

The New Arctic

The Arctic encompasses a vast area of land and ocean that includes eight nations (north of the Arctic Circle), and is home to expanses of tundra and taiga vegetation, large mammal populations, major fisheries, numerous communities of indigenous peoples, industrial cities, and some of the most extensive resource extraction operations on the planet. Characterized by extremes of environment and isolation that have led to the development of a wide range of unique ecosystems, the Arctic is changing dramatically, and in many respects becoming more “open.” Northern high-latitude ecosystems are presently some of the most dynamic systems on Earth, due to a variety of human-induced factors related to climate, and use of the land and sea.

Changes in the Arctic are overtly apparent. Over the past several decades, the Arctic has warmed at a rate at least twice that of the global average; Arctic air temperatures for the past five years (2014-2018) have exceeded all previous records (since 1900). Sea-ice is disappearing rapidly, with the prior twelve years (2007-2018) having the twelve lowest summer sea-ice extents on record, with concomitant effects on marine mammals (e.g. polar bears, walrus), northern fisheries, subsistence harvesting by marine-based indigenous populations, and feedbacks to climate. Beginning only in the summer of 2016, cruise ships have been able to completely navigate the Northwest Passage, a once-icy route that claimed numerous ships and the lives of many explorers. The absence of sea-ice and changes in weather are causing serious coastal erosion in the Arctic, and native communities are being forced to relocate. The Greenland ice sheet is shrinking, contributing to rising sea levels, and the extent of spring snow cover in the Northern Hemisphere is decreasing dramatically. Tundra and boreal forest vegetation is changing in complex and

unpredictable ways, and populations of birds and mammals are being affected. Permafrost is warming and thawing, putting cities and infrastructure at peril, and threatening the release of carbon dioxide and methane into the atmosphere, which will exacerbate climate warming.

With these environmental changes come new socio-economic developments. Increasing geopolitical tensions over the opening up of resources are leading to potential legal disputes over ownership. Increases in shipping and tourism in the Arctic will require new ways to manage ship traffic and plan for inevitable accidents. Resource extraction is becoming increasingly viable in previously inaccessible areas, leading to new boomtowns and migration of workers to the North. New cities are expanding while simultaneously coping with a dynamic land surface, e.g. destabilization of the frozen ground on which most Arctic structures are built. Traditional ways in which native communities have lived for millennia need to be adapted to a reshaping of the historical landscape.

The complexities of these dynamics that are currently occurring in the Arctic have not been sufficiently addressed in academic, economic, and political realms, yet our understanding of these dynamics and our ability to deal with them (either through mitigation or adaptation) are crucial for the long-term resilience of the region and the innumerable benefits that it imparts on the global Earth. One absolute necessity for successful efforts regarding the sustainability of the Arctic is the conveyance of information beyond the scientific community and local stakeholders, so that there is a more global understanding of the issues. Traditional forms of media are only reaching a small subset of the population, and therefore other approaches are

needed. The Arts is emerging as a key conduit between environmental data and general awareness, providing visual and auditory experiences that interpret and present scientific information in unique, accessible, and digestible ways for a broad audience. To that end, we are excited about partnering with artists Yvonne Love and Gabrielle Russomagno in hosting their exhibition *A Quick and Tragic Thaw* at The Ruffin Gallery at the University of Virginia as part of the conference *Bridging Science, Art, and Community in the New Arctic*. We are grateful for the National Science Foundation and its *Navigating the New Arctic* program for supporting highly interdisciplinary initiatives such as this.

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