

KELP

Kelp forests are increasingly recognized as blue carbon ecosystems. In Canada, kelp forests may provide substantial carbon uptake because of their extensive distribution along all three coasts. Kelp forests are highly productive habitats that absorb carbon dioxide at per area rates similar to rainforests. They are also sites of high biodiversity, can improve coastal water quality by absorbing excess nutrients, such as nitrogen, from the water, and support the livelihoods and cultural identities of many coastal people.

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To address kelp declines, innovative restoration efforts in Canada are ongoing and increasing on all three coasts.

KNOWLEDGE GAPS

Unlike salt marshes and seagrasses, kelp forests have not been formally recognized as blue carbon ecosystems, in part because the carbon sequestered is not stored directly in sediments. Instead, it is exported as detritus and transported throughout the broader marine ecosystem. Transported by ocean currents, detritus can become buried in long-term carbon sinks in the sediments of continental shelves or the deep ocean. For most of Canada's coastal zone, there is little regional information on kelp forest carbon dynamics such as carbon cycling and the rate of transport of kelp to deep ocean sinks.

THREATS AND MANAGEMENT

Reported trends show that kelp is declining along some areas of Canada's Pacific and Atlantic coasts due to anthropogenic impacts, which is in contrast to predictions of possible climate-induced expansion of kelp in the Arctic. It is important to note, however, that many coastal regions are not adequately monitored. Climate change writ large, however, is a pervasive threat, as kelp forests are particularly vulnerable to temperature anomalies such as marine heatwaves. These ecosystems also face threats like overgrazing by sea urchins, invasive invertebrate species, pollution and coastal development, but innovative restoration efforts in Canada are ongoing and increasing on all three coasts, with many examples of success in British Columbia.

KELP AND NATURAL CLIMATE SOLUTIONS

Kelp blue carbon habitats have the potential to act as natural climate solutions (NCS) if actions are taken to increase carbon accumulation and transfer in these ecosystems (e.g., restoration or enhanced management) and/or prevent habitat declines (e.g., marine protected areas). However, like all ecosystems, their potential to contribute as NCS will depend on their persistence under intensifying climate change impacts. To be effective, conservation actions will need to be assessed through social and ecological lenses, taking into account cultural, environmental and economic considerations. Likewise, Indigenous participation and consent in the design and implementation of NCS is essential to their success.

RECOMMENDATIONS

- ✓ Increase research of the spatial extent of kelp and its associated carbon dynamics at local scales to better inform modelling efforts, support broader recognition of kelp forests as a blue carbon ecosystem and understand their role as an NCS and how to integrate cultural, environmental and economic considerations.
- ✓ Improve the monitoring of kelp along Canada's coastline, especially the Arctic (which has the greatest area of kelp in all of Canada), to establish baseline information and understand trends and drivers.
- ✓ Support and build partnerships with Inuit communities and local Arctic communities in ways that advance their priorities and initiatives including restoration and conservation projects. Respectfully seek out Indigenous knowledge, perspectives and consent when developing NCS or conducting research on kelp.



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