

Monday, Mar. 27, 2006

### Canada's Crisis

Global warming will heat the Arctic first. A Canadian study offers a preview of how environmental change will alter our society

By LAURA BLUE

A millennium or so ago, the archipelago from Hudson Bay through Nunavut to northern Greenland was inhabited by nomadic groups we now call the Dorset people. They were, according to Inuit legend, tall and gentle folk, and they hunted from the ice edge, harpooning seals and walrus with tools made of bone and ivory. When a slight warming period hit about 1,000 years ago, the ice receded. Bowhead whales moved in from Alaskan waters, followed by seafaring hunters from the Bering Strait. With their boats, those hunters, the forebears of Canadian Inuit, eventually spread east to Greenland. For reasons still not clear, the Dorset disappeared. As with most environmental changes, the warming of northern Canada set in motion a series of complex, interrelated events that produced winners and losers.



ArcticNet/NCE

The research ship Amundsen covered 28,000 km last year

As the world heats up again--this time far more rapidly--the question repeats: Who wins and who loses? Climate models are notoriously useless at predicting local effects of global change. But a massive new Canadian research project, ArcticNet, may provide some early answers about the connections among warming, melting, ecosystem reorganization and human response. And the results may be the best indicator the world will get about what to expect elsewhere. The Arctic will show the earliest and most severe signs of global warming--with Canadian calculations predicting a rise in mean temperature of more than 4 degrees Celsius between the late 20th century and the mid-21st.

ArcticNet, the biggest Arctic research project ever undertaken, calls on more than 100 Canadian researchers from 27 universities and five federal departments to study just about everything in the Canadian Arctic that could be changed by global warming. "It's interesting, but pretty useless, to say the Arctic may have a three-month, ice-free summer, if you don't also look at what the impact will be on the people and industry in the north," says Louis Fortier, scientific director of the Networks of Centres of Excellence project, launched in 2004 and due to run at least seven years. The project grew out of the Canadian Arctic Shelf Exchange Study, which launched the research icebreaker CCGS Amundsen in the Beaufort Sea in September 2003.

Ice, naturally, is central to understanding the Arctic. In the physics of climate change, the ice cover on the water is far more important than the air temperature above it. "Phase change--when there's ice--is really the key," says Rob Macdonald, a Department of Fisheries and Oceans research scientist who studies carbon and contaminant cycling.

The Inuit report the same thing. A hunting, fishing and gathering people, they collect their food from the ice eight months a year. Or at least they try to. The land and sea have become noticeably less predictable in the past five to 10 years, says Sheila Watt-Cloutier, chairwoman of the Inuit Circumpolar Conference. While southern Canadians may bask in unusual winter heat, if ice is too thin to ride over and too thick to take a boat through, it is as if someone closed all the roads to the Inuits' grocery stores. "Ice and snow represent transportation, represent mobility," says Watt-Cloutier. There are more drownings from people falling through thin ice in winter and from hunters trying to cross streams in the summer that became torrents because of melting glaciers.

The changes in environmental cues--things like ice cover, temperature and salinity--are reflected in other natural events. The growth rates of algae and phytoplankton change. Salmon are migrating to western Arctic waters from the northern Pacific. There is concern that Atlantic cod will encroach in the east and compete with the smaller Arctic cod, which have thrived in frigid climates with their special proteins that prevent freezing of the blood. Meanwhile, the retracting ice makes it harder for ringed seals to find breeding grounds and for polar bears to hunt.

That means food isn't always there even when the Inuit can travel. Wildlife may well be less adaptable to extreme changes than humans are. When polar bears can't find prey, there are few alternatives; the bears burn their own fat, releasing into their systems the contaminants stored there--pesticides and other industrial chemicals that accumulate in cool Arctic waters and build up in the food chain. Other animals are also in trouble. In February, in what should have been midwinter in the far north, Nunavut's capital city, Iqaluit, was a balmy 5°C and rainy. When the temperature dropped, a layer of ice froze over the tundra. Now there's fear that the caribou, which normally dig through snow--not hard ice--to get lichen in winter, will be underfed. So the Inuit can expect a significant change in their diet.

There are other human-health consequences of the shifting biology that accompanies climate variation. Warming may mean that germs reproduce faster, increasing Inuit exposure to animal diseases, such as trichinosis. Warming could probably also damage public-health infrastructure--sewage systems, water pipes and reservoirs--as the permafrost on which it was built melts. And for Inuit communities, already reordering rapidly through modernization, the extra social dislocation brought by a warmer climate may bring stress, mental health problems and increased substance abuse. On the positive side, frostbite may decrease, along with cardiac problems brought on by heavy exertion in extreme cold.

And the winners in Canada's Arctic? When the Northwest Passage finally clears enough to be a viable shipping route--probably in the next 50 years--a whole range of trade opportunities will come with it. So will resources, as fossil-fuel deposits in the ocean floor become more accessible. ArcticNet researchers are already mapping out the undersea terrain with sonar and analyzing the geopolitical implications of finding the long-sought Arctic Grail. Their proposals should help the government deal with an international legal dispute already under way: whether the Northwest Passage is within Canadian waters, subject to domestic security and environmental regulation, or an international strait. "Our success will not necessarily be measured by the quality of science, but also in the policy," says ArcticNet executive director Martin Fortier (no relation to Louis).

Should Canada be doing more to mitigate the effects of climate change? Many researchers think so. The Harper government says it is committed to cutting greenhouse-gas emissions but that the Kyoto targets--a decrease of 6% from 1990 levels by 2012--are not achievable given that Canada is, by latest reckoning, 24% over the 1990 baseline. The government has announced that it will develop new "made in Canada" action plans for cutting emissions. Ultimately, once again, the problem will be figuring out which impacts count. But if ArcticNet results are meaningful, the whole world should take note of Canada's north. "It's kind of the canary in the mine shaft," says Louis Fortier. And the canary is roasting.