Human activity pulling the plug on a vital carbon sink

November 16 2011

(PhysOrg.com) -- Under better conditions coastal ecosystems might be the ace in the hole to mitigate climate change, but human activity is significantly weakening their ability to naturally dampen the impacts of rising CO2 levels according to a new study by Sydney environmental scientists.

In a report being published in Global Change Biology,a research team from the University of Technology, Sydney has recommended that a high priority be placed on protecting and conserving seagrass, salt marsh and mangrove ecosystems.

An analysis of Botany Bay sediments has revealed that since European settlement their composition has changed from largely "blue" carbon sources like seagrasses, mangroves and salt marshes to microalgal sources resulting in an estimated 100-fold loss to their carbon capturing ability.

Lead author of the report, UTS School of the Environment marine ecologist Dr Peter Macreadie, said the research clearly showed the impact was human induced and not part of a natural cycle.

"In other words, we have severely hampered the ability of nature to help reset the planet's thermostat."

"In our study we go back in time, more than 6000 years, to see what effect humans have had on the ability of coastal ecosystems to mitigate

climate change through the capture and storage of carbon. We wanted to know what the context was. Have these types of changes occurred in the past or is it unusual? Analysis of the layers of organic matter, or detritus, from two sites within Botany Bay shows that this is an unusual event."

Scientists believe that seagrasses, mangroves and saltmarshes – collectively known as macrophytes – are possibly the most intense carbon sinks on the planet due to their disproportionate ability to capture, and store carbon. However their estuarine habitats are under increasing and continual pressure from human settlement.

"It's something we've seen time and time again. Urbanisation around coastal ecosystems means more runoff and pollutants end up in estuarine habitats which leads to a process of eutrophication which promotes algal growth. Algae can thrive in degraded environments but are much less efficient at sequestering carbon than seagrasses," Dr Macreadie said.

Co-authors, Professor Peter Ralph from the UTS Plant Functional Biology and Climate Change Cluster and Professor of Earth Sciences Greg Skilbeck, said that the study emphasised the important role played by marine and estuarine sediments in sequestering carbon.

"Storage of carbon in sediments is essentially the reverse of fossil fuel use – putting the anthropogenically-used carbon back where it came from in the first place, or at least recognising it is there and not disturbing it," Professor Skilbeck said.

"This is further evidence that these habitats need to be protected from further degradation. We don't know what the risk is of the stored carbon, which has been in that state for possibly thousands of years, being released back into the atmosphere. Seagrass, mangrove and saltmarsh ecosystems should be included in carbon abatement schemes," Professor Ralph said.