Looking offshore for new carbon sinks

For Canada to live up to its commitments to cut greenhouse gas emissions, scientists are calling for a thorough accounting of the ecosystems that sequester carbon now, and in the future.

While forests and peatlands are often touted as carbon sinks, a new research project led by University of Victoria scientists aims to create the first Canadian assessment of the storage capacity of marine ecosystems. It could also help shape policy around protecting the country's coastal communities from rising seas and flooding.

Blue carbon ecosystems — mangroves, tidal and salt marshes, and seagrasses — can sequester two to four times more carbon than terrestrial forests, making them a significant nature-based solution to climate change, according to the UN's Intergovernmental Oceanographic Commission.

Even though we have 243,000 km of coastline, Canada's greenhouse gas accounting inventories do not include a full accounting of blue carbon, said Julia Baum, the project's principal investigator and a marine ecologist at the University of Victoria.

"We don't want to be accounting for things that aren't truly mitigating climate change," Baum told Research Money. "We need to have defensible, accurate numbers."

The $1.59-million, three-year project, supported by the Natural Sciences and Engineering Research Council of Canada and Mitacs, includes researchers from Fisheries and Oceans Canada, Parks Canada, BC Parks, Oceans North, The Kelp Rescue Initiative, Nature Trust, and BC Parks. Academic partners include University of British Columbia, Dalhousie University, and Université Laval.

Baum's interdisciplinary team of climate scientists, marine ecologists, biogeochemists, economists, and policy experts will do a critical appraisal of the current and future carbon storage potential of all blue carbon ecosystems on Canada's Pacific, Atlantic, and Arctic coasts. They will also try to predict where these ecosystems might occur in the future on Canada's coastline, under different climate change scenarios.

When asked if her project's findings might be used to justify controversial marine geo-engineering — seeding the ocean with iron to feed photosynthetic organisms that can sequester carbon, for example — Baum deemed it unlikely.

"We're going to be more cautious and realistic than other sources," she replied. "So no, I don't think we'll be a source of people taking our research and doing geo-engineering."

The project's findings are more likely to inform restoration of lost coastal ecosystems, such as kelp forests, she added.

Counting on kelp

Assessing the potential for kelp forests to store carbon will be one of the project's more significant goals, said Hansi Singh, climate systems professor at the University of Victoria. She noted that tropical mangroves are fairly well-studied, and in some jurisdictions used to sell carbon credits, but Canada's extensive kelp forests are less understood.

The irony is that in addition to its potential for carbon sequestration, kelp is particularly vulnerable to warming waters and recent marine heat waves have taken out some of British Columbia's kelp forests. At the same time, Arctic waters are warming up to the point they can now support kelp.

"If we find blue carbon environments are prevalent in the Arctic, it might have the potential to reshape geopolitically how we think about that region," explained Singh. "Somebody might say we need to drill here and by drilling you're destroying marine habitat that you know is a carbon sink — it will have some reputational implications."

At the same time, a little-known fact about kelp could muddy the waters.

"Kelp is quite interesting because it releases halocarbons — these are compounds that destroy the ozone layer and are super-effective greenhouse gases," she says. "So we'll also be considering the effects of those emissions on the climate."

An overdue assessment

Susanna Fuller, VP operations and projects for Oceans North, pointed out that ecosystems identified as carbon sinks are also likely to be biodiversity hotspots. Kelp forests, for example, act as nurseries for juvenile fish, and offer shelter from predators. Protecting those areas could serve double duty, argued Fuller, whose role with the project includes understanding policy implications.

It will also be important to share the project's findings with Indigenous communities, provinces and territories, which have jurisdiction over some coastal ecosystems, she said. For instance, Nova Scotia and New Brunswick have the power to grant leases to nutraceutical companies for rockweed harvesting.

Fuller insisted that it is way past time for us to understand the carbon sink potential of this marine ecosystem and others like it. At the same time, she worries about the potential for focussing on carbon sequestration at the expense of making the hard decisions necessary around cutting greenhouse gases.

“If we’re going to deal with climate change, the biggest thing we have to do is reduce emissions rapidly,” she concluded. “For a country with the longest coastline in the world, the fact that in 2022 we’re trying to get a handle on our blue carbon ecosystem, it’s like we’re late to the party.”

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