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From: Mark Dwortzan | MIT Joint Program on the Science and Policy of Global Change
Published January 10, 2016 11:32 AM

Natural carbon sinks and their role in climate

Protected areas such as rainforests occupy more than one-tenth of the Earth's landscape, and provide invaluable ecosystem services, from erosion control to pollination to biodiversity preservation. They also draw heat-trapping carbon dioxide (CO₂) from the atmosphere and store it in plants and soil through photosynthesis, yielding a net cooling effect on the planet.

Determining the role protected areas play as carbon sinks — now and in decades to come — is a topic of intense interest to the climate-policy community as it seeks science-based strategies to mitigate climate change. Toward that end, a [study](#) in the journal *Ambio* estimates for the first time the amount of CO₂ sequestered by protected areas, both at present and throughout the 21st century as projected under various climate and land-use scenarios.

Based on their models and assuming a business-as-usual climate scenario, the researchers projected that the annual carbon sequestration rate in protected areas will decline by about 40 percent between now and 2100. Moreover, if about one-third of protected land is converted to other uses by that time, due to population and economic pressures, carbon sequestration in the remaining protected areas will become negligible.

"Our study highlights the importance of protected areas in slowing the rate of climate change by pulling carbon dioxide out of the atmosphere and sequestering it in plants and soils, especially in forested areas," said Jerry Melillo, the study's lead author. Melillo is a distinguished scientist at the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts, and former director of the MBL's Ecosystems Center. "Maintaining existing protected areas, enlarging them and adding new ones over this century are important ways we can manage the global landscape to help mitigate climate change."

Manu National Park, a large (15,328-square-kilometer) protected area in southeastern Peru, includes several ecological zones and spans an elevation range of 150-4,200 meters above sea level. Manu's vast tracks of Amazonian rainforest are part of the global tropical forest carbon sink that is slowing the rate of increase in atmospheric carbon dioxide, a primary driver of climate change.

Photo: Greg Asner/Carnegie Institution for Science

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