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**Ocean warming threatens kelp forests**

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Increasing sea temperatures in the northeast Atlantic Ocean have led to lower growth rates and decreased local biodiversity within coastal kelp forests, new research has revealed.

The research shows that the amount of carbon fixed by kelp forests and released as 'leaf litter' had been previously underestimated and, crucially, that kelp forests in cold waters typically store and release two to three times more carbon than those in warm waters. Kelp forests generally occur in cold, nutrient-rich water and are among the most productive ecosystems on Earth, absorbing vast amounts of carbon dioxide in order to grow. However, recent significant warming of some parts of the Atlantic mean that sea temperatures are no longer optimal for kelp growth.



## Kelp grows more slowly in warmer sea temperatures

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Dr Dan Smale of the [Marine Biological Association](#), who co-led the research, has been studying kelp forest ecosystems in the UK and elsewhere for a decade. He says: "Some kelp species can grow incredibly quickly, providing fuel for coastal food webs that in turn support a wide range of marine life, including fish, crabs, birds and mammals. We knew that kelp forests fix and release considerable amounts of carbon, but until now we didn't know exactly how much energy flows through these habitats and just how strongly ocean temperature affects this process"

The team used scientific diving to perform surveys and experiments at eight locations, spanning 900 kilometres of UK coastline, from northern Scotland to southwest England, to determine how ocean temperatures affect kelp forest growth rates.

The observations have important implications for the future of oceans and management of global warming.

"The study comes as the debate of how we manage coastal ecosystems to tackle climate change intensifies, and our results suggest kelp forests have a more important role to play than previously thought," Dr Smale said.

In a separate, related study, the team also showed that ocean warming has led to changes in habitat structure, as different kelp species respond to increased sea temperature in different ways. Changes in the density and identity of kelp species have caused changes in the number and diversity of plants and animals using the forests as habitat. The study highlights how climate change can indirectly impact upon marine biodiversity, by driving changes in the distribution and performance of key habitat-forming species.

"Kelp forests represent critical marine habitats, similar to coral reefs and seagrass meadows, but they are difficult to study and our understanding of how climate change and other pressures are altering these ecosystems remains fairly limited. What is clear, is that they provide habitat and nursery grounds for a wide range of marine life, including fisheries species, and they play a key role in carbon capture and release in coastal waters," Dr Smale concluded.