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appropriation of marine ecosystem goods and services are fundamental motivations and values. Just as conservation values held by different ethnic groups involved in the Florida sponge fishery recounted by McClanachan had important implications for sustainability, Matthew McKenzie shows that changes in values and, in particular, loss of a vital connection to the resource were at the heart of the destruction of river herring populations in Massachusetts. Subsistence fisheries providing ecosystem services that touched many aspects of daily life in colonial America were supplanted by a commodity-driven view of river herring as bait for fisheries for other species, and so a deep conservation

ethic was lost. Carmel Finley traces the development of the concept of maximum sustainable yield in the mid twentieth century and attributes its advancement by the United States to broader geopolitical motives.

The chapters in this volume illustrate different stages of development in the application of the HMAP research strategy, some establishing proof of concept with further work to follow, others providing more complete analyses of specific problems. The opportunities to be found in thorough analysis of historical information from very diverse sources are evident throughout. Although the reader does derive a good sense of relative changes in the marine

animal populations examined for the period of record, I think it is fair to say that management lessons to be extracted from these case studies are quite general and often implicit rather than explicit. The tasks of linking these historical reconstructions with contemporary estimates of abundance and of deriving more specific insights into marine resource management remain a challenge for future work.

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Climate Change A Multidisciplinary Approach (Second Edition)

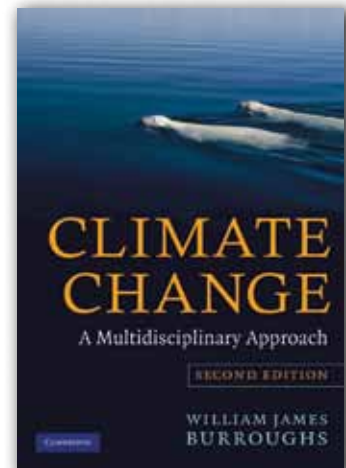
By William James Burroughs.
Cambridge University Press, 2007,
378 pages, ISBN 978-0-52169-033-1,
Softcover, \$55.00 US.

REVIEWED BY RAPHAEL WUST

Climate Change: A Multidisciplinary Approach (2nd Edition) is a thorough compilation of information concerning our current knowledge of climate changes and their implications for society. This book builds upon an earlier volume of the same name also written by William James Burroughs and published in 2001. Since the earlier publication, an enormous array of new information has come online, and the most critical data have been included in this new edition, such as new paleoclimate

data from the European Project for Ice Coring in Antarctica (EPICA) and the fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC, 2007, available at <http://www.ipcc.ch/ipccreports/assessments-reports.htm>). The book's chapters have also been rearranged so that the new structure guides the reader through the most basic components of climate and weather to the complexity of statistical concepts and climate models and implications for society as a whole. As such, the book provides a concise understanding of the fundamentals of climate and climate change without confronting the reader with excessive formulas or mathematics.

The book is organized into 11 well-illustrated chapters that include numer-



ous black-and-white photographs and illustrations. Each chapter ends with a summary section and questions related to the individual chapter, most of which encourage deeper thinking. The first chapter is an introduction to the subject of climate change and its complexity. It also differentiates between climate and weather patterns and climate variability versus climate change. The introduction of the time scales and connections

among processes reveals what the reader will confront throughout the book: within our climate system, everything is interconnected, and hence climate analysis depends on how changes in various aspects of Earth's physical conditions and extraterrestrial influences combine over time.

Chapter 2 outlines the main energy factors of Earth's climate—the solar and terrestrial radiation and Earth's energy balance. This chapter covers the basics of the “greenhouse” effect on our globe and the importance of atmospheric composition for the absorption of radiation from both Sun and Earth. Throughout the book, difficulties and limitations of the heat budget, including heat transfers, are clearly outlined and discussed.

The third chapter describes heat distribution, and the elements of climate and their interaction on our planet. It outlines radiation balance and atmospheric and oceanic circulation patterns, including ocean-atmosphere interactions (e.g., ENSO, the El Niño-Southern Oscillation; the North Atlantic Oscillation; the Pacific Decadal Oscillation; thermohaline and meridional overturning circulations; and ITCZ, the Intertropical Convergence Zone). The chapter also describes some of the recent changes observed in ocean circulation patterns and their implications for future climate, such as the slowdown or the “switch off” of the Gulf Stream, and it discusses the current state of the computer models. The chapter's summary emphasizes the importance of understanding the complex links within our climate system and how these elements can be put in context with what is known about past climatic changes.

Chapter 4 illustrates how climate change is measured, beginning with

instrumental records from both land and ocean as well as the more recent satellite data. It presents Arctic and Antarctic sea ice extents, which are dysynchronous, and reminds us to be cautious about using a simplistic “greenhouse” model of our planet. The chapter also explores historical instrumental measurements and proxy records (e.g., tree rings, ice cores, pollen, corals).

Chapter 5 covers statistics and statistical analysis and how climate data can be used to determine climate variability and climate change. In a remarkably simple fashion, the author explains this complex topic, which is absolutely essential in understanding climate change. The chapter first covers the basics of statistics and statistical analysis, including time series, noise, variability and significance, filtering, and smoothing before discussing the important wavelet and multidimensional analyses.

The next four chapters form the heart of this book. They provide the reader with an overview of natural causes of climate changes (Chapter 6) over recent and geological time scales (Chapter 8) as well as human impacts on climate (Chapter 7) and consequences of climate change (Chapter 9). Topics addressed include agricultural consequences during the last few hundred years and recent economic impacts. An interesting discourse on the “hockey stick” debate (Chapter 8) reveals the challenge scientists face in using statistical analysis to reveal climate fluctuations.

The final two chapters cover climate models (Chapter 10) and climate change predictions (Chapter 11). They outline the last decade's progress in the ability of computational powers to simulate future scenarios without neglecting

some of the limitations that still exist in even the best atmosphere-ocean global circulation models (e.g., cloud formation, ENSO behavior, ITCZ). The final chapter concludes with mention of the Gaia hypothesis, and, more importantly, it wraps up with a stimulating comment that is a thread throughout the book: “By taking a wide view of our climate, we may reinforce a sense of wonderment for the immensity and complexity of the Earth's climate.”

Overall, this book is an excellent synthesis of current knowledge of the climate system and past and present climates. It provides solid background information and includes critical assessments of issues that remain incompletely understood. Burroughs also manages to introduce critical thinking with the question section at the end of each chapter. There, it is up to the reader to logically evaluate climate change issues presented daily by the media. This book will become an oft-cited reference for climate researchers and students, and should be essential reading for politicians and managers involved in issues of climate change. The book presents the basics surrounding climate change in a simple way while pointing out the complexity of climate-data collection, processing, and interpretation. Burroughs must be congratulated on this achievement. This new edition gives readers an up-to-date and appealing reference that provides a scholarly foundation for improving our understanding of climate change and its future economic and political implications.

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