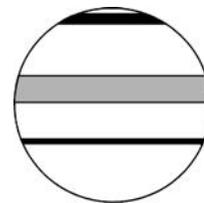


# Holocene book reviews



## Understanding environmental issues

Edited by Steve Hinchliffe, Andrew Blowers and Joanna Freeland, Chichester: Wiley, in association with the Open University, 2003, 179 pp., £19.99, paperback. ISBN 0-470-84998-3

It seems customary for book reviews to end with a reference to the cost of the volume under consideration. I would like to turn this tradition on its head by stating from the outset that, with a price tag of £19.99, this book represents great value for money. *Understanding environmental issues* is book one, the foundation stone, of a four-volume series entitled *Environment: change, contest and response* that has been compiled to support an Open University interdisciplinary course on environmental matters. The series has been designed to introduce readers to many of the principal approaches and topics in contemporary environmental debate and study. The writing and production live up to the excellent standards we have come to expect as the norm from the Open University. The main body of the text is divided into four bulky, but well subdivided chapters. These commence in a highly effective way with a case study of an estuary, the Blackwater in Essex, England, an example of a complex environmental system in which sea, land and the atmosphere meet and interact. This sets the scene and whets the appetite in terms of how environmental issues may be understood. Here the reader is introduced to a variety of themes, namely *change*, *contest* and *response*, which aim to guide the investigation of environments and associated issues. How environments *change*, how they become matters of debate or *contest*, and what is being done in *response* (or is a natural *response* of the particular environment) are founded in this chapter, becoming developed more fully in what follows. In common with the subsequent chapters, it is superbly and lavishly illustrated with maps, diagrams and photographs, the vast majority of which are in full colour. Text boxes are interspersed to emphasize key points and definitions of terms, while each chapter also contains activities that encourage readers to develop their knowledge and understanding. Appropriately placed summaries also guide the reader as to what should have been learned at stages through each chapter. Following a set of key references, answers are provided to the activities given in the chapters.

The following three chapters address aspects of extinction, species loss and habitats. Chapter 2 addresses such questions as what is extinction, has it varied through geological time and is it a current cause for concern? Building on the message from Chapter 1, that change in general does not occur everywhere at the same rate, Chapter 2 emphasizes the spatial and temporal dynamism of evolution and extinction, showing how species evolve and the rapidity with which they can become wiped out. The third chapter, entitled 'Who cares? Values, power and action in environmental contests', focuses on two case studies: the extinction of the passenger pigeon in the USA and the threat of extinction of the Indian tiger. The complicated migration patterns of the monarch butterfly between the USA and Mexico form the basis of Chapter 4. This case study develops into an analysis of how risk and uncertainty affect environmental responses. The survival of the butterfly may well be threatened if these migration patterns are interfered with, yet the degree of risk is difficult to quan-

tify, as, in common with many (all) environmental processes, there are deficiencies in both the available data and knowledge. The final section of the book comprises a brief set of conclusions that remind the reader of the key questions that, having read thus far, they should now be in a position to answer. This section effectively draws the volume to a close and forms an ending to a book that certainly stimulates the reader to want to know more, by way of its effective use of carefully selected case studies and pertinent examples. Although the degree of human responsibility as custodians of the environment is highlighted throughout, I felt that the practical and theoretical considerations facing policy-makers today were rather underplayed and could have been more fully developed. In this respect, the recent text by Ison *et al.* (2002) forms an excellent complementary companion volume to the book under review. The editors of *Understanding environmental issues* have, however, skilfully and successfully woven together relevant interdisciplinary strands from science, social science and humanities and are to be congratulated on the outcome. I would heartily recommend purchase of this book to those about to embark on an environmental science or similar degree programme and, more generally, to anyone who seeks to become better informed and in so doing make reasoned, balanced judgements on environmental issues.

