

End of the Cold War

Angela Self reports on a recent research expedition to the Russian Arctic where she witnessed first hand the detrimental effects of the changing climate.

The Arctic wind blasts across the frozen lake in Russia's polar Urals region, where I'm waiting anxiously with the rest of the research team. There is no sign of the helicopter yet. 'What time are they due?' I shout into the blizzard. Four o'clock – only a few minutes to wait. Our field equipment is slowly disappearing under a blanket of snow. We kick it clear: when our flight to warmth and safety arrives, we have to be ready.

If there is one place you might think would welcome global warming it would be here. Yet local people will tell you that this year's relatively mild weather has caused them many problems. Usually the rivers and lakes are frozen for nine months of the year, allowing people to travel safely over them until June. But this year the river ice melted early. Just a week ago, in April, a vehicle plunged through the ice into a nearby river.

Things could be worse still for the reindeer and the indigenous Nenets whose whole livelihoods depend on them. The herds must cross the ice at the end of every winter on their annual migration to their summer pastures in the north. With the ice gone, will the reindeer swim the swollen rivers, or will they stay in the southern zone? Staying put could be disastrous: as the surface layer of permafrost melts, the tundra becomes an impenetrable mire of thick, clawing mud that even reindeer cannot cross. Unable to migrate to frozen land in the north, they could become trapped on islands of degrading land in a quagmire sea.

This seemingly timeless environment is changing, and we're here to find out how. We aim to collect cores from the muddy lake

sediment. The sediment cores are a two-metre-thick sandwich of organic matter, mud and eroded rock, but preserved in these layers is a sequential record of the organisms that have lived in and around the lake. By examining the organisms in each layer we can see how the biodiversity, productivity and characteristics of the environment have changed over time. My own interests lie in the minute head capsules of chironomid larvae. These tiny, non-biting flies are easily overlooked in the haze of insects that swarm over Arctic lakes in summertime, but they are useful indicators of past climate. Each species has its own specific range of ecological conditions that it can tolerate – particular temperatures or nutrient requirements. Fluctuations in the various species over time enable me to estimate past temperatures and environmental conditions.

Cores I collected last year in western Siberia showed a rapid increase in abundance and biodiversity of chironomid larvae in the late 20th century, results echoed in other studies from the Arctic Circle. These biotic changes are profound and consistent, but the underlying mechanisms for change are less clear. Are the organisms

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responding directly to temperature, or indirectly through changing environmental parameters such as earlier ice melting, a longer growing season or increased nutrient flow? By examining different aspects of the vegetation, aquatic fauna and sediments of this lake, our team hopes to elucidate the root causes. We could then start to predict how these unique environments might respond to climate change in the future and identify particularly vulnerable habitats.

The helicopter is now 40 minutes late. Around us the lake, land and sky are gradually merging in a kaleidoscope of snow. In five minutes we'll have to start digging a snow hole. Our remoteness and vulnerability have never felt more apparent. Then suddenly above the howl of the wind comes the drone of rotor blades.

It is an immense relief to know we are safe, but we are leaving with the realisation that for the Arctic and its people the future is uncertain. What makes it all the more sobering is that their livelihoods depend on action by people who are remote, spiritually and physically, from this extreme environment – action that so far has been slow in coming. ■

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