Book reviews

High Tide: News From a Warming World by Mark Lynas (Flamingo/Harper Collins, London, 2004). ISBN 000713939X, 341 pp, $59.

This book is a most readable anecdotal account of Mark Lynas' travels to investigate the current effects of climate change on people in real situations. He went out of his way to visit circumstances where climatic extremes or changes were impacting on people, often at short notice, such as when floods or hurricanes occurred. Moreover, his anecdotal accounts are interspersed with a global scientific perspective, setting the local situations in the context of the Intergovernmental Panel on Climate Change projections and recent scientific research.

The book has chapters on floods in Britain, melting permafrost in Alaska, rising sea level in Tuvalu, encroaching desert in western China, hurricanes in the United States, and melting glaciers in Peru. The book concludes with a first-hand account of negotiations over the Kyoto Protocol in The Hague and Bonn in 2001, and a short series of recommendations for action on climate change.

Mark Lynas lives in Oxford, but grew up in Fiji, Peru, Spain and the UK. He is a journalist, campaigner and broadcaster who took history and politics at Edinburgh University, and now specialises in climate change (see www.marklynas.org). I read the book fully expecting to find exaggerations or unjustified assertions of certainty and doom, but did not find any. Instead, he carefully introduces his subject matter with cautious statements that each of these situations is not necessarily due to human-induced climate change, but he points to the supporting evidence from science for human influences, and reminds us of the broader picture.

The endnotes give many references to well-known scientific papers, some of which are authored by our colleagues here in Australia. Similarly, his acknowledgments include many well-known authorities including Sir John Houghton and Rajendra Pachauri, both of whom sent him comments on his draft. He also raises dilemmas such as the Alaskan villagers who get jobs in the oil fields, yet find their houses subsiding due to melting permafrost, and authors (including him) who burn up fossil fuels in their extensive travels.

Two things in *High Tide* stood out for me: the dramatic retreat of the glaciers in Peru, which provide water for coastal cities and towns; and the precarious situation of the islanders in Vanuatu, where land between the airport and the capital is inundated even now during spring tides by water rising through the porous ground. The former is illustrated by the striking contrast between Lynas' father's photo of a fan-shaped glacier in the eastern Cordillera Blanca, Peru in 1980 and its virtual disappearance some 20 years later. The latter describes a situation vividly illustrated, as it happens, by photos recently brought back by CSIRO's Kathy McInnes from a visit to Tuvalu (see below).

Left: the view west from the Tuvalu Meteorological Service across the airport runway towards the main township of Funafuti Atoll (Photo: K McInnes). Right: Inundation caused by spring tides in 2002 (Photo: courtesy AMSAT).

Lynas' account ranges from the personal and particular to the general in a smooth and most readable manner. Maybe I am a climate change junkie, but I really enjoyed how he made the subject real and personal as well as general and scientific. His five recommendations for personal and policy action make sense, although in some respects they are demanding, and perhaps to some minds extreme. I hope you will read the book and decide this for yourselves – I have just installed a solar hot water system.

Barrie Pittock

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Climate Change: A Natural Hazard by William Kininmonth (Multi-Science Publishing Co. Ltd, 2004). ISBN 0-906522-26-9. $98 (approx.).

This is really two books, although I'm sure the author did not intend it to be. The first is an informative tour of the climate system, detailing the main drivers of climate change and variability. This is a reasonably good book. The second book makes the case that it is premature to ascribe the recent global warming to greenhouse gas increases. This book is not so good, nor does it merge seamlessly with the first. Pieces of the second book are interspersed between the pages of the first, giving the reader a somewhat disjointed literary experience.

In the first book, Kininmonth's wealth of experience in studying the climate system is displayed. The climate of the past is described, and there are some very clear and readable discussions of the main causes of pre-instrumental climate variations. Kininmonth gives examples of past climate changes ranging over the entire globe, from Chile to equatorial Africa to northern Europe. He goes on to describe the fundamental processes of the climate system, including succinct accounts of atmospheric energetics, the oceanic thermohaline circulation, and so on. There are not many works that describe all of these topics in such a small package, so this book is useful in this regard.