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## Changing environments

Edited by Dick Morris, Joanna Freeland, Steve Hinchliffe and Sandy Smith, Chichester: Wiley, in association with the Open University, 2003, 336 pp., £24.95, paperback. ISBN 0-470-84999-1

Writing a textbook is a daunting task; writing a multi-author textbook is even more difficult. That is why I am always amazed at the ability of Open University (OU) staff continually to produce high quality textbooks which are accessible and beautifully presented, including classic series such as *Oceanography* (S330) and *Earth and life* (S269). Unlike the rest of us, they do not have to cope with lectures, tutorials and daily floods of students into their offices eager to expand their minds. Nor do they have the handicap of assuming that they can convert lecture notes into a brilliant course text, because they do not have any and because it never really works. Having said all this, I was disappointed by *Changing environments* and after introducing the book and series I will explain why.

*Changing environments* is the second of four books for a new OU course entitled *Environment: change, contest and response*, the others being *Understanding environmental issues*, *Contested environments* and *Environmental response*. *Changing environments* aims to introduce the reader to how the environment changes on different temporal and spatial scales. It also examines the causes of environmental change by investigating the

interplay between natural and human influences. As with most other books produced by the OU, it is beautifully presented, with colour pictures and diagrams, separate boxes for more complex issues, key bullet points and learning activities.

The book's limitations arise from its attempt to introduce a vast range of subjects, from plate tectonics and air quality to economics and models of development, and a tension between trying to explain environmental systems and illustrating the causes of environmental change, whether natural or anthropogenic. These problems could have been overcome by a clear structure, but this book's unfortunate lack of a coherent structure means it fails to link the processes of environmental change to the different timescales on which they operate. One solution might have been to write the book along a timeline, starting with longer-term environmental change and processes such as tectonics, and leading the reader steadily through the many influences on the natural environment, finishing with the historical, current and future influences of humanity.

One problem with *Changing environments* is the chapter structure; some are concerned with processes, such as *Human impacts* and *Population change*, while others pick on a particular area of the environment such as *Water*, *Land* and *Atmosphere*. Hence there is repetition and no clear path leading the reader through the book. Water shortages, for example, are discussed in Chapter 5, but irrigation and salinization in Chapter 4. There is also a lack of coherence within some chapters. For example, in Chapter 1 we jump from human influences on the land in the twentieth century to ecosystems to plate tectonics. The shame is that this structural defect masks some excellent chapters and some insightful writing. I particularly liked Noel Castree's chapter on uneven development, globalization and environmental change.

The disjointed nature of *Changing environments* could be blamed on the fact that each chapter is written by a different set of authors. This is different from many past OU books which have been written by a couple of authors or by a course team, but this does not seem to have affected the other two books in the series that were available at the time of writing this review. Both *Understanding environmental issues* and *Contested environments* have a strong underlying rationale and a coherent structure, leading students gently through some of the most difficult and interesting issues in environmental science.

Hence, for anyone working on the Holocene timescale, there are much better books on the physical processes of how the environment changes, such as Ruddiman (2001) or Wilson *et al.* (2000). I do believe, however, that *Understanding environmental issues* and *Contested environments* should be essential reading for everyone working on the Holocene in order to understand the wider implications of our research, since research into the Holocene provides us with the ability to understand the natural variability of the environment at a range of temporal (annual to millennial) and spatial (local to global) scales. It also allows us to investigate the human impact on the environment prior to historical and instrumental records, or in areas where these are unavailable. Yet, as many of us have found to our cost, many of these issues relate directly to the politics of environmental change, which we should consider when undertaking our research.

Considering my starting comments concerning the difficulties of writing good textbooks, I am extremely impressed with *Understanding environmental issues* and *Contested environments*, but disappointed with *Changing environments* as it does not live up to the standards we all expect from the OU. If it were judged as a normal textbook, I would not be so harsh,

but that's the price you pay for having extremely high standards and no students.

## References

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 Wilson, R.C.L., Drury, S.A. and Chapman, J.L. 2000: *The Great Ice Age: climate change and life*. London: Routledge and Open University.

