

THE STATE OF THE POLES: CLIMATE LESSONS FROM THE INTERNATIONAL POLAR YEAR. By CHRISTIAN BJØRNÆS and PÅL PRESTRUD. Oslo, Norway: Akademika Unipub Publishing, 2012. ISBN: 978-82-7477-491-9, 139 p., maps, colour illus., bib. Softbound. Kr 279,000; US\$49.00.

The International Polar Year (IPY) 2007–2009, co-sponsored by the International Council for Science and the World Meteorological Organization, was the largest ever coordinated research program covering the Earth's polar regions. This short, very well illustrated book is focused on what we know and do not know about the climate of polar regions, with the IPY providing a stimulus and the latest new scientific findings. The book is not limited to the research done during the IPY, but also brings in scientific findings and other information from the centuries of people studying our polar climates. In this reviewer's opinion, the book fulfills its objectives of presenting "the current state of the poles and assess[ing] the future changes to polar ecosystems and geophysical processes which could affect the rest of the planet" (back cover).

The co-authors of this book seem to make a good partnership. Bjørnæs is Senior Information Advisor at the Center for International Climate and Environmental Research in Oslo and has a background in journalism and writing. Prestrud is a leading Norwegian Arctic scientist and was director of the Center from 2007 to 2012. He was previously research director at the Norwegian Polar Institute and also vice-chair of the Arctic Climate Impact Assessment (where this reviewer was a lead author). The book reflects the backgrounds of the two authors. There is a strong Norwegian flavour to the stories presented, although there are also examples from scientists of many other countries. Since Norway has been and continues to be a leader in polar science, this bias is not a problem. Although there is some discussion of Antarctica, most of the book is on the Arctic.

After an introduction that includes definitions and maps of the regions, there are eight chapters, each with an interesting subtitle: Arctic Ice Retreat: Melting Beauty; Ice-Dependent Ecosystems: Life on the Edge; Ocean Acidification: Corrosive Waters; Ice Sheet Dynamics: Rising Oceans; Thawing Permafrost: Baked Alaska; The Importance of Soot: A Hazy Shade of Winter; Human Life in the Arctic: For Better or for Worse; Terrestrial Ecosystems: Southern Invasion. Each chapter is about 15 pages long, with excellent maps, photographs and graphs, and highlighted text in boxes. Chapters are not written in academic style, but with a very readable approach suitable to the book and the informed but not necessarily professional reader. There are no references in the chapters, but the bibliography at the end lists the main references, mostly in academic literature.

It is not possible in this brief review to discuss all chapters in detail, but for illustrative purposes, I have chosen to comment on five of them. The first full chapter, Chapter

2, "Arctic Ice Retreat: Melting Beauty," opens with a discussion of the then record 2007 minimum summer sea ice extent. Arctic temperatures are warming about twice as fast as the global average and the various theories for this are discussed as examples of "forces of nature" (p. 19) and "theoretical diversity" (p. 21). The chapter ends with the prediction of X. Zhang of the University of Alaska that summer sea ice could cease "to exist somewhere between 2037 and 2065" (p. 27). As noted, this is not a very precise projection and further research is needed to reduce the uncertainty. As an aside, on 27 August 2012, while this review was being written, the news came that Arctic sea ice was at the smallest extent ever recorded by satellite, breaking the previous record from 2007 (NSIDC, 2012).

Chapter 3, "Ice-Dependent Ecosystems: Life on the Edge," provides, at least for this physics-trained scientist, an excellent account of Arctic biological species, their life cycles, and their interdependencies. This chapter also fully brings in the Antarctic marine life—with a section on "the rise of jellyfish" (p. 35). In "Just-in-time production" (p. 36), the authors note that "the timing of the Arctic ecosystem has the precision of a symphony orchestra" (p. 36). In the discussion of changing ice melt that concludes that section, the authors note that changes in the timing of ice melt also change the life cycles of jellyfish and other key species and could significantly reduce the abundance of these species in the High Arctic marine food chain. Seals, penguins and bears are the topics of other sections that raise similar concerns.

Chapter 4, "Ocean Acidification: Corrosive Waters," provides an excellent explanation of the oceanic acidification problem and why the polar oceans are particularly vulnerable. The importance of these changes had not earlier been recognized and is now only becoming better understood.

Chapter 5, "Ice Sheet Dynamics: Rising Oceans," really shows global connectivity between the melting of polar ice sheets and the implications for global sea level rise. In a systematic review of the new science, the chapter includes observations on the changing ice sheets, and comes to some "guesstimates" on sea level (p. 78). Global sea level is projected to rise by as much as 1.6 m by the end of this century. Other models project a global temperature rise of more than 3°C, which will lead to the Greenland ice sheet "largely" (p. 78) disappearing. This disappearance will correspond to a sea level rise of 7 m. The chapter ends by completing a story started at the beginning: "Regardless of who is correct, Mrs. Wati and millions of her neighbours in Jakarta will have to raise their houses a lot more often in the future" (p. 78).

