throw-away economy and embrace a renewable energy-based, diversified-transport and reuse-recycle economy. To achieve this will require, Brown believes, no less than a society-wide effort on a scale that marked America's response to the attack on Pearl Harbour, namely a mobilization of 'whatever it takes'. Yet current thinking, outlooks, perceptions and plans, still reflect a world of calm predictability, and a case of the future being a simple extension of the past. The first quarter of this century is likely to be as different from the final quarter of the last century as that quarter was different from the final quarter of, say, the 17th century (before the onset of the Industrial Revolution). To cite Brown's closing comment, 'In this restructuring [the shift to a sustainable world], time is not on our side. It would be tempting to reset the clock, but we cannot. Nature is the time keeper.'

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Applied Environmental Economics. A GIS Approach to Cost-Benefit Analysis

BY IAN J. BATEMAN, ANDREW A. LOVETT AND JULII S. BRAINARD

xxi + 335 pp., 25 × 17.5 × 2 cm, ISBN 0 521 67158 2 paperback, US$ 43.00/GB£ 24.99, Cambridge, UK: Cambridge University Press, 2005

This book focuses on one of the most exciting and rapidly evolving trends in environmental economics and natural resource management: improving economic analyses of natural resource planning and evaluation through the use of geographic information system (GIS) technologies and data. The premise of the book is that economic valuation approaches and cost-benefit analyses can be substantially improved and made more relevant by incorporating natural resource and socio-demographic data that are both more detailed (site-specific) and spatially related to a variety of other data and phenomena.

The book incorporates most of the contents of the Ph.D. thesis of one of the authors, and many of its findings have been previously published in various articles in the last decade, however it is helpful to have the entirety of this material in one single medium. The focus of the presented research is on a single case study: the economic evaluation of converting agricultural land (primarily in sheep production) to multipurpose woodland across the entire country of Wales (United Kingdom) in the early 1990s.

The introductory chapter contains background material on both GIS and cost-benefit analysis, but these treatments are very limited, which encouraged me to skip ahead to chapter 9 (GIS and cost-benefit analyses) before beginning to read chapters 2–8. Chapter 2 summarizes recreation valuation methods used by economists to capture both use and non-use values (the contingent and travel cost approaches), while chapter 3 deals with recreation valuation specific to woodlands. Chapter 4 covers the use of GIS for benefits transfer (extrapolating prior valuation study results to another study location). The focus of chapter 5 is timber yield forecasting and estimating the productive values of woodlands, while chapter 6 deals with estimating the net benefits of carbon sequestration. Chapter 8 focuses on the opportunity costs of converting agricultural land to woodlands. Chapter 9 integrates economic analyses from all the previous chapters, and the final chapter evaluates the policy implications of this extensive research effort.

The strength of the book is in its detail and breadth, which make it a very useful read for researchers or policy makers interested in undertaking similar studies. The book also clearly demonstrates the benefits to environmental and resource economists in taking advantage of recently available GIS data and technologies.

A potential weakness of the book to some readers is that is difficult to reference or locate specific technical topics, particularly GIS procedures, using either the table of contents or index. On a related note, there are several cases where insufficient detail is provided regarding the 'nuts and bolts' of GIS methods used and, in my opinion, there are not enough caveats or warnings made regarding the potential to misuse GIS techniques, particularly by economists who may have GIS training and experience. There were a few cases of economics-based material being presented in too much detail, while other topics were sorely missed, such as a discussion and analysis of

land values, a topic which some consider a primary factor underlying agricultural land conversions.

Before, during, and after reading this book, I struggled with whether it was intended for environmental economists or GIS practitioners. Perhaps that is a good sign, as it indicates the book is likely to be of interest to both groups. Economists will likely gain valuable insight into the advantages of using GIS methods to improve cost-benefit analyses, even if they are unlikely to sufficiently learn all of the specific GIS techniques needed for such applications. GIS practitioners who will most enjoy the book are those with a desire to receive a broad introduction to the field of environmental economics and cost-benefit analysis, while gaining a better understanding of how economists and policy makers are likely to use GIS data and methods. Finally, since the book focuses solely on Wales, its applicability may be slightly reduced to readers in other countries with different agricultural land conversion issues.

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