Assessing Arctic Change
Revisiting an Earlier Exhibit with New Data and Contemporary Perspectives
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Challenges Facing Reindeer Herders

Warmer air temperatures have resulted in an increased number of rain-on-snow (ROS) events, a dangerous trend for reindeer herders.1 An ROS event is when rain falls on snow during a warm spell in winter and can form a layer of thick ice on the surface of the ground, preventing reindeer from accessing lichens and sometimes resulting in mass starvation.2 The Saami and Nenets of northern Europe cope with icy pasture by utilizing TEK to make informed decisions about when and where to move their herds. However, the increasing unreliability of formerly predictable season changes and the significant growth of infrastructure restrict their ability to cope.3

Rain-on-snow events have grown in extent and frequency since 2006, as has economic interest in the North, creating unforeseen challenges to the adaptive strategy of indigenous reindeer herders.

Declining Sea Ice

Perhaps the most dramatic and publicly recognizable change in the Arctic is an increasing decline in the extent and thickness of sea ice. Warming air temperatures lengthen and intensify the summer melt season, allowing the dark open sea to absorb more heat which then delays fall-freeze up.4 Indigenous people using rich terminologies are able to easily identify change in the type and quality of sea ice, expanding evidence for sea ice loss available through scientific data. Loss of sea ice has negatively impacted indigenous ways of life, as the ice that communities used to rely on in search of food is unsafe and no longer arrives on time, if at all.5

Arctic Sea Ice is disappearing faster than the already alarming rate predicted in 2006. Since then, the negative effects of decreasing sea ice, both social and ecological, have become massive, more visible, and undisputable.

“Big Picture” Synthesis

There are a few scales at which one could address the concept of climate change. At the planetary scale, one can think about the rising concentration of greenhouse gases, the associated temperature warming, or about the projected sea level rise.1 Focusing in more closely on a particular area, such as the Arctic, one could rely on additional sources of data, namely, the traditional ecological knowledge (TEK) and observational skills of Arctic indigenous peoples.

Of note when talking about climate change at a regional scale is the observed phenomenon of Arctic amplification, or that the Arctic is warming at 1.9 times the rate of the rest of the world.1,2 Therefore, data from the polar regions could provide a proxy for the impacts of global processes on people and environments of our planet.

Coastal Erosion

Coastal erosion rates are intricately linked with the amount of sea ice nearby: a larger fetch increases water levels and results in stronger eroding waves, particularly during the now ice-free fall time.1 However, coastal communities have shown great resilience in spite of the advancing sea. The Alaskan village of Shishmaref, featured in the 2006 exhibit, remains in its original location. Shishmaref is one of the 183 coastal Native Alaskan communities that are impacted regularly by coastal erosion and flooding.1 High costs and close ties to the land prevent communities from acting on calls for relocation, despite facing new challenges, including salt-water intrusion of freshwater sources and the loss of many cultural sites.3

Challenges to Boreal Forests

Wildfires in boreal forests are increasing in severity and frequency, resulting in deleterious effects for local communities. This issue was not covered in the 2006 exhibit. A longer fire season and a rising number of lightning strikes are thought to be the main causes.1 Fires lower the quality of local ecosystems for traditional food economies, as well as threaten homes. The immobility of many settled communities means that adjusting residence or hunting locations following a wildfire is more difficult.2

Also, the boreal forest is a large carbon sink with 33% of Earth’s forest cover. Carbon release during and following a burn has global implications as a source of greenhouse gases.1 Another issue, which is still seen as emergent, is the northward shift of the taiga-tundra ecotone as growing season length increases in the Arctic, which became more pronounced in the past decade.3

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