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## Contested environments

Edited by Nick Bingham, Andrew Blowers and Chris Belshaw, Chichester: Wiley, in association with the Open University, 2003, 344 pp., £27.95, paperback. ISBN 0-470-85000-0

*Contested environments* is the third in a series of four books to accompany an Open University course on *Environment: change, contest and response*. The first establishes the context of the three major themes of the subsequent volumes on changing and contested environments, and environmental response. Thus, *Contested environments* builds on its predecessors and relies on its successor to finish the tale; the introduction and conclusion are therefore unusually (and irritatingly) brief.

Not all environments are contested, although at times it might seem so, especially in relation to global climatic change, and, of course, the intensity of contest varies spatially and temporally. This idea of a continuum is inherent in the concept of contestation; some contested environments simmer slowly and draw little attention while others are full-scale conflicts. Examples of the former, which are cited as chapter case studies, include landscape, parks and wilderness relationships in various parts of the world, and the role of environmental values in decision making. Such 'contests' may be reported by local media and possibly national media. Examples of the latter focus on the debate about the promotion and trial of genetically modified crops and resistance to their use, and issues relating to environmental justice such as the substantial spills of oil containing PCB in Warren County, North Carolina, in 1978, and the problems caused by oil extraction from Nigeria's Ogoniland in the 1970s and 1980s. Such issues make international headlines. Like so many topics, environmental issues and their associated scientific and social contexts may be misrepresented by exaggeration or trivialization, not to mention inaccuracy, an issue rarely considered in environmental literature but which occupies a welcome chapter here.

Other contested issues included are problems of water availability, which the World Wide Fund for Nature considers the single most pressing environmental constraint on development, and energy provision. Moreover, problems of global trade relations, which are rapidly becoming the cause of considerable environmental injustice, are examined. It is surprising that no reference is made to the Earth Charter or the Global Ecological Integrity Project in the chapter on environmental justice, although these may have been considered in an earlier book. This is a problem of reviewing one book in a closely related series. Moreover, the reading material quoted relies heavily on the other books in the series. On the one hand, this emphasizes continuity, but on the other hand it is parochial and nepotistic (although advantageous for the profiting publisher). The style of writing is chatty rather than one of professional detachment, which is generally preferred by employers. The colour illustrations reflect the fact that this is considered by

Wiley to be a winner. While this is a useful addition to the environmental literature, it will have limited appeal for undergraduate courses such as geography or environmental science, especially as an isolated text. Readers of *The Holocene* may find this book interesting, although not momentous, and certainly not vital, because there is an absence of environmental history on scales greater than about 50 years.

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### Sea level rise: history and consequences

Edited by Bruce Douglas, Michael S. Kearney and Stephen P. Leatherman, San Diego: Academic Press, 2001, 232 pp. plus CD-ROM, US\$64.95, hardback. ISBN 0-12-221345-9

With growing recognition worldwide of the adverse impacts and exorbitant costs of coastal erosion, flooding and loss of life, property, habitat, groundwater resources and entire island nations due to rising sea level, *Sea level rise: history and consequences* is an important and timely contribution to the complex and interdisciplinary science of coastal change. Although coasts have long been known to be inherently unstable, coastal development continues and the attendant risks increase. The task of predicting and mitigating impacts associated with sea-level rise may seem straightforward, but as this book shows they are intricately dependent on interacting climatic, oceanographic, geologic, hydrologic and biologic feedbacks. Our incomplete understanding of these synergies and limited ability to forecast their impact are ultimately tied to the challenges of formulating effective policy to guide socioeconomic development in the light of global climatic change.

*Sea level rise* is targeted at senior undergraduate or first-year graduate students and will prove instructive to coastal scientists, resource managers and policy makers. Eight chapters, written by a diverse set of coastal scientists, examine the evidence and our capacity to identify sea-level rise resulting from human activities and their influence on global climate. Chapter 1 introduces the significance of sea-level rise and sea-level records with examples of the temporal-spatial complexity that are elaborated upon in the rest of the book. Chapter 2 provides a limited summary of past sea-level variability with a narrative on 'smooth' versus 'episodic' sea-level curves and higher Holocene sea levels, which is antiquated. It describes well the utility and pitfalls of geomorphic features, archaeological remains and marsh deposits as proxies of sea level, but it curiously ignores sea-level reconstructions based on high-resolution coral chronologies (e.g., Fairbanks, 1989; Bard *et al.*, 1996). Such records show pronounced sea-level variability linked to climate and ice-sheet reconfiguration during deglaciation, which also may characterize warm 'stable' periods of climate (Neumann and Hearty, 1996) similar to the present. This chapter also overlooks the literature describing sea-level behaviour in the Pacific, which is characterized by a middle-Holocene highstand above present (see review in Grossman *et al.*, 1998).

