Ocean Heat Waves Are Threatening Marine Life

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The March 4, 2015 NYT article the authors claim global warming, due to anthropogenic carbon emissions, is causing longer and more frequent ocean heat waves. They state ocean heat waves occur when water has higher than average temperatures for at least five consecutive days. Pierre-Louis and Popovich warn that these unusual warm periods diminish marine diversity by destabilizing ecosystems. A recent study provides evidence for this warning. Scientist concluded the temperature difference is destroying "the framework of many ocean ecosystems" by eliminating foundational species. These species "support the diversity of aquatic life," and without them whole ecosystems collapse.

While the authors effectively communicated that heat waves can last for weeks or months, killing off kelp forests and corals, and producing other significant impacts on marine ecosystems, fishing and aquaculture industries (Popovich & Pierre-Louis, 2019). The authors should have provided more examples and figures for their claims, explained the ecological importance of foundational species; given enough information on other threats to aquatic life associated with anthropogenic carbon emissions— e.g. ocean acidification, coral bleaching.

In 2011, a marine heatwave off Western Australia killed off a kelp forest and replaced it with turf seaweed (Serrano et al., 2018). The ecosystem shift remained even after water temperatures returned to normal which might indicate a permanent change. The heatwave also amounted to a widespread loss of seagrass meadows from the Shark Bay area, an increase in bacterial blooms, a decline in blue crabs, and scallops. It even affected the health of green turtles, and hindered the ability of long term carbon storage by these important habitats. Also, forest forming seaweed was eradicated from over one hundred km of coastline in just a few months (Serrano et al., 2018). Further north, unprecedented levels of coral bleaching and mortality were

recorded for a range of reef building coral species (Oliver, Hobday, Smale, Wernberg, & Holbrook, 2018). Rapid loss of underwater forests in response to recent oceanic warming has also been observed in other temperate regions of the world. An effect of this is tropical plant eating fishes are moving into temperate zones more often. This is detrimental to the ecosystem because they eradicate the plants that survived the heatwave.

Foundational species support the diversity of aquatic life by providing shelter from predators, moderating temperatures and acting as food sources. When they disappear, the entire ecosystem disappears along with them. A foundation species can occupy any trophic level in a food web. The term was coined by Paul K. Dayton in 1972, who applied it to certain members of marine invertebrate and algae communities. He discovered the importance of these species, stating that "it was clear from studies in several locations that there were a small handful of species whose activities had a disproportionate effect on the rest of the marine community and they were therefore key to the resilience of the community" (Dayton, 1972).

On a larger scale, the oceans are of great importance in regulating atmospheric temperature, and act as carbon sinks. Furthermore, anthropogenic carbon emissions act as blanket that covers the atmosphere which traps the heat and bounces radiation back to earth. Scientists noticed temperature of ocean water has been rising at the spots where heat waves occur (Oliver et al., 2018). The oceans act as a temperature buffers by absorbing the extra energy in the atmosphere. Unfortunately, despite the ocean's large specific heat capacity, the average baseline temperatures keep climbing. The oceans also sequester the extra carbon from the atmosphere. This process makes the oceans more acidic, which is another threat to the diversity of marine life. The authors remind us "it takes 52 days to get rid of one molecule of carbon emitted today" (Popovich & Pierre-Louis, 2019).

References

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