The second book argues that it is premature to claim that the observed global warming of the 20th and early 21st centuries is due to anthropogenic greenhouse gases. Kininmonth's argument goes like this. The IPCC assumes that the atmosphere was in radiative balance before the industrial revolution. Once extra greenhouse gases were pumped into the atmosphere by fossil fuel burning, the extra absorption of radiation in the atmosphere would need to be balanced by increased global temperatures. Kininmonth points out that radiation at the top of the atmosphere is hardly ever in balance: internal variability, due to energy storage mechanisms and transports, will ensure that radiation balance is rarely attained. Therefore the IPCC's assumptions are flawed, and by implication the extra radiative forcing due to increases in greenhouse gases will simply be swamped by internal variability.

To show that the atmosphere and ocean are complicated and variable, the author describes the major reasons for climate variability. This is one of the most valuable sections of the book; there are lots of useful explanations here. Kininmonth's argument is interesting, and indeed internal variability on time scales of a century or longer is poorly quantified, as both the IPCC and Kininmonth point out. The record of past climate does show episodes of centennial variability whose causes are not well understood. Nevertheless, there are several difficulties with his argument. Energy storage and internal variability cannot remove the additional radiative forcing from increased carbon dioxide concentrations from the atmosphere. This additional forcing is there no matter what happens to the rest of the climate system. Energy storage and internal variability can only delay whatever response the climate system makes to increased radiative forcing. At some point, and for a large enough radiative forcing, there must be an effect on global average temperatures. So the question then becomes whether the 20th century warming is caused by internal variability or radiative effects. If it is internal variability, then the warming due to the enhanced greenhouse effect is merely being postponed.

What Kininmonth does not do in his work is propose a way of resolving this issue. This is crucial, as it is insufficient simply to attack the IPCC without proposing a verifiable alternative hypothesis. If the 20th century global warming really is internal variability, then the observed distribution of the oceanic warming should be quite different from that predicted by climate models forced by increased greenhouse gases. If evidence is presently unavailable to resolve this issue once and for all, such evidence should be obtained, or at least it should be suggested how it might be obtained. In contrast, the hypothesis that the warming is due to fossil fuel burning is supported by simulations that are making detailed predictions of the predicted effects. This hypothesis is therefore predictive and falsifiable, both crucial tests of any scientific theory. Moreover, the predictions appear to be roughly in agreement with what is actually happening to the climate system. Science is never about certainty and always about the balance of evidence, even for extremely successful theories such as quantum electrodynamics, and both Kininmonth and the IPCC say that the evidence that natural centennial variability is happening now, as opposed to whether it has happened in the past, is scant.

Kininmonth's case is not aided by some curious statements that he makes. On page 47, he says that 'the different tools available for estimating temperature fluctuations during the past millennium do not permit a quantitative assessment of how local, regional, hemispheric or global temperatures have varied.' This seems harsh, given all of the good work that has been done on this topic. On page 67, he criticises the 'inadequacy of the simple radiative forcing model used by the IPCC, which infers [*sic*] that temperatures are an outcome of the local radiation balance.' This is

a greatly exaggerated statement of the view put forward by the IPCC of the relationship between local radiative forcing, energy transport and changes in atmospheric temperature. On page 72, he exposes 'the fallacy of "positive feedback effects" due to water vapour and clouds' and later says that these have not been quantified. This is despite studies using observations that have done exactly that. In addition, while there are many useful references, several key statements remain unreferenced, which is frustrating for the reader who wants to learn more.

Kininmonth concludes the work with a section on climate models and their inadequacies, but there is little in this section that modellers do not already know. Overall, the book is largely descriptive and so could be read by non-meteorologists, although they would have a hard time following some of the arguments due to the considerable amount of assumed knowledge needed. The standard of illustrations is rather lower than is usual in a published work, and these are mostly not referenced. The price seems high for a book of this overall production quality.

So, which of the two books will I keep? Kininmonth's first book will stay on my shelf because of its useful and concise descriptions of the climate system. Unfortunately, the second book will have to stay there as well. For a reasoned critique of the effect of greenhouse gases on the climate system, the reader is better referred to the IPCC reports themselves.

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