Chapter 3 concisely appraises the utility of tide gauges for interpreting historical sea level and sets forth the criteria used to select a subset of the global tide gauge database suitable for examining the global sea-level trend. A simple but elegant analysis shows the importance of record length for refining the rate of twentieth-century global sea-level rise, estimated at  $c. 1.8 \text{ mm yr}^{-1}$ . Chapter 4 provides a clear review of the Glacial Isostatic Adjustment (GIA) process, the viscoelastic adjustment of Earth's lithosphere and associated redistribution of ocean mass related to (de)glaciation, and its importance to

sea-level determinations. Compelling evidence from 'far field' sea-level reconstructions shows the link between ice-melt histories and GIA, and reveals appreciable contributions of Antarctic and Greenland ice melt to sea-level rise ending *c.* 4000 years ago. This implies that subsequent eustatic rise must derive from other contributions or be related to recent climatic warming. In addition to a review of the sources, fluxes and sinks of water in the natural hydrologic system, Chapter 5 provides a detailed account of how anthropogenic activities that reduce or enhance runoff to the oceans contribute to a net reduction of  $0.9 \text{ mm yr}^{-1}$  in sea-level elevation. If this model is correct, it suggests that other processes influencing sea-level rise such as thermal expansion of the water-column due to warming must compensate for water impoundment.

Chapter 6 provides a detailed description of the history, methodology and uncertainty of imaging sea-level height by satellite altimetry. Unlike tide gauges, which record vertical movements of land and sea, satellite altimetry measures the absolute change in sea-surface elevation relative to a reference surface (the geoid). Particularly important is the altimeter's capacity to image expansive areas at once and together with measurements of sea-surface temperature, and the authors show how variability from diurnal (tidal) to interannual (ENSO) phenomena is identified and factored to derive a global sea-level trend. Chapter 7 echoes the need for tide records greater than 60 years in length and illustrates how and why these archives are required to accurately identify interannual to decadal influences on sea level stemming from ENSO and decadal-scale basinwide wind and wave phenomena. Chapter 8 reviews a number of physical and socioeconomic impacts on sandy beaches, wetlands, deltaic coasts and low-lying islands and provides examples of the enormous costs associated with coastal restoration efforts. The results of a study proposing a relationship between the rate of lateral beach erosion and sea-level rise are thought-provoking, but are the subject of considerable debate (Pilkey *et al.*, 2000).

This book is effectively organized with instructional and engaging diagrams and illustrations. Apart from an over-emphasis on historical material and oversight of important recent literature in Chapter 2, it reflects cutting-edge science. The text is generally concise and well written, although Chapter 8 could benefit by differentiating between beach erosion, beach loss and coastal retreat, and clarifying that coastal retreat can occur while healthy, wide beaches are maintained. A CD-ROM containing monthly mean tide-gauge data, glacial isostatic adjustment corrections and an animated presentation of global sea-surface temperatures augments a valuable list of references and internet sites that will certainly interest many. Although sea-level rise often appears to be seemingly imperceptible relative to dynamic events such as hurricanes, floods and storms, its widespread inundation worldwide and synergistic influence with waves, tides and currents beg scientists to expedite our capacity to predict future sea-level related impacts. This book provides an important contribution to this challenge and is a worthy read.

