Researchers find seaweed helps trap carbon dioxide in sediment

June 3 2019

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Every beachgoer can spot seaweed in the ocean or piling up on the beach, but Florida State University researchers working with colleagues in the United Kingdom have found that these slimy macroalgae play an important role in permanently removing carbon dioxide from the atmosphere.

Their work is published in the journal *Ecological Monographs* by the Ecological Society of America.

The researchers, who partnered with ecologists from Plymouth Marine Laboratory in the United Kingdom, investigated how seaweed absorbed carbon and processed it, trapping it in the seafloor.

"Seaweeds have been ignored in the 'blue carbon' storage literature in favor of seagrasses and mangroves, which physically trap carbon from sediments and their own biomass in root structures," said Assistant Professor of Biological Science Sophie McCoy. "Macroalgae are also often overlooked by oceanographers who study the carbon cycle, as their high productivity occurs close to shore and has been thought to stay and cycle locally."

In designing the study, researchers suspected that the high productivity and huge amount of seasonal biomass of annual algae would provide carbon subsidies farther offshore than typically considered, and that these subsidies would be important to benthic food webs there.

That was exactly what they found. They also discovered that this was the process that leads to the burial of seaweed carbon in ocean sediments.

Blue carbon is the carbon captured in marine systems both through photosynthesis and then by trapping it in the seafloor. Researchers sequenced environmental DNA and modeled stable isotope data for over a year off the coast of Plymouth, England. Through this, they found that seaweed debris was an important part of the food web for marine organisms and that much of that debris was ultimately stored in sediments or entered the food web on the seafloor.

Jeroen Ingels, a researcher at the FSU Coastal and Marine Laboratory who conducted the meiofauna work for the study, said the research not

only explains seaweed's role in the food web, but it also shows that human activities that affect seaweed and the sea floor are important to monitor.

"The human activities that are impacting macroalgae and sediment habitats and their interstitial animals are undermining the potential for these systems to mitigate climate change by affecting their potential to take up and cycle carbon," he said. "The study really illustrates in a new way how seaweed and subsequently benthic animals can contribute in a significant way to blue carbon."

The team found that about 8.75 grams of macroalgae carbon are trapped per square meter of sediment each year.

Ana M. Queiros, a scientist at Plymouth Marine Laboratory and the paper's lead author, said these first measurements of seaweed carbon trapped in the sediment gives scientists more information to help them develop sustainable environmental practices.

"They tell us that the global extent of blue carbon-meaningful marine habitats could be much wider than we previously thought," she said. "Identifying these areas and promoting their management will let us capitalize on the full potential of the ocean's blue carbon towards the stabilization of the global climate system."

More information: Ana Moura Queirós et al, Connected macroalgal-sediment systems: blue carbon and food webs in the deep coastal ocean, *Ecological Monographs* (2019). DOI: 10.1002/ecm.1366

Provided by Florida State University