Climate Change and Alaskan Wetlands

by Jim Powell

Climate change is not just a theoretical concept or model. It's real--and Alaskans are witnessing its effects in their communities. A recent opinion poll showed that most Alaskans believe global warming is already causing or accelerating the loss of sea ice (83%) melting permafrost (82%), eroding coastlines (74%), and exacerbating forest fires (72%) in Alaska (Liserowitz 2006). These observations are supported by scientific field studies that show climate change triggers pronounced ecological and social change in Interior Alaska (Chapin et al. 2006). Since 1950, the air temperature has risen by 0.4^{o} C each decade while the growing season has gained 2.6 days, and permafrost (permanently frozen ground – technically classified a wetland) has warmed by 0.5^{o} C (Arctic Council 2005).

One impact of climate change is increased forest fires. Forest fire in Bridger-Teton National Forest, Wyoming. Photo by Richard Lancaster, National Forest Service."

More than forty percent of the land in Alaska is classified as a wetland or water of the U.S. Alaskan wetlands account for more than sixty percent of the nation's total wetland ecosystems (Hall et al. 1994). Most of Alaska wetlands have been projected by several scientists to disappear before the end of the 21st Century. Profound effects on landscape processes are already occurring as a result of warming.

Peat wetlands consisting of continuous and discontinuous permafrost constitute a dominant landform in the north, and contain as much as 30 percent of all terrestrial carbon, often locked in permafrost (Bridgham 1995).

A recent University of Alaska Fairbanks (UAF) study found that ebullition (bubbling), accounted for 95% of methane emissions from the edge of thaw lakes in North Siberia (Walker 2006). Methane flux from thaw lakes appears to be as much as five times higher than previously estimated.

(Walker 2006). UAF found that thawing permaforst along lake margins accounts for most of the methane released from the lakes, and reported that an expansion of thaw lakes between 1974 and 2000, concurrent with regional warming, increased methane emissions in the study region by 58 percent (Walker 2006). Although the degree to which these methane emissions contribute to atmospheric methane has yet to be quantified, as global warming continues to thaw permafrost, the peat's release of carbon in the form of carbon dioxide and methane could increase the atmosphere's heat-holding capacity.

Alaska is responding to warming by creating forums to discuss climate change, engaging the scientific community, and convening local scientific committees to begin managing change. While some opportunities--increased agriculture resulting from a longer growing season, for example--may result (Chapin 2006) the state faces myriad challenges, including decreased winter tourism, more wildfires, less stable permafrost, altered salmon runs, more invasive species, and storm erosion along northern coasts. These events will force Alaskans to adapt and become more resilient. In developing strategies to cope with inevitable changes in its climate as a result of warming, Alaska will need to create innovative and adaptive management and co management strategies locally and regionally.

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