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### **Climate changes during the Holocene and their impact on hydrological systems** (International Hydrology Series)

Arie S. Issar, Cambridge: Cambridge University Press, 2003, 127 pp., £50, hardback. ISBN 0-521-81726-9

The purpose of this book is to review the effects of Holocene climatic events on the hydrological systems of five regions: the Levant, Europe, East Asia (China, Korea and Japan), Africa, and the western USA and Mexico. Although the main topic of the book is climatic and hydrological systems, most of the discussion focuses on the impact of Holocene climatic change on the development of human societies. This is an interesting topic, but it is not portrayed by the title.

The length and depth of the discussion varies considerably from region to region. The Levant is discussed in great detail; evidently, this is the area where the author has done most of his research. The chapters for Europe, East Asia and Africa are shorter, despite the regions' size, diversity of landscapes and amount of research. However, they do summarize most of what is known in terms of Holocene climates. The chapter on the western USA and Mexico is the shortest (only seven pages), despite the amount of palaeoclimatic information generated in this region. One page in this chapter is devoted to Holocene palaeoclimates of Canada and the central United States; I wondered, therefore, why the chapter had not been entitled 'North America'. The last chapter 'General conclusions' is a cross-correlation between the regions treated in the book.

The discussion in the Levant chapter centres mainly on palaeoclimate reconstruction based on analyses of stable isotopes from cave speleothems and sediments from deep-sea and lacustrine sediments. Other palaeoclimate records are barely mentioned or not discussed at all. The author often correlates southern Levantine proxy data with  $\delta^{18}\text{O}$  values from Lake Van in eastern Anatolia, an inland region located away from the sources of rain that affect the Levant. This contradicts the main point the author makes about the influence of the Indian Ocean Monsoon, which may have affected the southern Levant, but not Anatolia, during parts of the early Holocene. A recurrent problem in the graphs and the text of the book is that the author associates wet conditions with low temperatures, which is not the common case in the Levantine region. Indeed, the enhancement of the Indian Ocean Monsoon and the increase in cyclogenesis in the eastern Mediterranean are directly related to atmospheric warming, as was the case in the climatic optima peaking around 14–13 ka and 9–8 ka. Another recurrent problem is the use of unconventional designations for archaeological periods. One example is the use of Early and Late Neolithic, which supposedly replace the conventional division of Pre-Pottery and Pottery Neolithic. The use of these unusual designations adds great confusion to the already complicated divisions of archaeological periods in the Levant. Additionally, some of the cultural periods on the graphs deviate from generally accepted time boundaries. Another major problem is the use of Levantine archaeological chronology in every graph of the book, even

those referring to China or Mexico; what relevance do the Ottoman and Mamluk periods have to the western USA and Mexico? Graphs and maps in the book, although showing relevant information, are of very poor quality. In some of them it is possible to see how labels were typed, cut and pasted onto the maps.

In summary, this book could disappoint readers who are not familiar with or not interested in the palaeoclimates of the Levant or those readers who expect a more detailed discussion on palaeoclimate in other regions. However, it does contain a concise discussion on climatic change in the Levantine region, Europe, Africa and East Asia.

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### **Global climate change: the science, economics and politics** (New Horizons in Environmental Economics, Bush Series in the Economics of Public Policy)

Edited by James M. Griffin, Cheltenham: Edward Elgar, 2003, 270 pp., £55, hardback. ISBN 1-84376-190-4

This book is timely in addressing the science, economics and political argument behind climatic change as it influences and is influenced by the United States. The first two chapters cover the basic science needed to comprehend the key issues. Schlesinger gives a useful overview of the carbon cycle and discusses in some detail the potential (in)significance of enhancing natural sinks, arguing that there is 'no alternative but to cut emissions, substantially and immediately' if we want to avoid climatic change. North explains climate modelling, the rapid progress that has been made and the huge challenges that remain. He shows the predictions of common scenarios, without reporting their assumptions in detail, and stresses the substantial uncertainty associated with each.

