

ENVIRONMENT

The Atlas of Climate Change: Mapping the World's Greatest Challenge

By Kirstin Dow and Thomas E. Downing. 2006. University of California Press, Berkeley, California, USA. 112 pages. US\$23.95 Paper.

An atlas suggests maps, and maps there are in abundance in this volume, though it also contains many graphs, charts, diagrams, and informative explanatory text. Although short, this book is packed with useful information and well repays careful study. The atlas is divided into seven sections, each focusing on a different aspect of the climate change story and each preceded by a one-page introduction. For the first five sections, topics are illustrated primarily by mapped data, usually at a global scale, though occasionally focusing on a specific region, such as the Antarctic. The maps are usually supplemented by a few paragraphs providing some additional background or explanation for the displayed data. The atlas is sprinkled with quotes, though these are mostly undated, which rather diminishes their urgency or relevance to the issues.

Part 1, Signs of Change, highlights some warning signs, such as the European heat wave of 2003, and then covers three aspects of climate change that set the context for the rest of the book. These three aspects comprise glacier retreat, weather-related disasters, and changes in the polar regions, areas that have been identified as having particular sensitivity to climate change. These topics are likely to be familiar to Canadian readers through various recent media stories. Part 2, Forcing Change, focuses more directly on the climate system, covering four topics, mostly through charts and diagrams. Two aspects of the climate system are highlighted, explanations for the greenhouse effect and how climate operates in terms of heat transfer across the globe. This section also provides a long-term perspective on climate change, showing the record of carbon dioxide fluctuations for the last 400 000 years derived from ice-core records. Finally, there are some scenarios, based on various model projections, showing projected carbon dioxide increases and related temperature increases.

The following three sections form the bulk of the atlas. With six topics, Part 3, Driving Climate Change, examines greenhouse gas production in more detail, highlighting several critical aspects of modern industrial activity and linkages to fossil fuels, especially transportation and agriculture. Covering seven topics, Part 4, Expected Consequences, paints a grim picture, showing, amongst other consequences, the impacts of rising sea levels, water shortages, and threats to human health. Africa stands out as the region likely to be most severely affected in the last category. One of the most interesting maps in this section deals with cultural losses, including historical and archaeological sites. These kinds of impacts are not often highlighted in discus-

sions of climate change. On the other hand, biodiversity losses and biogeographic changes are given very little attention. Since alterations in plant and animal distributions are some of the more obvious and visible signs of climate change, I found this rather surprising. For Canadian readers, these sections may induce both complacency and embarrassment. Complacency because the maps show that on an absolute basis, Canada does not contribute as much to the problems as other more populous industrialized countries. Embarrassment because on a per capita basis we consume so much compared to so many countries of the Third World. Such reflections form a natural transition to the last sections of the book.

Having provided a gloomy outlook in the previous section, Part 5, Responding to Change, shows what we can do about it, or how we might be able to modify the outcomes at a macro-scale. Eight topics are presented, most of which are focused on institutional or administrative responses, such as carbon trading or development of alternate renewable energy sources. Finally, Part 6, Committing to Solutions, shifts the focus from the global to the local, with some charts showing how individual actions might affect the trajectory of change. For those who want the "nitty-gritty" details, Part 7, Climate Change Data, tabulates various measures of economic activity and consumption on a country-by-country basis. These data underpin the maps and graphics in the rest of the book.

Generally the book concentrates on the more obvious impacts of climate change and the ones that are often the focus of media attention, such as potential limits on water and food supplies. As such, most readers are likely to have at least some passing familiarity with the issues. This book therefore serves as a useful source or companion book for those seeking more background on current issues. More subtle effects of climate change, such as water quality degradation, or cascading effects, such as wildfire frequency changes or aquifer depletion, are not shown, perhaps because these are less amenable to measurement or estimation and mapping. Moreover, the emphasis throughout is on impacts to the terrestrial realm; other than sea-level changes, very little attention is paid to marine systems. Again, this is perhaps surprising given the linkages that have been found between, for example, the ENSO (El Niño-Southern Oscillation) with rainfall and droughts.

