Impact of climate change on Arctic macroalgal communities

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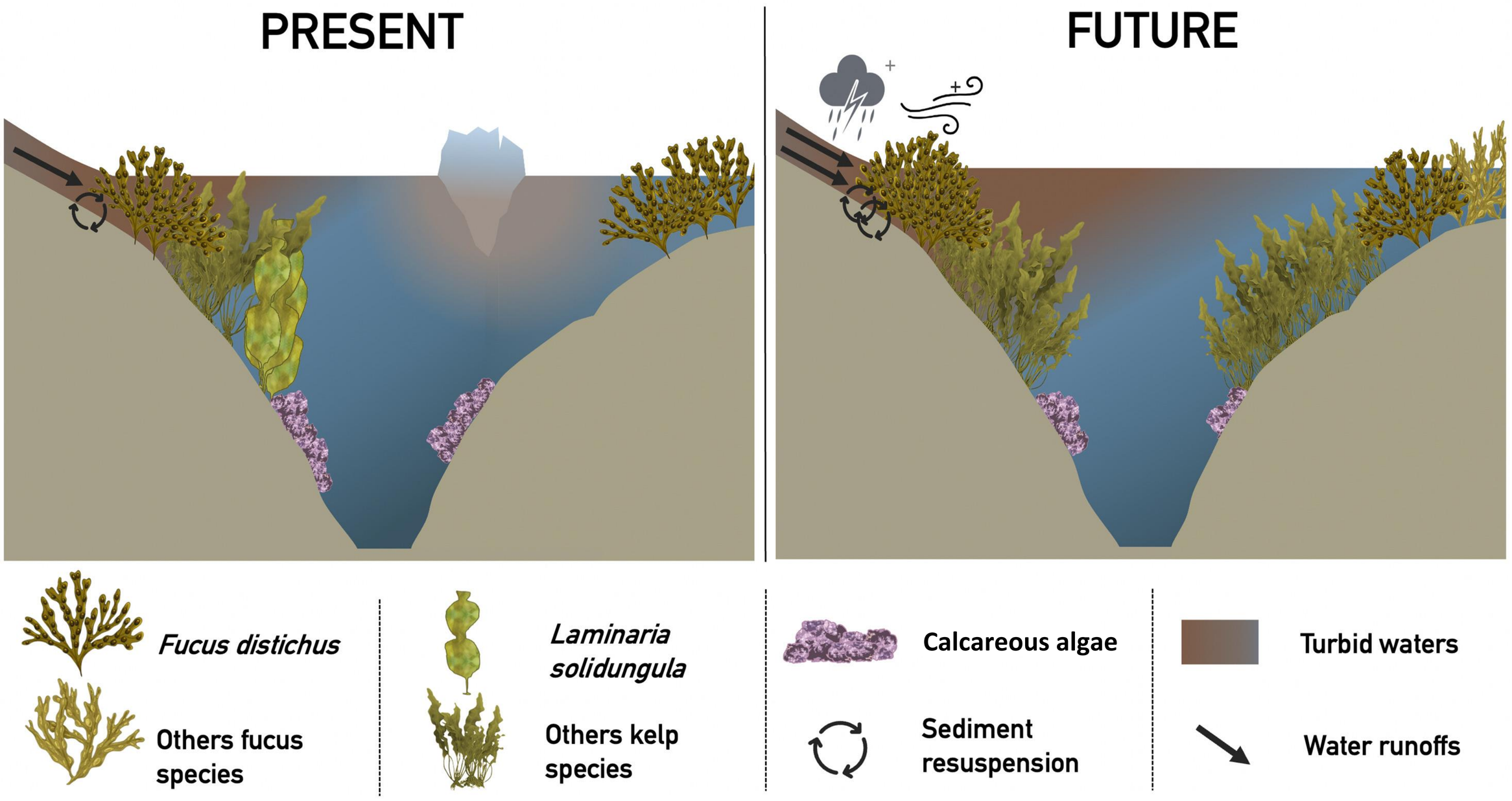
The Arctic is warming at twice the global average, causing changes in sea-ice, precipitation, and freshwater discharge. These changes affect benthic (i.e., seafloor) habitats and their communities, including important species like seaweeds, kelps, and calcareous algae. These macroalgal species are essential for the Arctic marine ecosystem, providing food, shelter, and nursery habitats for many species. However, the changes in the Arctic are already affecting the seasonality, diversity, food-web structure, and carbon cycle of benthic ecosystems. Here, we compile studies on the present and future response of Arctic macroalgal communities to climate change.

Arctic coastal macroalgae communities



In the future, increase in precipitation, wind-speed, river runoff and sediment resuspension are increasing the turbidity locally. The shorter ice season, a smaller ice-covered area and a reduction in ice thickness reduce ice-related pressures such as ice shading or ice scouring (abrasion and erosion of the seafloor by an advancing glacier or iceberg).

The surface cover of *Fucus distichus* doubled while higher ultraviolet radiation rates limit it to the lower intertidal zone giving ground to other *Fucus*-like species. Longer ice-free periods allow kelp range expansion except for *L. solidungula* which retreated with warming. Calcareous algae distribution will be constrained by the upper temperature limit in the South and by calcium carbonate saturation state in the North.

The Arctic ecosystem will undergo significant changes with both positive and negative impacts, but much is still unknown. It is crucial to improve understanding of key regions and provide scientific advice for ecosystem management. Global environmental change affects local communities and economies, as well as global markets through access to resources. Predicting the future Arctic ecosystem is a priority for adapting to changes in all sectors of society and the economy.

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FACE-IT has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869154.

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