The remainder of the book focuses on economic and political issues, starting with Goulder's exposition of the use of cost-benefit analysis in climate policy. Goulder concludes that, 'when used in conjunction with other aspects of policy analysis, benefit-cost analysis contributes productively to sound climate-policy decision making'. In the right hands this may be true, but if policy makers place undue emphasis on the appealing simplicity of 'bottom line' figures, this could be counterproductive. The next three chapters flesh out the benefit-cost thinking. Mendelsohn argues that moderate warming of 2.5°C would result in small net benefits, with damage setting in for higher temperature rises, and that compensation to the most vulnerable nations is a more attractive policy than attempting substantially to curb emissions. The substantial inherent uncertainties, however, do not seem well reflected in the conclusions, which are based on central predictions from a small number of simulations. Smith *et al.* also focus on the 2.5°C case, providing an overview of nonmarket valuation methods and estimates for climatic change. They conclude that it is not yet possible to value nonmarket impacts with accuracy. Thus they expect net global damages to ecosystems, biodiversity and health, benefits to recreation, and uncertain impacts for tourism and amenity, although in all categories they expect global variation, with winners and losers. Edmonds and Sands give a clear explanation of the Hotelling approach and its implications, describing the derivation of emissions paths for each possible stabilization level of atmospheric CO<sub>2</sub> concentration. They show that 'costs drop dramatically as the stabilization concentration rises, for example, from 450 ppmv to 550 ppmv. At higher concentrations, reductions in total cost become smaller'. They note that deep cuts now could be cost-effective if this caused a major

pulse in research and development leading to very rapid technological change with enough future benefits to outweigh the costs of current cuts, but they suggest this scenario is unlikely to hold. Why, however, should governments not invest directly in this research, without imposing dramatic cuts, thereby gaining the best of both worlds?

Manne sets up an intertemporal general equilibrium model with different damage scenarios, and reviews the implications. A particular conclusion relates to the error of thinking that we have to decide now what emissions will be over the next hundred years or more; although decisions now will have implications for future abatement opportunities, 'there will be ample opportunities for learning and for mid-course corrections'. One valuable conclusion is the demonstration that 'the longer it takes to resolve uncertainty, the greater the need for immediate precautionary action', which again flags up the high importance of rapid scientific research as a key component of climate policy. Victor reviews the problems of international agreement on climate policy, in particular relating to the Kyoto protocol. He argues that some difficulties could be overcome by adopting a hybrid instrument, based on establishing emissions targets and allowing trading, but with a ceiling on price via governments' ability to sell additional emission permits as required; by putting a limit on marginal abatement costs, this would make costs much easier to predict, which would enhance the likelihood of reaching agreement.

While this book covers what it covers very well, there are more fundamental issues to be addressed. Like much work in this field, there is a focus on moderate warming and central projections of medium-term climatic change. The real policy problems which face us are not whether or not we will undergo 2.5°C warming, but when this will happen, how much we will warm beyond that, and the uncertainties and risks associated with the mean projections. The book does touch on these points, but I felt the balance was too much on the moderate side. Similarly, intergenerational equity and the potential for intragenerational side-payments and compensation are touched on without being tackled in depth. One might ask whether the continued pursuit of economic growth in already wealthy countries is really worthwhile; self-reported happiness levels do not rise with growth and, if welfare above subsistence level depends primarily on relative income and rising relative position in society, the results are self-defeating rat-races and economically wasteful (inefficient) expenditure on positional goods. Even without the problem of climatic change, there are strong arguments for changing our focus from the size of the pie to the distribution of the slices. The focus on economic efficiency is closer to current political reality, in particular in the United States, and in that context the book is a useful overview of mainstream (neoclassical) economic thinking on the issue. Yet, by focusing primarily on economic efficiency, and to a large extent on mean predictions of warming, this book misses the fundamental points society really needs to address.

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**Remote sensing of atmosphere and ocean from space: models, instruments and techniques** (Advances in Global Change Research 13)

Edited by Frank S. Marzano and Guido Visconti, Dordrecht: Kluwer, 2002, 246 pp., £57, hardback. ISBN 1-4020-0943-7

Forty-five years ago the first satellite was launched, heralding the start of the exploitation of space, followed a few years later by the first meteorological satellite. Since that time a plethora

of sensors have been scanning the Earth taking truly global measurements of the environment from high above it. This book, the result of an International Summer School on Atmosphere and Oceanic Sciences at the University of L'Aquila in Italy, provides a timely update to the subject area, covering the basis of retrievals, observations and applications.

