

Vanishing sea ice creates whole new Arctic

Frozen ocean is not only getting smaller — its icy cover is thinner

The changes in sea coverage affords some development advantages and some other disadvantages.
TOM PADDON CHAIRMAN, ARCTIC ECONOMIC COUNCIL

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Frank Pokiak remembers long days on the land, camped at traditional hunting grounds under June's 24-hour sun, secure in the knowledge that sea ice would provide a safe highway back to his Tuktoyaktuk home. Those days are gone. "We used to stay out quite a while, eh," recalls Pokiak, a longtime Inuvialuit hunter. "We go hunting geese and ducks along the coast and after the snow melts on the ground we still have access via the ocean.



NATHAN VANDER KLIPPE/POSTMEDIA NEWS

Warm weather came nearly a month early in many parts of the Arctic, melting sea ice and setting the pace for another warm year.

"We don't really do that any more. You can't stay out on the land as long. The ice is melting quicker."

Last month, Arctic sea ice covered 630,000 square kilometres less ocean than the 30-year average. Sea ice extent is shrinking about five per cent a decade.

And the frozen ocean is not only smaller, it's thinner. David Barber, who holds the Canada Research Chair in Arctic System Science at the University of Manitoba, says sea ice has lost, on average, about 40 per cent of its total volume.

"We discovered this rotten ice in the summer of 2009," said Barber, who made the finding while on an icebreaker in the Beaufort Sea. "It was multi-year sea ice that had deteriorated so much that the meltponds had gone through and connected with the oceans.

"The ice had broken up into tiny pieces about the size of a Volkswagen and these bits and pieces had congealed with new ice that was forming, only a couple centimetres thick. The satellites thought they were looking at multi-year sea ice, but when we were driving a ship through it, it was this heavily rotted stuff that didn't slow us down at all." What's coming? Hard to say. Sea ice has always been highly variable. Barber said that variability is growing and makes predictions difficult. Dates for an Arctic free of summer ice vary from 2020 to 2080 and scientists can't really say how that's going to play out in different regions.

"When you look at what's happening over the whole Northern Hemisphere, the models are pretty good at that. What they're not good at is the small-scale stuff, particularly storms and the role that storms play in how the ice behaves.

"Most of the contemporary research is looking at these small-scale phenomena to try and understand them so we can encapsulate the physics of them better in the models." But the effects are already distorting fragile Arctic food webs.

Almost all Arctic life, from birds to bowheads, begins with algae that starts blooming beneath the ice every March, said University of Manitoba biologist CJ Mundy.

"When you take an ice core, the bottom of the ice core is brown," he said. "That's all algae."

The bloom is the first in a series of pulses that run from algae, to plankton, to tiny animals called copepods, to fish, to seals and on up.

"That bloom really kick-starts the whole system," Mundy said.

Arctic plants and organisms have evolved to take advantage of resources exactly when they become available.

"It's the timing," said Mundy. "The whole idea behind the Arctic is that they have certain pulses of primary production and then organisms have to survive the rest of the season without having access to that food any more.

"If you melt the sea ice, you're going to decrease the length of the ice algae bloom."

Life will adapt, he said. It just won't be the kind of unique and beautiful life evolved for the Arctic.

"If we start changing the timing, we're going to allow the more southerly ecosystems to march northward. It might produce more energy, it might open new fisheries, but it would likely be a different ecosystem than is there right now."

Weather systems may be changing, too — and not just in the North. Jennifer Francis at Rutgers University caused a stir last year with her paper suggesting that disappearing sea ice exerts an indirect, but powerful, influence on what kind of day southerners experience when they walk out the door.

"It's really kind of set off a whole new line of research," said Francis.

The average temperature difference between the Arctic and mid-latitudes is shrinking because the North is warming faster than anywhere in the planet, partly because melting sea ice allows oceans to absorb more heat.

That difference is what drives the jet stream. The narrower the difference, the slower and more erratic it is.

Francis said the stream is about 14 per cent slower than it was in the '90s. That allows the current to "wobble" north-south instead of flowing evenly east-west. That blocks weather patterns in place that would normally move along.

Scientists have suggested the phenomenon is at least partly behind events such as Alberta's disastrous 2013 flooding and droughts in California. Not all agree. Francis said the skeptics just don't think the effect is pronounced enough yet to be detectable.

"There's been a lot of evidence supporting that it actually is occurring, but the atmosphere is so chaotic that it's difficult to detect these signals with a lot of confidence," she said. "The controversy isn't from people saying, 'No, this is wrong;' it's more they're saying, 'No, we can't see it yet.' "

Much has been made of a potential economic boom from Arctic resources made accessible by opening seas. Not so fast, said Tom Paddon, CEO of Baffinland Iron Mines Corp. and chairman of the Arctic Economic Council, recently created by the group of eight nations that ring the North Pole.

"The changes in sea coverage affords some development advantages and some other disadvantages," he said.

Cruise ship tourism has increased. And although exploratory fisheries have failed to find commercial resources and the government has since banned such attempts pending more research, studies have found more than 800 commercial fish species are moving poleward at up to 26 kilometres a year.

Two commercial transits of the Northwest Passage have already occurred and Paddon said the route is likely to be a handy way to get Arctic minerals to market. Scandinavia has a long history of northern industry and Russia is busy building Arctic ports.

"But this is not the resource development bonanza that to some degree it's been portrayed," he said.

Canada has little to none of the infrastructure that makes development possible. New construction will have to confront issues such as melting permafrost, which destabilizes the ground that airports, mines and ports are built on.

"The Arctic remains an expensive business that requires significant investment. It's going to take time and it's going to take the appropriate level of oversight," said Paddon.