

Alan H. Lockwood

Heat Advisory: Protecting Health on a Warming Planet

Cambridge, MA: 2016, MIT Press.

ISBN: 978-026203487-6 (HB) £26.95. 256 pp.

Heat Advisory: Protecting Health on a Warming Planet is Alan H. Lockwood's impressive attempt to provide 'comprehensive discussion' on the numerous ways climate change will impact human health (p. 4). In this vein, each chapter of *Heat Advisory* addresses a unique aspect of this phenomenon, providing a systematic review of data for each case: from severe weather and air pollution, to infectious diseases and increased violence. Aimed at a predominantly non-academic American audience, Lockwood's objective for *Heat Advisory* is to convince a sceptical readership that climate change is real, and its negative effects are much closer to home than one realises.

Lockwood begins his task by devoting the second chapter to outlining a scientific history of the key findings that evidence anthropogenic climate change. In a coherent manner, Lockwood traces temperature measurements made from as far back as Midlands England in 1659 (p. 17), right through to recent developments in ice core measurements that identify the historical composition of the Earth's atmosphere (p. 19). This supplied data is then reinforced by a detailed, lucid overview of each major greenhouse gas, and how human actions are causing more of these gases to appear in the atmosphere at an unprecedented rate. Indeed, one of the great achievements of this chapter is Lockwood's clear translation of scientific jargon into layman's terms. For instance, where the IPCC's Fifth Assessment Report states that scientists are 'virtually certain' climate change will cause a retreat of permafrost, Lockwood is quick to translate 'virtually certain' as a 99 to 100 percent probability (p. 32). It is this effort toward promoting greater science communication that reveals *Heat Advisory* as a useful tool to discredit climate deniers – deniers who would otherwise exploit the communication deficit that exists between climate science and the public.

Each subsequent chapter of *Heat Advisory* then takes on a different aspect of how climate change negatively impacts human health. In order, these are: severe weather, especially heat-waves and storms; infectious diseases; climate-affected agriculture leading to famine; sea-level rise worsening the numbers of environmentally displaced persons; air pollution and respiratory issues; increased violence due to hotter temperatures and scarcer resources; and the economic costs climate change will cause to social services such as healthcare. Two notable chapters deserving of emphasis are Chapters 4 and 7, which cover infectious diseases and air pollution respectively.

In Chapter 4, Lockwood presents an informative review of recent developments in 'disease ecology' – an increasingly important subject that studies 'the relationships between climate and its effects on the physiological state of the pathogen and the population of disease carriers, or *vectors*' (p. 58). A thorough summary is then provided of diseases most at risk of creating a global epidemic due to 'teleconnections' – disease prevalence linked to distant climatological phenomena – such as the El-Nino Southern Oscillation and the dilution effect (p. 58). Disease-carrier mosquitoes are particularly studied in this regard, for 'as the number of mosquito species decreases, possibly as the result of a changing climate, the probability of transmission rises' (p. 69), with increased epidemic risk of malaria, dengue, and the Zika virus to name but a few. Though the recommendations Lockwood provides to counter these problems are vague ('improving the infrastructure associated with delivering reliable, safe water supplies is essential' [p. 74], for example), the strength of this chapter lies in concretely

demonstrating to the reader how countries rarely associated with diseases like malaria are becoming increasingly vulnerable.

Chapter 7's data survey on air pollution alerts the reader to the falsity of any political administration that suggests pursuit of 'clean' coal and shale gas for energy is better for the environment and our health than other fossil fuels. In the American context, Lockwood illustrates how successful laws such as the Clean Air Act (CAA) have been and how damaging it would be to undermine these laws by endorsing continued use of coal and gas. For instance, the Environmental Protection Agency has predicted that between 1987 and 2020 the CAA would have resulted in \$2 trillion per year in health benefits (p. 112). This has largely come about due to reductions in particulate matter and ozone from increased industry regulations on gas emissions. Were these regulations to lapse, 'It is likely that the effects of climate change will lead to increases in the ozone concentration [...], particularly in areas with high levels of air pollution' (p. 122). Since all four of the most common causes of death in America – heart disease, cancer, diseases of the respiratory system, and stroke – are correlated with air pollution (p. 127), this chapter candidly states that any new administration's emphasis on producing more coal and gas ought to be strongly advocated against.

The successes of chapters 4 and 7 are in large part due to how well bounded and elucidated these topics are. Unfortunately, this cannot be said for every chapter of *Heat Advisory*. The breadth of content Lockwood endeavours to include sometimes comes at the expense of important details that ought to have been included. Chapter 5, on agriculture and famine, is an exemplar of this. This chapter intends to offer an overview of how climate change will create increasing food shortages across the world due to either droughts or severe rainfall. Yet a glaring omission from this chapter is the effect the meat production industry is having on both climate change and human health. The meat production industry accounts for as much greenhouse gas emissions as all the world's transport emissions combined and, importantly, is the biggest source of anthropogenic methane – a gas 20 times more potent for trapping heat in the atmosphere than carbon dioxide. The health effects of the meat industry include not only the results from eating too much red meat (such as heart disease), but also ammonia run-offs from animal waste. Perhaps more devastating, however, is the industry's role in reinforcing conditions for food shortages through the amount of agricultural land that is used specifically to feed livestock (Ripple et al. 2014). It is a shame Lockwood does not mention this issue.

To conclude, *Heat Advisory* is a welcome volume that is well suited for its target audience, with its main strengths being that of communicating climate science in a clear manner to a non-academic readership. However, readers should remain wary, because the scope of topics Lockwood wishes to address means that he risks saying too much and too little at the same time.

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Reference

Ripple, William J., Pete Smith, Halmut Haberl, Stephen A. Montzka, Clive McAlpine, and Douglas H. Boucher. 2014. 'Ruminants, climate change and policy.' *Nature Climate Change* 4: 2–5.