The book is divided into four main chapters, starting with the basis of methods for retrievals of parameters through the use of models and inversion techniques. The first paper discusses LIDAR measurements of the atmosphere and, in particular, of aerosols that play a crucial role in controlling the climate through radiation balance and interactions with water. An overview of the use of radiative transfer in physical models of precipitation is provided and the representativeness of the databases needed for the retrieval of precipitation is discussed. This is followed by the selection of the vertical profiles of parameters together with an outline of the use of Bayesian techniques in remote sensing.

The second (and largest) chapter, on atmospheric remote sensing using microwave and visible/infrared sensors, is divided into six papers. The first outlines the use of microwave sounding channels to retrieve temperature profiles, and its use in numerical prediction models. The fundamentals of microwave limb sounding are then provided, with web-based links enabling further information to be found. The remote sensing of water in the atmosphere is covered in the next papers, dealing with water vapour and cloud liquid water, microwave precipitation retrievals, and clouds and rainfall using visible/infrared sensors. These three papers provide a good overview of techniques backed up by a good range of referenced material. The final paper in this section addresses the observation and measurement of tropospheric aerosols.

Chapter 3 begins with two papers on oceanic remote sensing, covering sea-surface altimetry and scatterometry, and the basis and theory of retrievals and real-world applications, together with the correction for atmospheric effects and assimilation into wind-driven models. The third paper looks at how observations from multiple sensors may be usefully employed to determine the characterization of the sea surface. The final chapter provides a very useful introduction to the assimilation of satellite data into mesoscale models using a variational assimilation technique. This is followed by an outline of the COST Action 712 program on microwave radiometry. A brief, but useful, explanation of the COST action is provided, followed by a more detailed outline of microwave radiometry.

This book, although a collection of papers, is a good source of information, with plenty of additional references quoted if the reader should want to explore the selected subjects in more depth. The selection of web links also provides readers with quick and easy access to further information and, in some cases, to computer code, should they want to investigate and experiment further.

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**Climate variability and change in high elevation regions: past, present and future** (Advances in Global Change Research, volume 15)

Edited by Henry F. Diaz, Dordrecht: Kluwer, 2003, 282 pp., €99, £63, hardback. ISBN 1-4020-1386-8

This book follows on from *Climatic change at high elevation sites* (Diaz *et al.*, 1997). Both books are direct reprints of the journal *Climatic Change*; in the case of the present book, volume 59, numbers 1–2 (2003). In turn, this derives from papers presented at a workshop in Davos, Switzerland, in 2001.

The book begins with a short introduction by the editor and other workshop organizers, followed by a wide-ranging review of the possible impacts of climatic change by Beniston. Given that the remaining 11 chapters vary greatly in their geographical and temporal scope, theme, length and methodologies, it is unfortunate that Beniston's chapter was not finalized with reference to the other papers in their near-final form to provide a more valuable synthesis. Within these 11 chapters, three are hemispheric or global in scope, four address parts of North America, three deal with parts of the Andes and one is based on research in mid- to low-latitude regions, particularly the Andes and the Tibetan Plateau. This geographical spread reflects the distribution of recent and ongoing research projects in the fields addressed by the book, and also underlines the fact that most of this work, whether in industrialized or developing countries, is being undertaken by scientists from Europe and North America. However, the longest paper is by Villalba and colleagues, mostly from institutions in Argentina and Chile, with one from Germany. This major paper addresses large-scale temperature changes across the southern Andes, using both instrumental and tree-ring methods. The other papers on trends in the Andes are by Vuille and co-workers, addressing the observation of, and potential mechanisms for, the retreat of glaciers in the tropical Andes; and by Schotterer and co-workers, also working on tropical Andean glaciers, but addressing climatic changes preserved in the glacial record, both chemical and physical.

