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## Spring Books

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# Managing nature as Earth warms

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BOOK REVIEWED
***Heatstroke: Nature in an Age of Global Warming***
by Anthony D. Barnosky
*Island Press*: 2009. 288 pp. $26.95, £16.99

Climate change is transforming the world as we know it. It disrupts biological clocks, pushes species to different latitudes and altitudes and shrinks biological diversity. It also challenges humanity to question its relationship with Earth; global warming is the antithesis of responsible stewardship. We look to science for guidance on how to turn back the hand of humankind, but it can provide only partial answers. Science is imperfect, unfeeling and slow compared with the steady rise of the global thermometer.

Into this mix of responsibilities, human identity and scientific uncertainty comes Anthony Barnosky's new book. Unlike other accounts of climate change, *Heatstroke* looks at the issue from the perspective of plants and animals. He introduces us to the Irish elk, the pack rat and biologists such as Jim Patton, a professor at the University of California, Berkeley — species and people that are helping to reveal the biotic signature of climate change.

Using many case studies, Barnosky explains how worldwide changes in climate are altering the reproductive rates, timing of breeding and living conditions of creatures. He is spot on in his description of new and exciting scientific findings, portraying them in an accessible and compelling way. Such findings include predictions of the existence of climates with no modern counterparts within 100 years, and a careful reconstruction of past climatic effects on small mammal communities. The reader becomes engulfed in a world of scientific discovery, searching through bones, walking transects to record the numbers of animal and plant species, and looking back across history to reveal the influence of climate on life.

This is not a happy book. Barnosky sounds the alarm about the biological effects of climate change, but his gloom and doom message could alienate readers. He repeatedly asserts that climate change will lead to permanent species loss: "At best, we seem to be witnessing wholesale changes in nearly every ecosystem on Earth. At worst, we may be witnessing the extinction of life as we've known it." The former statement is true, but the latter is extreme. In Yosemite and Yellowstone national parks in the United States, Barnosky reports changes in the composition and locations of species. But these places are not yet experiencing profound species loss. The public needs to understand how climate change is altering life on Earth and that such threats are very serious, but I worry that scientists risk a backlash if their primary message is the worst-case scenario.

Climate is a major determinant of where a species lives and how species interact. Biologists also know that climate change will outpace evolution for a great number of organisms, although perhaps not for bacteria, viruses and some insects. Barnosky describes the result as "like taking a color portrait and rendering it in black and white, or stripping all the harmonic notes out of a symphony". But not all organisms will be affected negatively; some will flourish. We need to figure out if climate change is eroding the species that humans value and replacing them with those that cause harm. And we must identify which species will be most affected, which ones will muddle through and which will rise to prominence. This information will help us to determine what sort of biotic world climate change is creating and what steps we might take to affect that change.

If we heed Barnosky's call to care about the impacts of climate change, we must reduce the greenhouse gases that we emit into the atmosphere and capture those already there. We could also help some species out.

*Heatstroke* describes the strategy of assisted migration — helping a species to relocate to a place where it might be expected to thrive. This strategy aims to overcome dispersal barriers, so that species can survive climate change by altering their geographic distributions. Assisted migration is not a panacea, and it has serious risks, but it is an example of a new kind of thinking that we desperately need. We must devise other adaptation strategies to reduce the harmful effects of climate change where they occur.

*Heatstroke* concludes with ideas about how to slow the climate crisis, such as reducing energy consumption. But Barnosky stops short of offering suggestions that match the scale of the biodiversity crisis he has outlined. He could have suggested alternative strategies, and I hope that *Heatstroke* will inspire others to design potential solutions. We should also stop confusing assisted migration with 'Pleistocene rewilding', an idea that Barnosky raises after assisted migration. Rewilding would return ecosystems to their state before historical climatic change by transporting large animals and predators across continents. But rewilding has different goals and potentially greater consequences than assisted migration, and it has muddied the waters for productive debates about such strategies.

After reading *Heatstroke*, I felt the urge to go outside and experience nature at first hand, to develop a deeper appreciation for the life that climate change threatens. If the public at large could be similarly inspired, there might be hope for positive change. Read this book, and reflect on your own views about humanity's place in nature. Then plant a tree, walk to work, and go and call your political representative.

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