Chapter 8, "Human Life in the Arctic: For Better or for Worse," provides some interesting "cold numbers" (p. 109), as the book calls them, about the people and economic development in the Arctic. The Arctic is rich in resource-based industries, such as mineral extraction and fisheries, but they do not contribute much to the local economies, which depend more on state financial aid to residents. Both climate and industry are drivers of change. Focusing on

Russia, the authors compare reindeer herding and fishery businesses (losers) with transport systems (winners), concluding that the redistribution of wealth is highly variable from region to region.

This book is well documented and prepared, and no flaws were found. The quality of reproduction, editing, and printing is excellent. In conclusion, I fully recommend this book for students, informed laypersons, and practitioners. I also recommend that senior staff of leading politicians around the world read it and advise their bosses appropriately. The messages from the poles are messages of concern, and global actions are needed.

REFERENCE

NSIDC (National Snow & Ice Data Center). 2012. Arctic sea ice extent breaks 2007 record low. Arctic Sea Ice News & Analysis, 27 August. <http://nsidc.org/arcticseaicenews/2012/08/arctic-sea-ice-breaks-2007-record-extent/>.

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CANADA AND THE CHANGING ARCTIC: SOVEREIGNTY, SECURITY, AND STEWARDSHIP.

By FRANKLYN GRIFFITHS, ROB HUEBERT, and P. WHITNEY LACKENBAUER. Forewords by BILL GRAHAM and HUGH SEGAL. Waterloo, Ontario: Wilfrid Laurier University Press, 2011. ISBN 978-1-55458-338-6. xxx + 310 p., maps, colour and b&w illus., appendix, bib., index. Softbound. Cdn\$34.95.

Canada and the Changing Arctic: Sovereignty, Security, and Stewardship is based on research conducted for the Canadian International Council and combines an overview of the major issues in Canada's Arctic North and international Arctic relations with critical insight into policy recommendations for a Canadian northern strategy. Putting the essays of Franklyn Griffiths, Rob Huebert, and P. Whitney Lackenbauer into dialogue, the book explores ways in which the federal government can most effectively realize sovereignty, security, and stewardship in the Canadian Arctic. Over the course of three essays, the authors touch on history, politics, north-south relations, international relations, militarization, natural resources, and historical and contemporary partisan stances. Two helpful forewords provide a framework for the essays and introduce the volume's central topics, including the Arctic Council, circumpolar cooperation, defence, interdepartmental government collaboration, the Northwest Passage, and the disparity between the importance given to the Arctic in political rhetoric and the actual implementation of Arctic policy.

Rob Huebert's essay argues that Canada must maintain control and awareness of its Arctic regions in order to protect itself from international threats to its sovereignty and security. In particular, he takes the position that Canada needs to focus on reinforcing its claim to the Arctic by increasing its northern military presence. Huebert goes on to discuss the main changes in the Canadian Arctic as he perceives them: climate change, resource development, and geopolitical transformation. These changes provide both opportunities for Canada and potential threats to the country's sovereignty and security, as they are increasing international attention and action in the Arctic.

In contrast, P. Whitney Lackenbauer writes against the alarmism and crisis-based mentality that he believes to be present in political and media rhetoric today, arguing instead that a 3-D (defence-development-diplomacy) approach is the best way to combine and address domestic and international priorities. He maintains that an increased military presence does not contribute to sovereignty, and that dialogue and circumpolar cooperation are essential for an effective Canadian northern strategy. Further, he advocates against a national and international "Arctic Race" approach, characterized by unstable governance and a scramble to stake claims on Arctic resources. Rather, he states that an "Arctic Saga" approach is necessary: balancing global collaboration with sustainable Arctic resource development that benefits and includes Northerners. Strengthening the Arctic Council is central to his suggestions, as it will provide a forum that encourages bilateral and multilateral cooperation.

Franklyn Griffiths emphasizes the need for Canada to create a northern strategy that focuses on international cooperative stewardship (reducing conflict between circumpolar countries and caring for the environment) and stronger governance. His recommendations are based on three main concepts, all of which involve the close participation of the Canadian prime minister: elevate, engage, and invigorate. The first term refers to elevating international Arctic relations to the highest possible political level among the Arctic Eight and non-Arctic states. The second involves engaging Russia and the United States to foster pan-Arctic collaboration. The third entails invigorating and enlarging the Arctic Council so that it is able to coordinate and support cooperative stewardship practices between the Arctic Eight as well as non-Arctic countries.

In the conclusion, Lackenbauer provides an update on national and international changes that have occurred in the Arctic since the essays were finalized in early 2009, and how these changes relate to the issues as discussed by the authors of the book. He also briefly discusses the Canadian government's *Northern Strategy*, released in July 2009, and the Department of Foreign Affairs and International Trade's *Statement on Canada's Arctic Foreign Policy*, released in August 2010.

Canada and the Changing Arctic provides a timely, relevant, and insightful contribution to the literature on northern politics and policies. Resisting simplistic classifications,