

Glacier Book Talk

by Liz Barker

Glaciers seemed like an appropriately cool topic for hot July. Then came Covid with limited library access and no in person group meetings complicated by my own technological inadequacies. Things have changed - including my interest in making up for some of those missed topics. Thanks to some e-book access and contact with my climate change obsessed friend Cindy Snodgrass, I have some material to read. Stratford's volunteer coordinator Emily is posting my write-ups.

I was more interested in focusing on geological glacier discovery and theories plus the specific effects of glacier retreat. *In the Shadow of Melting Glaciers* by Mark Carey (2010) is an excellent specific example of the many entities and issues involved in glacial retreat in the Peruvian Andes. Glacial research in a relatively inaccessible area was begun with efforts to mitigate the disastrous effects of moraine dam outbursts. The final two chapters are a crescendo of conflicting and expanding interests that influence both the research and responses to change.

There are many glaciers high up in the Andes. Many of them feed rivers that plunge down the slopes into the Pacific. The water supplies indigenous farmers on the high slopes, various villages on the way down, and urban centers nearer the coast. That water is also necessary for irrigation and hydroelectric projects which were originally local and/or governmental and are increasingly influenced by international corporations and organizations.

When the glaciers melt and retreat they leave behind a glacial moraine and a scooped out area where melt water forms a glacier lake. The moraine acts as a dam but is not overly engineered. Rainfall and additional melt increases the volume of water. Destabilization of the glacier can induce landslides and the calving of big chunks of ice. A chunk of ice or rock falling into the lake creates big waves that can rise over the dam and compromise its structure. Then it all plunges downhill devastating everything in its path. That's one effect of climate change which encouraged a lot of glacier research.

There's the Zen query about whether a tree falling in the forest makes any noise. A rephrasing might ask whether it is a disaster. That apparently requires a loss of human life or property damage. The Andean glaciers are far from high population areas and relatively inaccessible. In the mid-20th century little was known about the exact cause of such an event - which did occur - or the probability of similar disasters. Even surveys were difficult. Prevention by attempting to lower the level of threatening lakes was limited to hand labor with equipment that could be hauled in by mules.

Questions arise in relation to who would be in charge of projects and who would benefit.

Relocating those in harm's way involved sacred areas, cultural disruption, and class conflict: risks just as real as a moraine dam's overflow. An almost completed hydroelectric plant had been destroyed. Economic development and stable government became factors. Hydroelectric and irrigation projects actually wanted to build more, bigger reservoirs. Aid to disaster areas may open up economic opportunities - and possibly dislocate indigenous populations. Research that focuses on specific aspects may miss extraneous effects. Current approaches don't necessarily envision how essential those Andean Glaciers are to the water supply and regulation of a wide area.

This was a fascinating book, something of a microcosm on confronting climate change - illustrated by global warming's effect on Peruvian glaciers.

Glaciers: the Politics of Ice / Jorge Taillant (2015)

There are many similarities and parallels between this book and In the Shadow of Melting Glaciers. The Argentine author is the director of the Center for Human Rights and Environment. He has written alternating chapters on glaciology and the politics involved in legislating conservation of the glacial environment in Chile and Argentina influenced by the mining operations of Canadian Barracks Gold investment group.

Again, a major factor is the little understood and difficult to explore glacial environment and its relation to the area's water supply. The specific area involved is the Andean heights on the continental divide border of Chile and Argentina. Much of the glacial content refers to unrecognized aspects of the periglacial area such as rock glaciers and debris covered glaciers.

Debris covered glaciers are what you would think they are. Glaciers strewn with rocks, etc. that have fallen on a glacier. Rock glaciers could be described as being underground. These are glaciers in which the rocks and debris contained within the glacier have been frost heaved to the surface. The amount of rock and the weather conditions are sufficient to obscure the entire surface while the glacier underneath continues to inch its way along. You can do this at home by filling a pan with a mixture of water and rock and repeatedly freezing and thawing it.

Lack of available information on the extent of glaciation and the active reluctance of both government agencies and mining companies to share any they had motivated the author to educate himself on the interpretation of Google Earth satellite photographs. There is a large section on how to access and read those photos. The availability of the satellite photos is a valuable source and a huge change from physically surveying the area.

The politics aspect covers the initial passage of a glacial area conservation law, its last minute veto by Argentina's president and the subsequent passage of related legislation in both Chile

and Argentina. This is followed by a lengthy chapter on efforts to implement those laws. Concerns about province versus national control were a major Argentine issue. Ignorance of the location and importance of glacier areas affected votes. Mining companies sometimes aided the impression that glacial areas were quite limited by releasing reports denying any impact on such. The desire for economic development conflicted with environmental concern. The potential value of having gold reserves even came into play. Mining companies' desire to extract resources was avidly abetted by speculative investment firms as eager to make it big on the stock market as any gold rusher ever was to find that mother lode.

The Fate of Greenland: Lessons from Abrupt Climate Change (2011) is filled with full page color photographs of icy landscapes. The beginning section is a quite detailed and explanatory description of the process of obtaining and analyzing glacial ice cores. The general focus is on constructing a history of changing climate and developing theories for some rapid changes. The photos are gorgeous and the ice core stories are very interesting. As the authors wander farther afield to provide verification for some interpretation and theories the science seemed to get more complicated - too much so for me. Overall the book was a good introduction to what glaciers can tell us.

Arctic Dreams / Barry Lopez (1986)

There is not really much about glaciers here but it rode along with the glacier books and who can resist? The author's reputation as a naturalist and a descriptive writer is more than justified. This vivid picture of the cold terrain where the glaciers of our imagination live is an aesthetic tribute worth reading no matter what the topic.