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Blue Carbon: An Oceanic Opportunity to Fight Climate Change

Mangroves, salt marshes and sea grasses soak up to five times more carbon than tropical forests, making their conservation critical

By Robynne Boyd | Thursday, March 10, 2011 |

Mangroves are tangled orchards of spindly shrubs that thrive in the interface between land and sea. They bloom in muddy soil where the water is briny and shallow, and the air muggy. Salt marshes and sea grasses also flourish in these brackish hinterlands. Worldwide, these coastal habitats are recognized for their natural beauty and ability to filter pollution, house fish nurseries and buffer shorelines against storms.

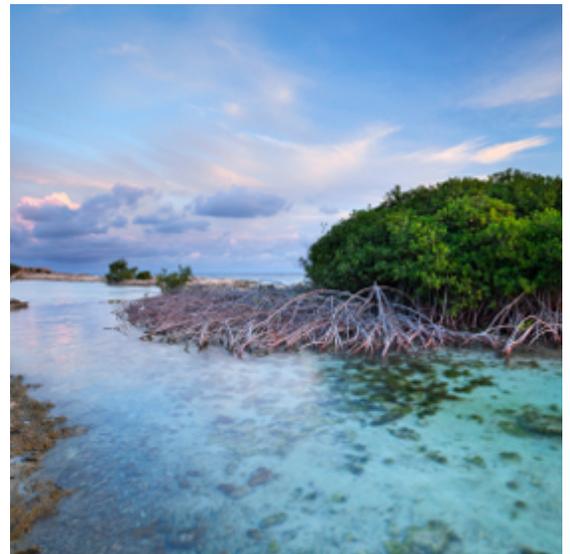
Less known is their ability to sequester vast amounts of carbon—up to five times that stored in tropical forests. Dubbed "blue carbon" because of their littoral environment, these previously undervalued coastal carbon sinks are beginning to gain attention from the climate and conservation communities.

Because they hold so much carbon, destroying them can release substantial amounts of CO₂. People around the world wreck coastal habitats through aquaculture, agriculture, timber extraction and real estate development. To date, human encroachment has destroyed more than 35 percent of mangroves, 30 percent of sea grass meadows and 20 percent of salt marshes.

Stopping such destruction could therefore become an important element in confronting climate change. "Blue carbon is a source of emissions that hasn't been addressed by the climate community and therefore creates an opportunity to reduce emissions," says Roger Ullman, executive director of the Linden Trust for Conservation in New York City, which promotes the use of conservation finance and environmental markets. "These fabulous ecosystems...don't cover a very large expanse of territory, yet still provide enormously important services to humanity and are being destroyed three or four times faster than the rate of tropical forests."

Emissions from wetlands destruction

Case in point is California's Sacramento–San Joaquin River Delta, explains Dan Laffoley, marine vice chairman of the World Commission on Protected Areas at the International Union for Conservation of Nature and Natural Resources. Over the last 100 years, 1,800 square kilometers of wetlands were drained, emitting two gigatons of CO₂ that had been accruing in the plants and soils for thousands of years. Between 10 million and 15 million tons of CO₂ continues to be released from the Sacramento Delta each year, an amount equivalent to around 3 percent of California's total greenhouse gas emissions.



MIGHTY MANGROVE: Mangroves, salt marshes and sea grasses soak up five times more carbon than tropical forests
Image: ©iStockphoto.com / Sara Winter

At the global scale, coastal wetland destruction could account for 1 to 3 percent of industrial emissions; a number that will increase along with coastal wetland destruction. "In 2011 we have a reason why mud is important," Laffoley says.

Even so, almost all coastal and marine system research and exploration is about a decade behind its terrestrial counterpart. People have focused on understanding the surrounding lands, rather than the unseen animals, plants and processes below the ocean's surface, explains Emily Pidgeon, director of the Marine Climate Change Program for Conservation International. The ocean is more dynamic and its systems generally more complicated to access and understand than land-based ecosystems, such as forests.

Take remote sensing, for example. Most approaches, including satellite-based systems, cannot see underwater. So whereas these methods very effectively provide data that enable scientists to estimate the amount of carbon in forests, they cannot get the equivalent information on the carbon load of sea grasses or other submerged marine ecosystems, especially in sediment where most of the CO₂ in blue carbon systems is stored. Instead, scientists are required to go to sites and dig up meters of the sediment to measure how much carbon it holds—a thankless task, to be sure.

"Mangroves are as unsexy as you get, since you ride a boat through them and get covered in mosquitoes," Pidgeon says.

Green cash for blue carbon

Getting local communities to save their mangroves will depend on economics. Land managers, farmers and other developers often opt to control these watery landscapes, thereby transforming them into income-generating acreage, such as a shrimp farm or rice paddy. The carbon markets, with their carbon credits selling between \$15 to \$20 per ton, could offer an alternative. The fees would encourage land conservation, which would prevent the release of carbon into the atmosphere, and the markets would reward them for mitigating climate change.

Whereas many of these programs are at least three to five years in the future, the preliminary economics looks like it could work, especially in certain cases to preserve these fragile ecosystems, such as avoiding the conversion of mangroves to shrimp farms in the Indo-Pacific region.

Still, the main hope for conserving these coastal habitats lies in a combination of economics and science. The first step is recognizing the importance of coastal carbon pools as a significant tool for climate mitigation, says Stephen Crooks, a wetlands expert who is climate change program manager of ESA PWA, a San Francisco–based environmental consulting and engineering firm.

Even without carbon markets nations have obligations to manage their greenhouse gas emissions, which means that the carbon in these coastal habitats can be tallied in national accounts as a way of contributing to their management of global greenhouse emissions. This would be especially helpful in the Coral Triangle (an oceanic area between Southeast Asia and northern Australia that encompasses Indonesia, the Philippines, Malaysia, East Timor, Papua New Guinea and the Solomon Islands) as well as Bangladesh, Indonesia and China, where coastal habitats are being destroyed at an alarming rate. Companies could also start volunteering to launch socially and environmentally friendly coastal habitat projects in the name of climate protection.

The final prong would be the creation of international carbon markets. As Crooks puts it: "One day the biggest bang for your buck may come from conservation."