Cartographically, the book is attractive, clear, and well-designed. It is apparent that a great deal of thought and care has been paid to the layout, presentation, and overall design. In my view, the design is one of the book's greatest strengths. Many people are "visual learners" and this book will definitely appeal to anyone that prefers graphics to text. Most of the global presen-

tations use the same map projection, with Europe and Africa in the centre and the Americas and Australasia at the extreme left and right. For North American readers, this projection can seem strange, since we are more used to seeing the Americas displayed centrally with other continents on the periphery. Much of the base information is quite complicated but the maps show good use of colour and symbols to convey information and summarize complex ideas. One of the more interesting maps shows greenhouse gas emissions, with countries' size distorted according to the amounts emitted. The effect is quite startling, with the dominance of the industrialized regions (USA, Europe, CIS, and East Asia) standing out. Perhaps more telling is the minuscule contribution from Africa, which shows up as a small polygon, despite its large land area and population.

Even with the references and sources, I did find myself wondering exactly how some of the figures underlying these maps are derived, especially because so many of the data are presented at a regional level, where regions may include several countries, and are "binned" into a few categories to simplify cartographic presentation. Uncertainties or error estimates are not provided for the data. Inevitably, there must be some fairly broad assumptions and generalizations underlying the figures. To take one example, what kinds of measurements could be available to allow an estimate of methane emissions on a per capita basis? Are the same or comparable measurements, that is, the same data quality, really available for all areas of the world? How are data integrated even within one country, given that there

are different ecoregions and uneven population distribution? How much of the disparity shown is real and how much attributable to varying levels of data available for different areas of the world? In fact, how far are the numbers behind the maps realistic estimates based on reliable instrumentation or simply informed "guesstimates"? Notwithstanding the beguiling presentation, I did find myself asking many questions about the methodology behind the mapping.

Perhaps the greatest drawback with this book is that, because it deals with current and rapidly changing issues, the information presented will quickly become dated. The authors note that no new material was added after spring 2006, but they also indicate that they intend to update the volume, especially after the next Intergovernmental Panel on Climate Change (IPCC) report, expected in 2007 (page 13). It will be interesting to see how future editions compare to this one and whether detectable changes in some of the indicators show up on that time scale. One could argue that such information is better presented on a website, where it could be updated as needed. However, having the information gathered together in book form makes it easier to consult and compare the different maps. The book's greatest advantage is its accessibility, with its clear presentation and distillation of an enormous amount of complex information into a readily understandable format.

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An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It

By Al Gore. 2006. Rodale, New York, USA. 328 pages.
US\$28.95 Paper.

I freely admit that I picked up this book already predisposed to dislike it. After all, it's supposedly a book about climate science by a politician, so how good could that possibly be? I am relieved to report that this volume pleasantly surprised me; the book is considerably more readable and worthwhile than I expected it to be. Surprisingly, it also projects, an air of intelligence and careful consideration. Yes, the book is a call to action and a strong statement of a particular point of view, but the hype and hyperbole are at a lower volume than I had feared. More importantly, the book is largely based on solid science and the presentation of that science is done in a remarkably straightforward fashion.

In his introduction, Gore says that the book was developed from a slide show and, judging by the layout and design, that presentation mode has carried over and set the book's style. It is arranged as a continuous narrative, with clear graphs and graphics, some on fold-out pages, colourful eye-catching photographs, short sentences and paragraphs, and large type. Graphics are

sourced, though complete citations are not provided. Text and explanatory captions are generally written in plain conversational language. The book surveys the evidence for global warming and outlines the main forcing factors, highlighting the importance of greenhouse gases and the role of human activities in the increasing rate of, especially, carbon dioxide content in the atmosphere.

Gore drives home the message that human activities, in particular industrial activities, are responsible for much of the recent increase in greenhouse gas concentrations in the atmosphere and therefore the increasing rate of global warming. He sets these trends in context by showing, for example, recent rates compared to the carbon dioxide trend inferred from Antarctic records extending back to 600 000 years before present. Other long-term records, such as tree-rings and Greenland ice-cores, are also used to provide perspective. Several times, the point is made that it is not simply the absolute amount of increase that is important but the increasing rate of increase. Taking it as given that global warming will continue, even if actions are taken now to reduce rates of carbon dioxide emissions, Gore then exam-