The chapters from North America range from the Subarctic to desert mountains. Moore and coworkers address the impact of elevation on the ENSO signal in precipitation records from the Gulf of Alaska region, including a high-elevation site on Mount Logan. Further south, Fagre and coworkers review an integrated programme of ecosystem modelling and field studies in the Pacific Northwest, and Graumlich and coworkers consider river flow in the Upper Yellowstone Basin and teleconnections with climatic variability. Also using tree-ring methods, Hughes and Funkhouser look at climate responses over the past millennium of long-lived pines in the Great Basin.

The remaining four papers also vary greatly in terms of their methods and geographical coverage. Diaz and coworkers have used Northern Hemisphere data sets to examine the variability of freezing levels, melting-season indicators and snowcover over the past five decades. Seidel and Free describe how radiosonde data from Africa, the Americas, Asia and Europe have been used to better understand the variability of temperature and atmospheric freezing level, a key issue with regard to glacier retreat, which is the topic of a useful, although brief, synthesis by Meier and coworkers. Finally, Thompson and coworkers provide the latest summary of their work on the use of stable isotope ratios preserved in low-latitude glaciers to understand climatic change over the past 25,000 years.

Taken together, these papers show the state of the art in research on climatic change in high mountain areas, with a strong emphasis on glaciers, and frequently underlining the importance of teleconnections as key drivers of climate variability and change. The full range of methodologies which can be used for such research is described in one or more of the papers. Thus, the papers should be read by anyone who has a strong interest in understanding or conducting research on climatic change in high mountain areas. Yet, as most of the potential audience will have access to the journal *Climatic Change*, either through their libraries or via the internet, I am not convinced of the value of reprinting an entire issue as an expensive book without an index or synthesis.

## Reference

Diaz, H.F., Beniston, M. and Bradley, R.S., editors 1997: *Climatic change at high elevation sites*. Dordrecht: Kluwer.

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## Advances in historical ecology

Edited by William Balée, New York: Columbia University Press, 1998 (paperback 2002), 429 pp., £23, US\$32.50, paperback. ISBN 0-231-10633-5

As attempts to regulate and manage a wide range of global and regional environmental issues gather pace in the early years of the twenty-first century, it is becoming increasingly obvious that understanding of the interrelationships between humans and the wider environment is fragmented and lacks historical and social depth. Environmental and conservation management, pollution control and epidemiology are examples of activities whose practices are restricted by this limited understanding. *Advances in historical ecology* is an important and impressive collection of papers that seeks to widen the debate on the meaning of human-environment relationships, primarily by attempting to provide a common framework that integrates the social and physical sciences. The collection emerged from a 'mini-conference' in New Orleans in 1994; it was published in hardback in 1998 and now appears in paperback.

The collection opens by providing definitions of historical ecology and explanations of the divide between social and physical sciences, together with the implications for understanding human-environment relationships. In so doing, the reader is well grounded in the complex, ongoing debates surrounding the meaning of 'environment', primarily from a social sciences perspective, and is given a critical basis from which to judge the subsequent case studies. The collection goes on to offer bridging solutions to the social science-physical science divide through the development of a landscape-based vocabulary which social and physical scientists can share. This vocabulary is first taken into discussion of key material factors that influence landscape organization and change, including fire, soils and pathogens, before moving into case studies that explore the interactions of humans and the surrounding world in a range of geographical contexts. The case studies are predominantly drawn from South, Central and North America, focusing on traditional and earlier societies, but with some recognition also of the Indian subcontinent and southeast Asia. Examples from Europe and Australia are absent and case studies from these continents would have helped provide a truly global perspective for historical ecology. For a collection that seeks to be genuinely integrative of the social and physical sciences, there is a surprising absence of hard scientific data in places, particularly in those papers that include discussion of soil properties, perhaps reflecting the anthropological bias of the authors.

These criticisms should not, however, take away from what is an outstanding and thought-provoking collection of papers, offering real insight into the complexity of human-environment relationships. It is a genuine, valuable and constructive attempt to provide foundations for a more secure and nuanced understanding of the way we live in the world. This collection has wide relevance to a range of disciplines and should be recommended reading for advanced undergraduates, graduates and researchers in geography, environmental sciences, anthropology, history and ecology.

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