

CAREY, Mark, 2014, *Glaciares, cambio climático y desastres naturales. Ciencia y sociedad en el Perú*, Lima, IEP and IFEA. 343 pp.

In the 1960s, many of the environmental problems that affect us today – destruction of ecosystems, extinction of species, intensive use of non-renewable resources, pollution – began to be perceptible. This led to the emergence of activist environmental movements as well as greater government and academic interest in the history of the environment and the relationship between human beings, industry, and nature. Issues such as extinction of species, the impacts of industry on biodiversity or the depletion of natural resources due to the demographic bomb became part of the debate among historians. *Glaciares, cambio climático and desastres naturales (In the Shadow of Melting Glaciers: Climate Change and Andean Society)* is a work that focuses on a little-studied topic in Peru: the history of the environment and, within this topic, a subject that is even less-studied: the thawing and gradual disappearance of glaciers in the central Andes as a result of climate change as well as the social, political, and economic impacts of this phenomena. As the author demonstrates, the melting of glaciers has had an enormous impact in terms of lost lives, natural disasters, economic losses, and, especially, on agriculture and tourism – impacts that are increasing as time goes by.

Carey's book is important not only because it deals with issues that are little-studied but because of its multi-disciplinary approach and the reflections that it provides regarding matters that will become more and more important for Peru and the contemporary world, such as the shortage of water and insufficient energy generation. As Carey points out, the Mantaro glaciers provide significant quantities of water for the capital city, Lima, where one-third of Peru's population lives.

*Glaciares, cambio climático y desastres naturales* focuses on a variety of issues but here I will discuss only two of these. First, the author discovers a forgotten case of scientific excellence on the periphery: the Peruvian engineers and glaciologists who in the mid-20th century developed original knowledge and methodologies to measure risk in Andean high-mountain lakes. Second, he analyzes the causes, impacts, and reactions to thawing, the principal cause of one of the worst "natural" disasters in the history of Peru – the 1970 earthquake in Yungay. "Natural" has been placed in quotes because as the author tells us, the origins and impacts of these disasters have much to do with human action. Although Carey concentrates on the Cordillera Blanca geographically and on the second half of the 20th century historically, the book permits us to draw lessons that are applicable to different situations prevailing in Peru today.

Near the end of the 1980s, historian Marcos Cueto wrote a very influential book, *Excelencia científica en la periferia* (Lima: Grade, 1989), in which he describes the conditions that

permitted Peruvian scientists to produce original research in a country where traditionally little research was done. Carey's book discusses one case that has not been analyzed – the Peruvian glaciologists charged by the Peruvian government with discovering ways to classify and warn about the risks of thawing in the lakes of the central Andes. After a series of natural disasters related to thawing, they were able to classify and stabilize dozens of lakes through methods that had been later used abroad. They achieved this despite a shortage of resources and stable funding, the need to build improvised equipment, and difficulties in reaching their objects of study – that is, the glaciers. By bringing attention to this case, the book reminds Peruvian historians of science that there exist stories that can provide us with valuable lessons about the situations that promote scientific research in Peru.

As has been shown in other cases and contexts, beyond creating knowledge, the daily life of the scientist requires negotiation, politicking, and social relations. This was the case of the Peruvian glaciologists who repeatedly had to convince local politicians and populations about the value of their work. In fact, an important chapter of this book describes how, at the end of the 1990s, the government, claiming that resources were needed for more urgent tasks, closed the Office of Glaciology, which had brought together scientists, archives, and very valuable knowledge. This demonstrates the limited value that the Peruvian state attached to science or, in any case, that its support has been more cyclical than linear. Scientists and local populations had to forge an alliance to lobby to have this office re-opened.

As Carey demonstrates, however, scientific knowledge is not sufficient in and of itself to modify habits or promote reforms. Scientific truths are not necessarily accepted as valid by the various actors exposed to the effects of thawing.

The second aspect of this book that I would like to highlight concerns natural disasters and reactions to them. Carey's study reminds us that science is a way of understanding the natural world, but not the only one. He notes that large sectors of the population refused to evacuate areas that government officials described as at risk and exposed to flooding. In contrast, sectors of the middle class organized masses or carried religious symbols to snow-capped mountains in search of protection; and oral history associated floods not with thawing as a product of climate change but with the apparition of supernatural beings or the existence of underground canals dating back to before Spanish colonization. At the same time, sectors of the wealthiest classes in the area rejected the relocations promoted by the government out of fears that this would alter urban order (that is, that there would be a mixture of people from different socio-economic sectors within a new urban zone).

These refusals to accept changes, even when faced with the possibility of a natural disaster, are associated with explanations about causes of these disasters, which are not always consistent with the scientific explanation of thawing. In this regard, the study reviewed here builds on the work begun by Charles Walker in his book *Colonialismo en ruinas. Lima frente al terremoto y tsunami de 1746* (Lima: IFEA and IEP, 2010), and continued by researchers such as Lizardo Seiner, who seek to discover the perceptions of the role of the state in relation to natural disasters as well as local responses.

It is also necessary to point to the author's use of a wide variety of sources. In addition to a very large bibliography of secondary sources, the author has found printed primary sources that have been little studied and was able to find documents and regional archives that had never been consulted and which shed a light on the natural disasters that have taken place in Huaraz and, particularly, the emblematic case of Yungay. In addition, he interviewed scientists, regional leaders, and local residents who were protagonists in the matters under study. This is a book that introduces us, in a dynamic and interesting way, to the problems causing by thawing, to the actors involved, and to the tragedies and the responses to them. At the same time, he warns us about climate change and its impacts on the past and the present. And, finally, this is a text that exemplifies, for the Peruvian case, the threat of what some historians call the "perfect storm" that is approaching in the 21st century: the need to adapt to climate change in the context of increased demand for water and energy resulting from population growth and increasing urbanization.

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