Book review

Climate Change: Biological and Human Aspects, second ed., Jonathan Cowie. Cambridge University Press (2013). 577 pp., $69.99, ISBN: 978-1-107-60356-1 (paperback)

This is the second edition of a celebrated book on climate change originally published in 2007. Since this new edition has been released only six years after the first one, one may ask what's new and important enough to justify a new edition after so short a period. I see several good reasons. In a fast-growing field such as climate change studies, a book is destined to grow old rather quickly. This new edition reflects the need to revise and update text, data and figures according to the latest developments in the field. In particular, the new edition contains: a considerable expansion of the sections on climatic impacts on early societies; updated data and graphs on energy production and consumption; new sections on the Kyoto II conference, and on the energy and climate policies of Canada, Australia and New Zealand; and a new appendix titled "Further considerations" designed to stimulate discussion. This capillary work of revision and expansion has led the book to have a 30% greater word count compared to the first edition, although thanks to the use of a different page layout, the page count has not proportionally increased.

This book remains a "must have" for its particular organization. In recent years, many books have been published that deal with the causes and effects of climate change from different points of view. However, Cowie's book remains unique in its attempt to embrace virtually the entire domain of climate change studies. This book presents, in reader-friendly language, an immense amount of information taken from primary literature from a great variety of disciplines connected with the study of climate change and its impacts. It is thus an invaluable reference not only for undergraduate students, but also for scientists.

Like the first edition, this edition presents, in the first four chapters, a detailed discussion of Earth's climatic history, connecting (in some 200 densely packed pages) past events, current phenomena, and future processes. Although this section may appear of scarce interest from a conservationist's point of view, nothing could be further from the truth. What occurred in the past can be viewed as a natural experiment that can shed some light on the effects of current, anthropogenic climate change. Few books have emphasized this aspect (I can recall one noticeable exception dedicated to butterflies: R.L.H Dennis' *Butterflies and Climate Change*, published in 1994 by Manchester University Press), and Cowie's book deserves special attention for this.

Chapter five shifts from the historical to the most recent phenomena and chapter six presents an updated synthesis of current warming and likely future impacts. This latter chapter contains a first part explaining some of the most prominent biological responses to climate change (including, among others, boreal dendrochronological and tropical rainforest responses, changes in ecosystem functioning, species phenology, species shifts and alteration in species interactions). Although the author uses a selection of studies as exemplificative of general patterns and processes, the variety and abundance of references cited in this section (as in most parts of the book) makes this synthesis a true mine of information for further reading. A second part of this same chapter is dedicated to a detailed discussion of case studies from the USA, Canada, the UK, and Australasia. The chapter ends with a discussion of how greenhouse gases will drive future changes.

Chapter seven is dedicated to the human ecology of climate change. This chapter first explores the past, present and future demographic patterns of our species and the associated main drivers of those patterns, with an emphasis on energy and food supply; then, it moves to shows how human-induced climate change will affect human health and food security. Finally, the author discusses some biological ways (such as vegetation and soil management, and the manipulation of marine photosynthesis) to reduce anthropogenic climate change, and the pros and cons of biofuels. Chapter eight offers an updated, candid review of past and present international environmental policies, and the possible measures that might be adopted to address climate change.

Cowie's book includes appendices containing a glossary, explanations of recurrent abbreviations, a biogeological chronology, and details about calculations of energy demand/supply; as well as a detailed index. The only flaw is that print quality is not excellent. The book does not contain colour figures, although many illustrations would have benefited from colours, the paper quality is not very good, and the book seems obtained from a laser printer.

All in all, *Climate Change: Biological and Human Aspects* offers an interesting interdisciplinary synthesis of our current knowledge of global climate change and of interactions between humans, biological systems and Earth's climate. It is both a fine reference text for undergraduates and stimulating reading for anyone interested in climate change.

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