The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

GLOBAL CLIMATE CHANGE

Climate Change Impacts in Alaska

A summary of the threats that climate change poses to the people, businesses and ecosystems of Alaska

Chilkat Inlet southeastern Alaska. © Charlie Ott

Increases in carbon dioxide and other greenhouse gases in the atmosphere have caused global temperatures to rise by an average of 1°F over the past century. This global warming has resulted mainly from human activities such as the combustion of fossil fuels and deforestation. Global temperatures are expected to rise more this century as emissions of heat-trapping gases continue to mount. While the impacts of climate change will vary from region to region, it's clear that almost every place on the planet will be affected.

WHAT ALASKA CAN EXPECT

- Increased pest infestations and forest fires
- Sea-level rise and coastal erosion
- Disruptions and hardship for subsistence cultures
- Increased risk of disease and health effects
- Costly damage to buildings, pipelines and roads caused by thawing permafrost

Over the past 50 years, The Nature Conservancy has invested billions of dollars in land acquisition and conservation. These investments, as well as those of state and federal governments, are jeopardized if emissions of heat-trapping gases continue unchecked.

Private and public entities throughout the nation have succeeded in preserving many important areas of wildlife habitat, including those of Alaska, renowned for its globally significant wildlife nurseries. From the Arctic to the Pribilof Islands in the Bering Sea, Alaska is a vast and, for the most part, undisturbed natural environment. Climate change, however, is going to impact the state more immediately and more intensely than others in the lower 48. By 2100, average temperatures in Alaska are projected to rise by 5-18°F. Given the rapid pace of climate change, the prized natural environment of Alaska will be altered in devastating ways unless we start making sharp reductions in greenhouse gas emissions today.

The following is a summary of how climate change is likely to affect Alaska:

Forest impacts

Climate change is expected to bring about immense changes in forest composition and health. Studies show that catastrophic wildfire in populated areas may be one of the most costly effects of climate change in Alaska – especially alarming given the accuracy with which climate models have predicted fires in recent years. For example, higher summer temperatures brought about a record year for forest fires in 2004. The 1990s saw the greatest damage to forests caused by insects ever recorded in North America as the spruce bark beetle devastated millions of acres on the Kenai Peninsula. The outbreak of this invasive pest most likely occurred because of rapid warming and overall mild temperatures. Since these conditions are likely to be repeated in coming decades, Alaska's forests may see large-scale pest infestations again in the future.

Structural impacts

Higher temperatures are causing immense areas of Alaska's permafrost and ice-covered regions to thaw and melt. Thawing of permafrost poses a major threat to the state's infrastructure and development and is sure to trigger substantial repair costs. Structural failures in buildings have already occurred, as the properties of permafrost change in warmer temperatures. As temperatures rise, more incidences of structural failure, sinking and tilting pilings, broken pipelines and road damage can be expected. In places such as Fairbanks, where average temperatures are traditionally near 32˚F, even a small warming will have a major effect on the landscape. Currently, the costs of thaw-related damage to structures and infrastructure in Alaska have been estimated at about $35 million per year, of which road repair is the largest component with up to $3 million needed to replace one mile of road. Warming permafrost may also harm mineral and petroleum extraction, industries that account for one-fifth of Alaska's $34 billion economy. As warming continues, the Trans-Alaska Pipeline's support structures, anchored in permafrost and designed for specific temperature ranges, would be affected, costing up to $800 million to repair.

Coastal impacts

A large portion of Alaska's population resides near the state's 31,400-mile coastline. With climate change, coastal residents will experience sea-level rise and increasing frequency and ferocity of storm surges exacerbated by the loss of coastal sea ice. Flooding of low-lying property, loss of coastal wetlands, beach erosion, damage to infrastructure and saltwater contamination of drinking water are all likely impacts of climate change in Alaska. More than 180 Alaska Native villages have already experienced increased flooding and coastal erosion. Worsening conditions may require the relocation of many small villages at taxpayers' expense. The government estimates that the cost of relocating a single village of fewer than 400 people could top $400 million.

Impacts to indigenous cultures

Native Alaskans who subsist on fishing and hunting are highly susceptible to the effects of climate change. The long-term survival of their subsistence way of life depends on the survival of key marine and terrestrial species including salmon, herring, walrus, seals, whales, caribou, moose and various species of waterfowl. In recent years, warmer temperatures have caused traditional meat ice cellars in several northern villages to thaw, making them useless. Milder winters and less shore-fast ice have impeded access to offshore and tundra food resources. A decrease in pack ice will affect the entire Arctic food chain. Arctic cod, ringed seal, walrus, polar bear and beluga whale are some species that depend on sea ice for sustenance and survival. As habitats change, these populations are likely to undergo dramatic shifts in range and abundance, which in turn will affect indigenous cultures. Recent declines in fish stocks and walrus populations are already impairing the dietary and economic well-being of certain subsistence communities. Additionally, there is some indication that the increase of water-borne diseases due to greater runoff from heavy rainfall may be affecting the health of indigenous people in Alaska.

Impacts to fisheries

The Gulf of Alaska and Bering Sea contain the nation's largest commercial fisheries. Changes in temperature, precipitation and glacial runoff will affect these rich marine ecosystems. Increasing lake, stream and river temperatures could also contribute to declining salmon populations especially in the southern parts of their ranges. A reduction in stocks due to the effects of climate change may already be impacting Alaska's salmon fisheries. Offshore, Pacific cod are shifting farther northward as oceans warm and their copepod prey recede to colder waters. Scientists think that climate change could halve average harvests of any given species; some fisheries may disappear, other new ones may develop. Such changes could decrease local economies by hundreds of millions of dollars annually.

The Nature Conservancy supports cost-effective, mandatory policies that reduce heat-trapping emissions from fossil fuel consumption, deforestation and other major sources.

Sources: Alaska Fisheries Science Center (2004); Alaska Regional Assessment Group (1999); Derocher, A., et al. (2004); Government Accountability Office (2004); US Environmental Protection Agency (1998); US Global Change Research Program (2000).

for more information, please contact:

Cathleen Kelly
Senior Program Officer
The Nature Conservancy
(703) 841-4897
ckelly@tnc.org

Kurt Parkan
Director of External Affairs, Alaska
The Nature Conservancy
(907) 276-3133
kparkan@tnc.org

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