

BOOKREVIEWS

BIOMETEOROLOGY FOR ADAPTATION TO CLIMATE VARIABILITY AND CHANGE, by Kristie L. Ebi, Ian Burton, Glenn R. McGregor, (Editors). Springer. (ISBN 978-1-4020-8920-6). On line version available at <http://www.springerlink.com/content/978-1-4020-8921-3>. 2009. 281 pages. €119.95. circa NZ\$ 426, AUS\$476, US\$ 189, £109.

This is the first volume in a series in biometeorology whose purpose is to compliment material published by the International Society of Biometeorology (ISM). The series will consist of theme-based volumes organised around the subfields of biometeorology. The current volume emphasises adaptation to climate change as opposed to the extensive literature on its mitigation. The first chapter by the editors explores the development of biometeorology that emerged as an interdisciplinary science in 1956, and then considers "adaptation" from a Darwinian perspective. Here they point out that adaptation through natural selection has a long time frame but the alternative, through migration, where this is possible, is much shorter. To this, may be added, the interference by the human species in selective breeding of plants and animals and in the chemical composition of the earth's atmosphere as well as to modifications in the earth's solid surface. The remaining 11 chapters reflect the core areas of biometeorology and are grouped into two sections – research frontiers and perspectives. Each of these chapters has an abstract and its own list of references. In the research section Chapter 2 (Jendritzky, Germany; de Dear, Australia)

considers the thermal environment of humans and their adaptation to it by considering the human heat budget. They point out that the human species is now able to live and work in any climate zone with varying degrees of discomfort. They then assess the various thermal indices that have been developed usually as a combination of air temperature and humidity (warm climates) and air temperature and wind speed (cold climates). After discussing the current development of a Universal Thermal Climate Index (UTCI) they consider its use for both short- and long-term adaptation. L.Kalkstein (USA), Sheridan (USA) and A.Kalkstein (USA) discuss the problem of extreme heat in urban areas and the development of heat/health watch warning systems (HHWWS) in Chapter 3. They point out that however sophisticated the warning system is, it will only operate successfully if it is implemented quickly through a warning system. Chapter 4 (by Ebi, USA) discusses early warning systems for malaria, the most important vectorborne disease in the world. The problem is that currently warning systems do not predict when and where outbreaks will occur far enough in advance. But this is a young science since the first operationally useful early warning system was only implemented in India in 2004. The systems need the merging of meteorological and health data. Eight authors (six Finnish - Sofiev, Linkosalo, Ranta, Rantio-Lehtimäki, Siljamo, Valvorvirta; one French - Bouszuet; and one Greek - Damialis) combine to write a chapter on "pollen, allergies, and adaptation". Pollination ecology, pollen transport, the effect of climate change on pollen production and distribution are all discussed. The last of these is

important because it will result in the spread and naturalisation of some allergy plants into new areas. Continuing the botanical theme in Chapter 6 (Orlandi, Bindi, Italy; Howden, Australia) discuss plant biometeorology and adaptation with particular reference to agricultural crops and their diseases. They are closely wedded to the IPCC scenarios and the way in which these need to be incorporated into management techniques at all levels from local to international. Moving from the plant world to the animal world the multi-authored Chapter 7 (Gaughan, Australia; Lacetera, Italy; Khalifa, Egypt; Valtorta, Argentina; Hahn and Mader, USA) looks at the response of domestic animals to climate challenges. Although there has been a lot of research on how domestic animals respond to climate stress little is known about how they adapt. The main stress is heat and this is often measured in terms of Thom's THI (temperature humidity index) although new indices are currently being developed. Genetic, environmental and nutritional modifications are other ways in which heat stress and animal adaptation can be managed. In Chapter 8 (Scott, Canada; de Freitas, New Zealand; Matzarakis, Germany) we return to human leisure and consider the tourist and recreation industries that are something of a research frontier. Mass tourism is a post World War II phenomena and the ISM's Commission on Climate, Tourism and Recreation was only founded in 1996. Consequently the literature tends to deal with impacts and mitigation of climate change rather than adaptation to it. This chapter tries to redress this balance by including sections on tourists behaviour (they have wide choices),

tourist operators (snow reliability and water supply, management by offering alternative activities), government (overall planning and/or restrictions, research) and the financial sector (mainly the insurance industry who have introduced weather insurance to counteract their withdrawal of normal insurance from weather sensitive risk areas). 'Adaptation and water resources' is the title of Chapter 9 by de Freitas (New Zealand). He summarises the various options available to the water management industry distinguishing between technological, behavioural, economic and legal adaptive measures before pointing out that climate change impact assessment is currently quite crude. He suggests that researchers should concentrate more on sensitivity studies and describes response surface studies of annual water surplus in Auckland (New Zealand) and Alexandria (Egypt) as an illustration. For a second example he uses calculations of water balance upon Pacific atolls and the sensitivity of the region to changes in rainfall due to an enhanced greenhouse effect. In Chapter 10 Stewart (USA) presents a theoretical framework (Protection Motivation Theory) to organizing the psychological perspectives that can affect adaptations to climate change. That brings to an end the research frontiers and the last two chapters provide a perspective on them. Chapter 11 (Auliciems, Latvia) discusses 'human adaptation within a paradigm of climatic determinism and change'. He discusses climatic determinism from the beginning of the twentieth century to the integrated adaptive model at its end. This is a difficult chapter to read and it is not helped by rather poor proof reading with inconsistent figure

references, formats described but not adhered to (especially Table 11.2), over complex diagrams and language. Finally the three editors return in Chapter 12 to review the status and prospects for biometeorology. Here they put the various chapters into their perception of adaptation to climate change and variability and conclude that

“the material contained in this volume begins to suggest a new vision for biometeorology as the science of understanding the interactions and feedbacks between atmospheric conditions (as codified in the sciences of meteorology and climatology) and biophysical and human systems. “

I noticed a number of typographic errors throughout the book and hope this will be improved in later books in the series. The included index is short but will be quite useful to students who come across the volume in the library. Another improvement would be to include a standard list of acronyms and for all authors to adhere to them. In this volume we have HHWS (heat-health warning services) in Chapter 2 and HHWWS (heat/health watch warning systems) in Chapter 3. In spite of these criticisms the editors are to be congratulated in bringing together a volume with 30 authors from 13 countries. At the prices quoted the book will not find its way onto many private book shelves and a search of the internet showed only a few copies at slightly discounted prices. That is a pity because it will be a useful reference book for a number of years – perhaps librarians could be persuaded to buy several cheaper copies rather than one at full price!

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QUALITY OF THE AUCKLAND AIRSHED By Ningbo Jiang. Published by VDM Verlag Dr. Muller Saarbrucken, Germany. 254 pages. ISBN: 978-3-8364-9002-2. Paperback. US\$ 111.00

This book presents the results of research on air quality in the Auckland Region by taking an “integrated approach” to the subject. The relationship between the local meteorology and air quality, the impact of land-use on air quality, and the relationship between synoptic weather types, local meteorology and air quality are all considered using consistent methodology and a single dataset. While there is a vast literature on urban air quality across the world, there is relatively little that is focused specifically on New Zealand, and Auckland in particular. The book is intended for air quality scientists working across academia, regional councils and in crown research institutes, especially those with interests in urban air quality. While some of the material is technical in nature, the book is quite readable and is well written.

The text is divided into eight chapters with much of the content presented in three chapters covering the topics of meteorology, land-use and synoptic weather types. Chapter 1 gives an overview of air quality in New Zealand with a focus

on Auckland. The reason for selecting NO_x as the pollutant on which the analysis is based is given, as is a brief (one-page) description of the chemistry of NO_x. Chapter 2 is a detailed description of the dataset, while Chapter 3 is a comprehensive description of the statistical techniques used in the data analysis, including principle component analysis, cluster analysis and multiple linear regression analysis. Chapters 4, 5 and 6 cover each of the three aspects of the “integrated approach” to air quality: the relationship between meteorology and air quality, the impact of land-use on air quality, and the relationship between synoptic weather types, local meteorology and air quality. Chapter 7 is a discussion of the results while the overall conclusions are given in Chapter 8.

In some sense, the book promises ‘wide’ coverage (as suggested by the title and as outlined in Chapter 1) while what is delivered is rather narrow, limited largely by the database on which the results are based; only NO_x data are considered, and data from 1990 to 1996. The conclusions derived from the work are based on just two sites: Penrose (a largely industrial area) and Mt Eden (a suburban area). In addition, the author chose to consider only winter data and only data collected during the morning rush hour. In light of the rapid advances in air quality monitoring techniques and the significant expansion of the Auckland air quality database between the mid-1990’s and now, much more could be done using a more up-to-date dataset by considering a range of pollutants (such as particulate matter as well as carbon monoxide) and consideration

of data from other sites that have now been in operation for many years.

One of the big issues (once again, constrained by the data at the time) is the lack of co-located meteorological data used to support the air quality measurements at either of the sites. The analysis was based mainly on meteorological data from the airport site located many kilometers away from either of the two air quality sites considered. While one can argue that the airport site provides reliable ‘above-the-height-of-buildings’ wind flow information across the city in synoptic conditions leading to high wind speeds (irrespective of the position of a site relative to the coastline), the same cannot be said for surface winds in urban locations (where the pollution monitors are located), particularly in low wind speed conditions conducive to high air pollution levels. This is particularly an issue in the chapter on the influence on land use on air pollution levels where the precise wind direction is critically important for the argument.

One of the strengths of the book is the statistical rigor that the author brings to the area of air pollution science. The author is commended for his efforts in this regard. Dr. Jiang sets a high standard for the rest of us working in this area.

This book is an opportunity to comment on the quality of air in Auckland relative to other cities around the world; in fact, given the title, it seems that this is almost expected. While there is discussion (in page one of the book) of the increase in emissions (due in part to New Zealand’s love of cars) and

about the 'brown haze' phenomena in Auckland, there is very limited discussion about our favorable meteorology and coastline in relation to prevailing winds and how this impacts in a positive way on our air quality. We are left wondering how Auckland's air pollution levels actually compare to other urban centres when both the emissions and the meteorology are taken into account.

Despite the book's short-comings (inflicted largely because of the out-of-date data on which the analysis is based), the book is a comprehensive analysis of many of the techniques available to help come to grips with the role meteorology, weather systems as a whole and land use play in determining air pollution levels.

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